HYSICAL OBSERVATORY REPORTS

OF THE GEODETIC AND GEOPHYSICAL
RESEARCH INSTITUTE OF THE HUNGARIAN
ACADEMY OF SCIENCES

YEAR

1994–1998

NAGYCENK GEOPHYSICAL OBSERVATORY

SOPRON
2001

GEOPHYSICAL OBSERVATORY REPORTS

OF THE GEODETIC AND GEOPHYSICAL
RESEARCH INSTITUTE OF THE HUNGARIAN
ACADEMY OF SCIENCES

YEAR

1994–1998

NAGYCENK GEOPHYSICAL OBSERVATORY

IAGA CODE: NCK

Editor

V. Wesztergom

Technical editor

J. Szendrői

Contributors/Authors

J. Verő, V. Wesztergom
geomagnetism

P. Bencze, F. Märcz, G. Sátori
atmospheric electricity and ionosphere

SOPRON
2001

Exchange copies of this Report may be obtained

from:

GEODETIC AND GEOPHYSICAL RESEARCH INSTITUTE
OF THE HUNGARIAN ACADEMY OF SCIENCES

H–9401 Sopron, P.O.B. 5 (Hungary)

HU–ISBN 963 8381 132

Felelős kiadó: Dr. Závoti József

director

Sopron, Csatkai E. u. 6-8.

Tel.: 508–350

Hillebrand Nyomda Kft.

Sopron, Csengery u. 51.

Tel.: 333–800

Fax.: 330–900

Felelős vezető: Hillebrand Imre

Készült: 250 példányban

CONTENTS

Preface

The geophysical observatory of the Hungarian Academy of Sciences is pleased to present the 1994–1998 report in the Geophysical Observatory Report series.

Nagycenk Geophysical Observatory has been supplying data since 1957. The objective of the observatory is to record continuously the Earth's electromagnetic field of external origin. Geophysical Observatory Reports comprise earth current data from 1957 on, geomagnetic data from 1961 on, atmospheric electricity data from 1962 on and ionospheric data from 1967 on. The observatory became involved in the INTERMAGNET program in 1993. This led to stronger co-operation with other observatories, adoption of standard specification for measuring and recording equipments and production of geomagnetic data in close to real time. Data acquisition systems of earth current, atmospheric electricity and ionospheric observations were also modernized and three new computer-based measurements such as Schumann resonance, ionosonde and meteorology started during the above period. In consequence several modifications of the traditional observatory reports have been performed from the year 1994: In the present and next volumes data will be given in digital form (diskette is attached) and more space is devoted to the operational questions, latest developments, notes, comments, research and use of data On this occasion a short overview of the past 40 years is also given.

Further information and data including archived data are available by special arrangement at the institute:

Geodetic and Geophysical Research Institute
Earth Science Centre
Hungarian Academy of Sciences
H-9401 Sopron
P.O.Box 5
Phone: +36–99–508340
Fax: +36–99–508355
e-mail: wv@ggki.hu

Sopron, August 2001

V. Wesztergom

I. DESCRIPTION OF THE OBSERVATORY

V. WESZTERGOM

Nagycenk Geophysical Observatory was founded in 1956–1957 and it has been operated since then by the Geodetic and Geophysical Institute of the Earth Science Center, Hungarian Academy of Sciences.

The observatory is situated about 10 km to E of the city Sopron and 60 km SE of Vienna, on the southern shore of lake Fertő. The observatory lies on thick conductive sediment preserving the site from far industrial noise and it is surrounded by the Fertő-Hanság National Park which helps to shelter the long term measurements from any change caused by nearby manmade activity.

The co-ordinates of the observatory

3-character IAGA code: **NCK**

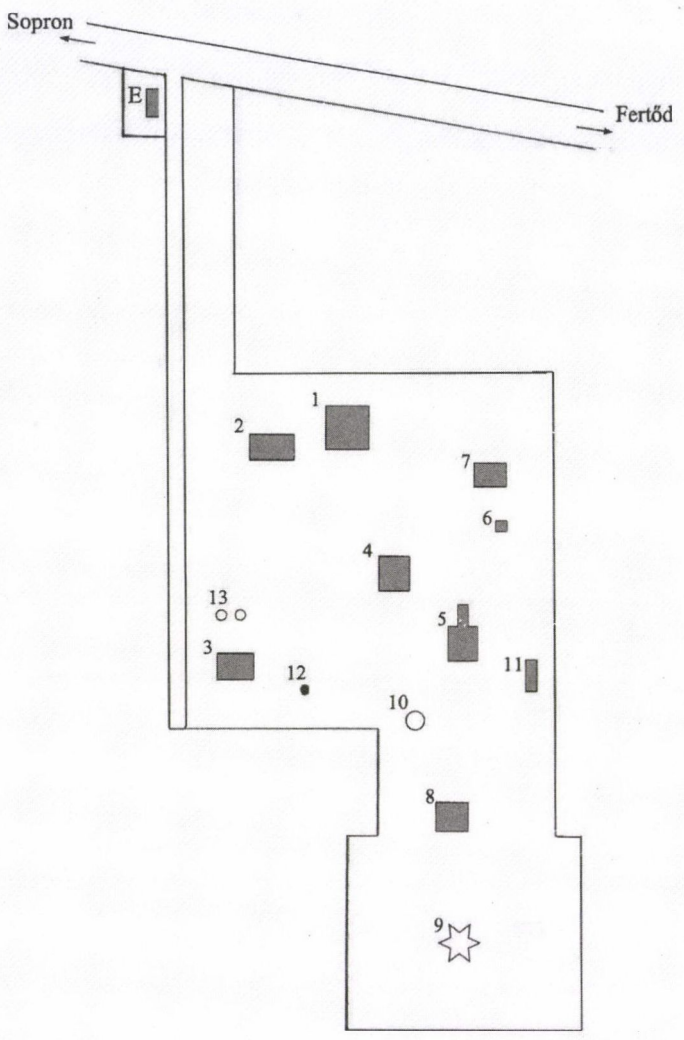
Geographic co-ordinates:

φ	=	47°38′ (N)
λ	=	16°43′ (E)
Altitude	=	153.70 m (magnetic house)
McIllwain L	=	1.9

Measurements and reports started in 1957 (International Geophysical Year) with earth current data. As it is customary the potential differences are measured in N-S and E-W directions with electrode spacings of 500 m. Low polarization lead plate electrodes are buried about 2 m below the surface. Potential differences are recorded with 1 sec and 10 sec sampling rate. Exceptionally long time series cover nearly four solar cycles.

Continuous observation of atmospheric electricity started in 1961. Slow variation (DC component of vertical atmospheric electric field) is measured between the ground and an electrode (at 1 m height) around which the potential is equalized by means of a radioactive collector. Potential gradient is recorded with 15 sec sampling rate. Point discharge is measured with stainless steel tip mounted on the roof of the atmospheric electricity building.

Table I. Observatory site diagram



E – Entrance, 1 – Main building with staff hostel and electronic laboratory, 2 – Telluric instruments and office, 3 – Atmospheric electricity centre (laboratory of Schumann resonance, potential gradient, point discharge and radiovawe absorption measurements), 4 – Magnetic absolute house with four pillars, 5 – Underground magnetic variometer chambers, 6 – Proton magnetometer (DI/DD) hut, 7 – Computer centre (data loggers, server of local network, satellite transmitter) 8 – Ionosonde station, electric and mechanical workshop, 9 – Ionosonde D-antenna, 10 – Meteorological station, 11 – ELF induction coil chamber, 12 Ball antenna (Schumann resonance antenna), 13 – Potential gradient sensors

Continuous observation of geomagnetic elements with control of the absolute observations began in 1961. The observatory has belonged to the INTERMAGNET co-operation since 1993. Data are transmitted via METEOSAT satellite to geomagnetic information nodes and made also available to the international research community on CD ROM.

Since 1967 ionospheric measurements have also been carried out. Lower ionosphere is studied using A3 (oblique incidence, LF radiowave absorption) method.

The early nineties are to be considered as a transition period in the observatory again. Schumann resonance measurements started in 1993, an ionosonde station type IPS 42 works since 1996 and a scientific meteorological station was installed in 1996. The meteorological station is based on a Campbell CR10X measurement and control modul, temperature, humidity, wind speed, wind direction, rainfall and radiation sensors.

II. HISTORY
THE BEGINNINGS AND THE IGY

P. BENCZE

The Geophysical Research Laboratory of the Hungarian Academy of Sciences, as one of the predecessors of the Geodetic and Geophysical Research Institute of the Hungarian Academy of Sciences was founded in 1955. It was also that time, when the preparations of the International Geophysical Year began in the framework of CSAGI (Comité Special de l'Annee Geophysique International). Thus, the Laboratory was also prompted by these arrangements to establish an observatory for the investigation of the geoelectromagnetic field. The choice fell on the electromagnetic field of the Earth, because at that time the Laboratory was mainly engaged in the establishment of the telluric method used in the geological prospecting for raw materials. As it is known, the telluric method of geophysical prospecting is based on the simultaneous recording of telluric, or earth currents in the field at two different places. The earth currents are recorded at a stationary basic station and at a moving station the situation of which is determined by the given project. Thus, the staff of the Laboratory had already enough experience in the measurement and temporal, as well as spatial variations of two of the six components of the geoelectromagnetic field.

Assignment of the place of the Observatory

In course of the establishment of an observatory, the first and at the same time the most important task is the assignment of the place of the observatory. From the point of view of a geoelectromagnetic observing site, the most important conditions to be fulfilled are the absence of artificial, antropogeneous electromagnetic noises disturbing the natural electromagnetic field. Such disturbing factors can be d.c. railway lines, vagabond currents originating from the 50 Hz electric network. It is to be noted that the intensity of vagabond currents are the larger, the smaller is the thickness of the sedimentary layers covering the bedrock. The currents are concentrated, namely, in the sedimentary layers their electric resistivity being by orders of magnitude less, than that of the bedrock. The increased current density in the sedimentary layers can be observed as the increase of the potential difference between two electrodes on the surface of the ground. Therefore, those places are

more suitable for the establishment of a geoelectromagnetic observing site, where the thickness of the sedimentary layers is large enough, i.e. the bedrock is located deep enough. Thus, the location of a geoelectromagnetic observatory depends not only on the electromagnetic conditions, but also on the geological structure of the lithosphere.

At the time of the establishment of the observatory, it was clear that the three magnetic components of the geoelectromagnetic field correspond to the three components of the variation field of the geomagnetic field. However, the situation was not at all as clear in the case of the three electric components, more exactly in case of the vertical electric component, as the situation with the magnetic components. It was assumed that the vertical electric component of the geoelectromagnetic field might be the atmospheric electric field, that is the vertical potential gradient. However, the atmospheric electric field can only be measured at places, where local disturbances as contamination of the air by antropogeneous sources (households, industry, traffic) do not affect the conductivity of the air. Thus, the latter circumstance was also important at the establishment of the observatory.

The assignment of the place of the observatory was also influenced by financial conditions, namely, to establish the observatory at low cost. At that time a border zone existed along the western border of the country, which one could enter only with special permission. In the surroundings of Sopron, there was a formerly well known hostel, which was abandoned because of the proximity of the border. The head of the Laboratory professor Károly Kántás wanted to establish the observatory in and around of this hostel. The control measurements were carried out recording the earth currents and the vertical component of the geomagnetic variation field by a horizontal loop, furthermore mapping the spatial variation of the magnetic field by two Schmidt type magnetometers to reveal a possible magnetic anomaly in the area. Though, it turned out that the thickness of the sedimentary layer is small, the favourable location of the place (far from inhabited area in a woodland, lack of antropogeneous electromagnetic disturbances, building available) induced professor Kántás to try to establish the observatory there. However, to do this, the permission of the ministry for home affairs was needed. The ministry rejected the request because the area was located in the border zone.

It was necessary to find another place in the surroundings of Sopron. Taking the map of this area, such places were selected, which were far from inhabited area and appeared to be undisturbed. For control measurements, places like meadows,

woodlands were selected. In this phase of the assignment only earth current measurements indicating the presence of vagabond currents were carried out at the places, which seemed to be suitable to establish a geoelectromagnetic observatory. For this purpose earth current measurements were carried out at least in four places in the surroundings of Sopron. Finally, the present place of the Geophysical Observatory Nagycenk was found suitable to establish a geoelectromagnetic observatory. Though, the area of the Observatory belongs to the territory of the village Fertőboz, it was thought that the centre of the estate of the family Széchenyi, that is the name Nagycenk is more known in the world, than the name of the small village Fertőboz.

The conditions, which made the place suitable for the establishment of an observatory for the study of the electromagnetic field of the Earth, were the followings. The area formed a part of a woodland called "Kiscenki fácános". The place was far from inhabited area, on the side of the terrace, a geological, sedimentary formation of Lake Fertő. The nearest settlement, the small village Fertőboz is located at a distance of about 1.6 km to the west. No disturbances were found in course of the control measurements. The road connecting the villages on the shore of Lake Fertő and by which the place can be approached, runs at the foot of the terrace. The railway between Sopron and Győr located at a distance of about 1 km to the south of the selected place, was not electrified at the time of the establishment of the observatory.

Furthermore, for the assurance of the disturbance free state of the observatory, the area around the observatory was declared natural conservation area. This means that no kind of activity may be performed without the permission of the Laboratory. Thus, the illegal activity endangering the function of the observatory could be avoided. However, our observatory could also not avoid the fate threatening the work of many observatories all over the world. The railway between Sopron and Győr was electrified and consequently the increased electromagnetic noise made impossible some of our measurements. The only consolation was the compensation for the limitation of the observation activity of the observatory, which was paid by the railway company to the Institute. The railway line crosses, namely the natural conservation area of the observatory and thus, the railway company violated the law referring to natural conservation areas. However, first it was necessary to prove the fact that the measurements in the observatory are really disturbed by the electrified railway line. As everything has its bright side, the Institute could buy new instruments from the sum of compensation.

The actual establishment of the observatory began just before the revolution of 1956. The conditions for the acquisition of money and the necessary materials changed, but it was necessary to continue the building of the observatory, if we wanted to reach the goal set by us. The director of the Geophysical Research Laboratory professor Kántás left the country in November 1956. Unfortunately, several members of the staff, almost half of the staff left the country, too. The remaining three scientists, Antal Ádám, Pál Bencze and Ákos Wallner had to distribute the work among them. Antal Ádám, who was charged by professor Kántás to be the deputy of him led the workshop of the Factory for Geophysical Instruments founded in Sopron for the production of earth current recording instruments. Ákos Wallner leaved for China to participate in the work of the Hungarian Geophysical Expedition. The author of this paper shouldered the establishment of the Observatory. As it turned out that professor Kántás do not intend to return to Hungary, professor Antal Tárczy Hornoch, the director of the Geodetical Research Laboratory took over the leadership of the Geophysical Research Laboratory.

Establishment of the Observatory

Returning to the establishment of the observatory, first the building plans of the house for the recording of the elements of the geomagnetic field (variation house) and the drawings of the bureau building were prepared. In case of the variation house, the architect wanted to design a building, which fits in with its surroundings, i.e. it looks like a wine cellar (Fig. 1). The surroundings of Sopron and especially

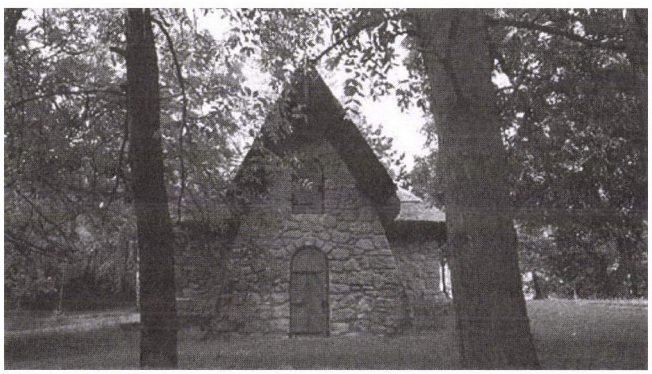


Fig. 1. The house for the recording of the components of the geomagnetic field variations (variation house)

the area around Lake Fertő is a historical winegrower region with many vineyards. The walls of the house were made of limestone from the quarry of Fertőrákos. This limestone is not hard, therefore it can be cut easy. The building had to fulfil also two technical requirements. It was necessary to build it without the use of iron and it had to assure good temperature isolation. This meant that all locks were made from brass, where nails were needed, e.g. for the finishing of windows and doors brass nails were used. The architect designed a roof made from reed, on the one hand for assuring good isolation, on the other hand because of the fitness of the building. The isolation of the building could be increased by the circumstance that the area of the observatory is a hillside. Thus, the variation house was built lowering the structure partly in the hillside. The reed roof was completed by using copper wire for the fastening the sheaves together. According to the technical plans, the variation house consists of two rooms. Entering the house, stairs (staircase) lead to the first room, which was necessary for the light trap, but it can also be used to the installation of other geomagnetic instruments. The solution of the photorecording in the second room necessitated the establishment of the light trap. The variation house was the first building built in the Observatory and it was almost finished in 1956.

The bureau building was planned to give place to a bureau room, to a room for the recording of the earth currents, to premises for the developing of recordings and charging of accumulators, to a separate room for the accumulators and a small flat for the keeper of the observatory. The keeper's duty was to look after the instruments, to exchange the films, photosensitive papers and develop them, call up the Laboratory, if he found some irregularity in the functioning of the equipments. The bureau building was built in 1957 (Fig. 2).

The establishment of the Observatory was continued with the building of the house for the magnetic absolute measurements (absolute house). This building was also erected by using limestone as building material, but this time the limestone was transported from Eplény. In this case the locks were also made from brass and where nails were needed, e.g. for the finishing of windows and doors brass nails were used. The absolute house got also a reed roof, for the fastening of the sheaves using copper wire. The building consists of two rooms, of an entrance-hall and a measuring room. The entrance hall was used for the preparation of the measurements. In the measuring room four concrete columns were built for the setting up of the instruments. The absolute house was finished in 1957 (Fig. 3).

Fig. 2. The building in which the earth currents are recorded (bureau building)

Fig. 3. The house for the measurement of the absolute values of the geomagnetic components (absolute house)

A building was allocated also for the placement of atmospheric electric instruments (atmospheric electric house). Originally the recording of all three characteristics of the global atmospheric electric circuit was planned. Thus, the building consists of six rooms. Four rooms open on a corridor, rooms devoted to the placement of the recording instruments of the sensors working in the open air, to the housing of the equipment for the recording of the atmospheric electric conductivity, to the placement of a pendulum clock and an accumulator charger. A small room

Fig. 4. The building erected for the placement of atmospheric electric measurements (atmospheric electric house)

at the end of the room for the atmospheric electric conductivity was planned for the housing of Gerdien condensers. The walls of this room were covered by wire screen for the elimination of electromagnetic noises. Similarly, a small room was formed at the end of the room for the placement of the pendulum clock and the accumulator charger, where accumulators could be kept. The atmospheric electric house was finished in 1957 (Fig. 4). The Observatory was officially opened the 14. 11. 1957.

Instrumentation

The task of the observatories is getting data extending at least to a period of tens of years. The collection of such long series of data can only be warranted, if the probability of the break down of the equipment is minimum. The probability of a break down of the equipment is the less, the simpler is the equipment used for this purpose in the observatory. This principle was also followed in course of the instrumentation.

Earth currents

After the buildings of the Observatory were finished, first the most important task was the installation of the existing instruments. The recording of the earth currents started already at the beginning of the IGY, the 1st July 1957. As the building devoted to the housing of the instruments was at this time not ready,

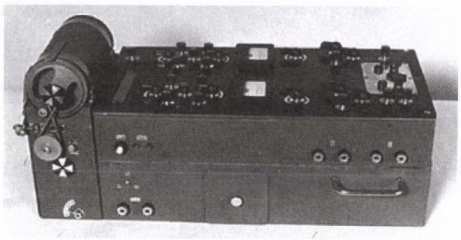


Fig. 5. The instrument by means of which the earth currents are recorded

the scientists József Verő, Cz. Judit Miletits, Lajos Holló carrying out these measurements and providing for the processing, as well as studying the data of these measurements were forced to place the recording instruments in a tent. Without electric network, the instruments could be operated only by means of accumulators. For the charging of the accumulators it was necessary to take them to Sopron. When the bureau building was finished, the recording instruments could be placed in the room devoted for them (Fig. 5).

For the establishment of the recording of the earth currents, electrodes placed at a distance of 500 m from one another were used, one pair of electrode in N-S direction, the other pair in W-E direction. The electrodes were made from lead sheets and were put in a depth of 2 m. The polarisation of the lead electrodes is very small, thus, the compensation of the potential difference between the electrodes must rarely be corrected. The electrode pairs were connected with the recording instruments placed in the bureau house by shielded cables to avoid the picking up of disturbing noises. The recording instruments provide for the compensation of the nearly constant potential difference between the electrodes so that only the variation of the potential difference due to the earth currents can be recorded by means of sensitive galvanometers. The signals of the galvanometers are recorded on photosensitive paper with two different recording speed (2.0 cm/hour and 7 mm/min). The other important part of the recording instruments is the circuit, by means of which the transitional resistance of the electrodes can be measured and then the corresponding resistance is inserted into the scaling circuit. The scaling is made namely by switching off the electrodes from the equipment and thus accurate scaling can only be carried out when the circuit includes also the transitional resistance of the electrodes. The devices can be scaled by a normal cell and the motor operating the convey of the photosensitive paper is supplied from the

electrical network. Thus, it was necessary to assure the recording also during that periods, when the electrical network breaks down. The problem is solved by a DC to AC converter, which is supplied from accumulators. In this way the continuous current supply is solved.

The precise time-signal is very important for every observatory. The time-signal was originally provided by a pendulum clock, which gave time-signals hourly, or each minute according to the requirement of the recording speed. Later, the time-signals were provided by a central time marking system, which is controlled by the time-signals of a time-signal transmitter. Hourly, each minute and even each second time-signals can be provided by this system for every building of the Observatory.

Geomagnetism

For the recording of the variations of the geomagnetic field, the generally observed declination (D) and the horizontal (H), as well as vertical (V) components of the geomagnetic field, the well known La-Cour type variometers were bought from Denmark (Fig. 6). Two systems of these variometers were obtained differing only in the sensitivity of the H variometer. The systems placed in the variation house on two tables made from artificial stone began to work in 1961. However, besides the running of the variometers, it was also necessary to carry out absolute measurements. The absolute values of the recorded field components were measured by an old magnetic theodolith obtained from the Geomagnetic Observatory

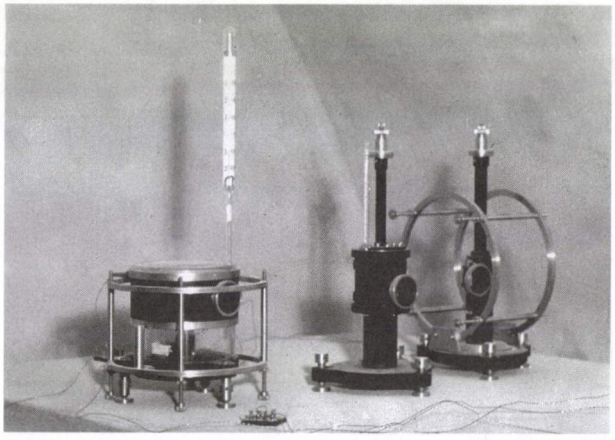


Fig. 6. The La-Cour type variometers, from left to right the Z, the H and the D variomters

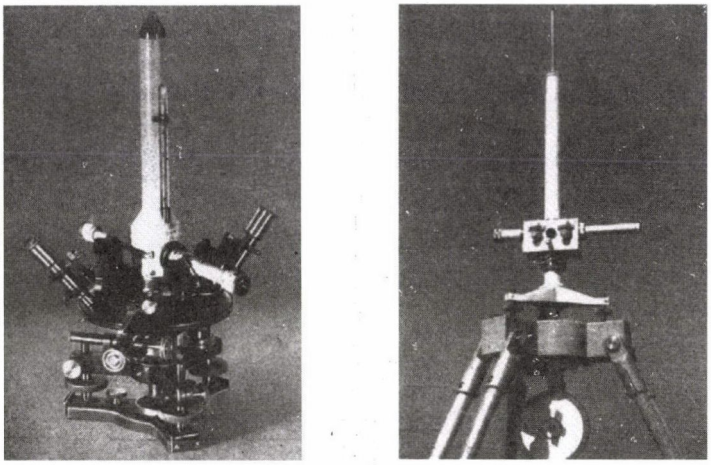


Fig. 7. The instruments for the measurement of the absolute values of the geomagnetic components

Tihany, two QHM and a BMZ instruments bought from Denmark (Fig. 7). The calibration of this devices was made in the Geomagnetic Observatory Tihany comparing our instruments with the instruments of that place. This was temporarily a sufficient solution, since the equipments of Tihany were earlier compared with the instruments of Niemegk (Potsdam). The measurements of the absolute value of the declination could only be determined by a magnetic theodolith, if the azimuth of a geographical direction was known. The azimuth of a geographical direction can be calculated, if the geographical co-ordinates of two points determining the direction are known. For this purpose, on the one hand the geographical co-ordinates of the Observatory had to be determined. On the other hand it was necessary to select a distant point (mira), which is far enough, it can be seen from the window of the absolute house with the magnetic theodolith and the geographical co-ordinates of which are available. In our case the tower of the church in Balf built at the hillside was used as a mira.

Atmospheric electricity

The measurement of the characteristics of the atmospheric electric circuit could be started only after the construction of the instruments needed for this purpose. From the atmospheric electric measurements operated in the Observatory the recording of the point discharge currents was the first because of its simplicity.

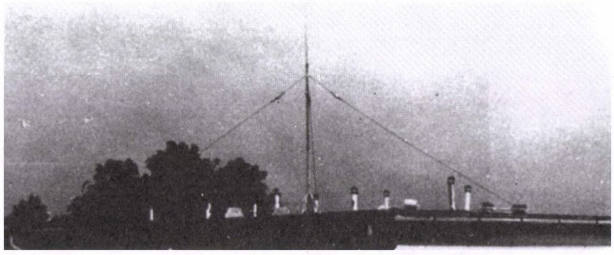


Fig. 8. The vertical mast enabling the observation of point discharge currents on the roof of the atmospheric electric house

For the observation of these currents, namely, an electrically insulated point made from stainless steel was put to the end of a vertical mast, which was placed on the roof of the atmospheric electric house (Fig. 8). It was fastened to the roof by means of three wire ropes to secure its position in case of strong wind. The insulated point establishes the conditions of point discharge, since the distance of equipotential surfaces decreases in the vicinity of curved surfaces (points, edges, peaks) depending on their radius of curvature. The smaller is the radius of curvature, the smaller the distance between the equipotential surfaces and thus the greater the field strength accelerating the ambient ions. At a certain field strength the ambient ions gain enough energy in the electric field between two collisions, that they can ionise the neutral molecules at the next collision. The field strength is above flat surfaces relatively small, when this process can already start in the vicinity of curved surfaces. From the arising ions those, which have a charge of sign opposite to that of the ground, flow through a cable — placed inside the mast and connected to a galvanometer — to the ground. The currents originating in this process are called point discharge currents. In our case these currents are recorded photographically by a high sensitivity galvanometer, the sensitivity of which can be changed by resistances connected in series and parallel with the galvanometer. For this purpose one of the recorder instruments was applied, which was originally used in the first earth current measurements in the field. The ions of sign corresponding to the sign of the charge of the ground remain in the vicinity of the point decreasing the field strength, till the wind does not transport them. Then the process starts again. In this manner, the point discharge is a successive process. The recording of point discharge currents began in 1961.

The first experiment for the recording of the atmospheric electric potential gra-

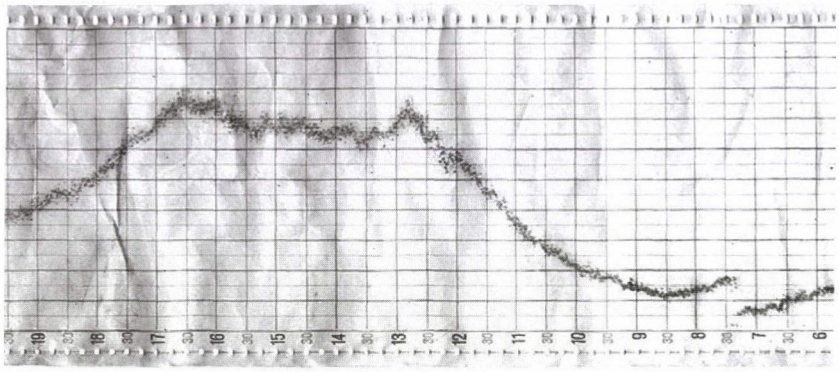


Fig. 9. The first record of the atmospheric electric potential gradient

dient by means of a simple device using a radioactive (polonium) collector and a point recorder was made in the garden of the family house of the author (Fig. 9). However, for the continuous recording of the potential gradient a radioactive collector is needed, which is prepared with an alpha radiating radioactive isotope having a long half-period. Such radioactive isotope is the radium, the half-period of which is 1680 years. Another important characteristic of the radioactive isotope used in the radioactive collector must be its activity. If the activity of the radioactive material is too high, then the collector becomes sensitive to the wind. However, if the activity is too low, then the transitional resistance of the collector is high and an appreciable part of the atmospheric electric potential difference between the collector and the ground gets to the transitional resistance reducing the measured value. Therefore, the radioactive collector could only be obtained from abroad. The large insulation resistance was secured by a double-walled cylindrical holder, the inside of which is connected with the outer space through diffusive channels formed by the lower side of the holder. The insulator separating the radioactive collector from the ground is placed in the inner part of the holder. This space is heated to assure the same high insulation resistance in any weather conditions. The radioactive collector, actually the radioactive preparation is put into a small cylindrical box, which is attached to the end of a rod. The rod is fixed to the top of the holder and they keep the radioactive preparation in a height of 1 m above the ground (Fig. 10). Beside the high insolation resistance, an instrument of high input resistance is needed because of the appreciable transitional resistance of the radioactive collector. The atmospheric electric potential difference between the potential in 1 m height and the ground is

Fig. 10. The radioactive collector of the equipment by means of which the atmospheric electric potential gradient is measured

namely divided between the transitional resistance of the radioactive collector and the input resistance of the instrument. The potential difference appearing at the input resistance of the instrument approximates the better the potential difference between 1 m height and the ground, the larger the input resistance. The problem was solved by using a hot-cathode tube applied in battery receivers. If the role of the anode and that of the grid is inverted, the input resistance increases and the dynamic range of the tube widens. The recording of the atmospheric electric potential gradient began in 1961. The processing of the atmospheric electric measurements was supervised by Ferenc Märcz.

Ionosphere

After the beginning of the recording of the quantities listed above, it turned out that the atmospheric electric field can not be considered as the vertical electric component of the electromagnetic field. However, the electromagnetic field of the Earth depends on the state of the ionosphere, first of all on the state of the lower ionosphere. The author of this paper participated in a summer school on the lower ionosphere in Kühlungsborn/Heiligendamm in 1964. Here methods for the investigation of the lower ionosphere were also reviewed and demonstrated in the

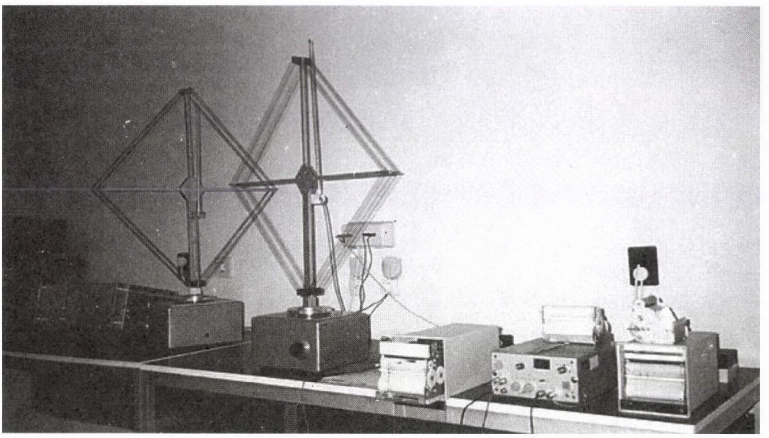


Fig. 11. The frame antenna used for the measurement of the ionospheric absorption of radio waves

Observatory Kühlungsborn. As a consequence of this meeting, the experimental measurements of the ionospheric absorption of radio waves of transmitters working in the long and middle wavelength bands were started in 1966. For the measurement of the ionospheric absorption the transmitters Ceskoslovensko (272 kHz) and Budapest (539 kHz) were selected, the sky waves of the carrier frequency of which were received by means of frame antennas and wide-band receivers (Fig. 11). The use of frame antennas is necessary for the separation of the sky wave from the surface wave. The received signal corresponds to the total field strength, if the plane of the frame antenna is parallel with the direction connecting the place of the transmitter with the receiving site. It is to be noted that the share of the sky wave in the total field strength is negligible small as compared to the surface wave in this position of the antenna. Moving the antenna from this position and approaching the position perpendicular to the direction mentioned above, the surface wave is gradually eliminated. In the position of the frame antenna perpendicular to the transmitter-receiver direction, it is only the sky (reflected) wave, with a component perpendicular to the plane of the antenna, which induces voltage in the coil of the antenna. The rectified signals of the output of the receivers were recorded by point-recorders. The recording speed is 6.0 cm/hour. However, wide-band receivers are not suitable for the accurate measurement of ionospheric absorption, because they do not have enough frequency stability in case of the reception of a single station's carrier frequency for longer time. Therefore, it is necessary to construct

a heterodyne receiver with a crystal controlled oscillator, the frequency of which mixed with the carrier frequency of the selected transmitter produces a medium frequency. Thus, the stability of the frequency of the oscillator and also that of the medium frequency is of the same order of magnitude as the frequency stability of the transmitter. The mistuning of the receiver can be avoided. The receiver is scaled by turning the frame antenna from its position perpendicular to the direction connecting the place of the transmitter with the receiving site gradually by 90° both to the left and to the right first in steps of 5° (to 30°) and then in steps of 10°. This method of the measurement of the ionospheric absorption is namely a relative method, the magnitude of the absorption is determined in units of the surface wave.

III. GEOMAGNETISM

EARTH CURRENT MEASUREMENTS

J. VERŐ

The first earth current measurements were carried out in the Geophysical Observatory Nagycenk in June 1957 with quick-run type instruments, and the regular recording started on August 2, 1957, i.e. forty-five years ago. The "normal" earth current recording (speed 25 mm/hour) was continuously running, quick run records (speed 20 mm/min) were made on regular and irregular world days. The former counted three in each month, the latter were announced daily in the news, often giving at that time topic to humorists. The two instruments which were used for recording were Type GMG T9 earth current recorders, constructed by A. Ádám and produced by the Sopron plant of the Geophysical Instruments Company, originally produced for export to China. These instruments have an essentially flat frequency response down to periods of 10 s, and the eigenfrequency is at about 2.5 s.

Following the start of recording, the problem arose: how to process the records. It is not to be forgotten that at that time nearly nothing was known as compared to present knowledge about geomagnetic activity, the notions substorm, Pc and Pi-pulsations etc. were not coined, no *in situ* measurement was made in the magnetosphere (also an unknown notion at that time), the first satellite, Sputnik I was started just in October 1957. If I remember well, we obtained Dungey's basic treatment on the propagation of hydromagnetic waves in the magnetosphere and resonance there already in 1957 or in 1958, and this was a basic source for planning the processing of the recorded data.

The processing of the normal geomagnetic records has everywhere consisted of the determination of hourly averages and of activity indices, e.g. K-values, from which planetary indices, Kp, have been deduced. Thus, a rather high number of observatories followed this procedure, including several ones in the immediate vicinity of Nagycenk, as e.g. in Tihany (Hungary), Wien-Kobenzl (Austria), Budkov (Czechoslovakia), Grocka (Yugoslavia) etc. The addition of Nagycenk to this lot would not mean a significant gain. Therefore it was decided to strive at some kind of "spectral" indices both from the normal and quick-run records. A detailed description of the early processing methods was given by Ádám and Verő (1958).

In the case of the normal records, the following data were entered into the daily list in each hour:

1. average amplitude in the period range 0 to 2 min
2. the same, 2 to 6 min
3. the same, 6 to 12 min
4. the same, 12 to 24 min
5. the same, 24 to 60 min
6. maximum potential between the electrodes
7. average potential between the electrodes
8. minimum potential between the electrodes
9. potential at the 00 min of the hour
10. sum of all variations (so-called total variation).

In this list, the "total" variation is clearly a heritage from the processing of earth current exploration. Maximum and minimum values were soon substituted by range. The potential at the full hour was dropped soon, too, as it had little sense.

From the remaining values daily and monthly averages were computed, too.

The range, called T(elluric) has had till present a linear scale, as in the case of earth current records, the long period variations are more and more damped with respect to geomagnetic ones, corresponding to the magnetotelluric equations. In addition, the width of the film on which records were made, corresponded to 16 x 1.8 mV/km. Thus 10 1.8 mV/km steps covered more than the half of the film, and the signal often left by such high activity the visible area. The amplitudes in the 5 period ranges were determined for a rather long time, and among others, they enabled the publication of the first English paper on some shifts in the periods during active times (Verő 1958). As this idea did not reappear later, it is worth mentioning here, that the essence was that activity in the period ranges 2 to 6 and 24 to 60 min preceded by about one day those of the ranges between them, thus the first two were considered as "primary", the latter ones as "secondary". The range

24 to 60 min covered clearly substorms, but the earlier appearance of the range 2 to 6 min has no explanation.

In addition to the hourly values, special events were also listed, according to present nomenclature, geomagnetic storms, substorms with and without Pi-s, Pi-s without apparent substorms, SI-s, very short impulses and a few others. The list of these special events included several parameters of the events, as ratio of the amplitudes in the two components, phase lag between them, direction and so on. Details of the early list of special events are found in Ádám and Verő's cited work (1958).

Concerning quick-run records, the basic time interval was originally 10 minutes, and in each interval, the number of cycles within certain amplitude limits. The four groups were characterised by the amplitudes 0.1; 0.5 (0 to 1); 1.5 (1 to 2) and 3 (more than 2) mV/km. The counting of the amplitudes proved to be too tedious, so it was omitted soon. In addition, the activity in five period ranges (0 to 8, 8 to 15, 15 to 30, 30 s to 1, 1 to 2 min was characterised by an index between 0 and 3.

The processing of the quick-run records was in this first form much less successful than that of the normal records, therefore it was soon substituted by an improved method. It is to be mentioned that quick-run records run only three to seven days a month, as mentioned, on world days. As the primary aim of the observatory was from the very beginning the study of geomagnetic pulsations, a continuous recording seemed to be inevitable.

Simultaneously with the start of the activity of the Nagycenk Observatory, the interest for geomagnetism in general and for geomagnetic pulsations in special significantly arose. The International Geophysical Year brought an immense amount of data from all regions of the Earth, including the polar regions, which led in some years to the development of the notion "substorm". In pulsations, Voelker discovered the latitude dependence of pulsation periods, Troitskaya the simultaneous appearance of certain pulsation trains, Kunetz carried out measurements at distant sites and found simultaneous events, Jacobs studied both theoretically and observationally the latitude dependence etc. IAGA accepted soon the classification of pulsations. After later modifications, these classification introduced the Pc (pulsation continues) and Pt (pulsation trains) names, the latter was later substituted by Pi (pulsation impulse). A strong influence was exerted by on the Nagycenk activity by Angenheister's ideas (1955). In a lecture given at the Geophysical Laboratory in the early sixties, he explained his idea on "spectral" and "energetic" indices of

pulsation activity. Spectral indices reflect somehow the spectrum, energetic ones the amplitude of the pulsations. He considered also the existence of a lowest level of the signals what meant that in spite of increasing scale value of the instruments, in certain intervals no signals can be found within given period limits.

The difficulties of producing pulsation spectra from the early analogue records is well illustrated by a paper by Cz. Miletits and Verő (1965), where the analysis is based on a few hundred data points taken continuously from the analogue records, then Fourier analysis was made using different lengths of the series to obtain "realistic" spectral peaks. The aim was to find harmonics in the spectrum. Nevertheless, due to the very tedious method, results proved to be unsatisfactory, partly due to the limited extent of the samples (around ten minutes), partly due to computational problems (without computers at that time).

On the basis of own experience and of the cited authors, the processing of the quick-run records was changed twice. The first change was due to the inadequacy of the original method, the second meant a simplification necessary due to the enormous quantity of the processing needed for the intermediate method. This was the more so as in 1965, the continuous recording of the pulsations with a speed of 6 mm/min started (the instrument used was similar to T9, called GMG 14A, they were of smaller dimensions, used 100 mm wide paper instead of the 160 mm wide recording paper used previously; only the recording speed was changed with respect of the instruments produced for exploration purposes). Nevertheless, during world days, this continuous quick-run recording was substituted by the 25 mm/min records. Thus, slightly different but comparable methods were necessary for the two kinds of records.

The intermediate processing method included a characterisation of the activity at a very high number of periods (up to 30 s, for each full s, then up to 60 s, for each 2 s, and so on). The basic interval was 15 min. Within this interval, a shorter section was chosen which seemed to be characteristic for the whole interval; this interval consisted of 5 to 10 individual cycles. (This is clearly the most subjective part of the processing). A "weight" was attributed to each interval, being $10 \cdot P_{\text{upper}}/P_{\text{lower}}$. This weight intended to characterise the shape of the spectrum: the more enhanced a peak is, the higher this weight. Moreover, the "regularity" of the pulsations was also noted on this basis, as "O" (oscillations, very regular sinusoids with periods differing less than 10 percent), "Q" (quasi-oscillations, period differences up to 50 percent, but still smooth sinusoids), "W" (waves, smooth without period limits),

"T" (irregular). This processing method meant the first approximation of the later idea of a "Pulsation Catalogue" which should include as many characteristics of the pulsations in each interval, as only possible.

The final processing method, used for the continuous quick-run records is rather similar to the intermediate method, as it is based on a "catalogue", too. Nevertheless, here the number of period ranges was reduced to 12:

P1	1	to	5 s	P7	30	to	40 s
P2	5	to	10 s	P8	40	to	60 s
P3	10	to	15 s	P9	60	to	90 s
P4	15	to	20 s	P10	90	to	120 s
P5	20	to	25 s	P11	2	to	5 min
P6	25	to	30 s	P12	5	to	10 min.

The number of possible weights was also significantly reduced, namely to 1 for irregular and 2 for regular pulsations. After 1971, the amplitudes in the ranges, where the presence was noted, were also kept. The rules were else not changed, that means that the subjective element, the choice of a characteristic section from which the values introduced into the catalogue were determined, remained the same.

This classification remained rather fine in the range of the most often occurring pulsation with periods around 25 s, at very short and very long periods, the limits are farther away from each other. Moreover, most O, Q and W type variation occurred in the central part, in the ranges P4 to P7, too. Values (presence and amplitudes) were noted in each 30 min interval, these values were averaged for 3-hour intervals and for the day, too. On the basis of the daily sums, daily indices were deduced for each period range. It is important to remark, that the daily indices were determined so, that the values 1 to 5 should have as uniform distribution as only possible. When the person making the processing changed (this happened several times during the years to follow), these limits had to be changed. Even if the person remained the same, the limits were changed after a few years to follow changes in the personal limits set by this person. Therefore index averages for different years must not be compared, however, activities in different ranges or on subsequent days/months can be very well compared. Such daily indices could be produced both from occurrence (spectral type) and amplitude (energetic) data.

It is to be remarked here, that due to the needs of the regional earth current measurements made in Hungary, so-called station ellipses were determined for the

same period ranges as used in the processing of the continuous quick-run records. These ellipses express the activity of the corresponding ranges (average amplitudes), as well as their direction characteristics (direction of the greatest activity). Early results of the statistics obtained from station ellipses and results of the processing of the 25 mm/min quick-run records were presented by Verő (1961), the intermediate method was described by Verő (1963).

Based on a significantly greater amount of data, Holló and Verő (1967) compared daily indices in the different period ranges with overall geomagnetic activity (at that time, no interplanetary data were yet available). It was found that the activity is connected with the activity in the range 5 to 10 s, as well as with the position of the maximum in the 20 to 30 s range, and these two factors express practically the complete information concerning overall geomagnetic activity of the pulsations.

The noise level in the Nagycenk Observatory was initially extremely low. Neglecting high frequency (several kHz) noise of unidentified origin, possibly connected with the then extremely strong border protection, the border of the communist world, noise sources were restricted. Sometimes the diving-pump of the nearby (about 1.5 km) cattle farm caused slight disturbances, but the responsible leaders of the farm learned soon that some noise appeared in the observatory, the insulation of the pump got faulty and a repair was imminent, thus having experienced the noise we told them, let's repair.

A peculiar source of noise is also worth mentioning. Originally the energy in the observatory was taken from alkaline accumulators. Later the electric network was built up, and current reached the observatory through a 2 km long sideline air cable from the next village Fertőboz. The cable crossed partly a forest with young oak trees. Slowly the trees got higher and reached the level of the cable, thus a cleaning of the cutting was necessary in every second year. Especially winter rime-frost caused serious troubles, as sometimes a continuous connection was established by ice between the branches of the trees and the cable. The only remedy was naturally to cut the branches of the trees in the vicinity, especially above the cable.

Another experience is even more closely connected to the electric network. Namely typical noise was found after some reparations in the buildings. This noise appeared as sudden "jumps" in the potential between the electrodes, and the shifted potential value remained for some time, several hours during which repeated smaller-bigger jumps were apparent, then the quiet conditions returned. This noise appeared mostly during the evening hours, from 6 to about 10 p.m. As a close

connection was found between the transmission time of the Hungarian TV (e.g. no noise was found on Mondays, being then without transmission, and on Sunday mornings the noise was present, together with transmission), this noise was called "TV-noise". However, the next TV-set in the house of the forester, lying rather close to the W-electrode proved to be not the source of this noise, as it appeared more characteristically in the N-S component. Finally the following explanation was found: the three-phase cable from the village was a symmetrically loaded there, and the zero lead had an AC voltage of about 5 V during the disturbance. This voltage was then "demodulated" by the soil with an efficiency of about 0.1 percent, resulting in a DC voltage of a few mV-s on the N-electrode, being nearest to the earth of the network connection. Having disconnected this earth from the network, the noise disappeared. Later we had again serious troubles with similar noise. At that time, no earth connection was approved in the observatory area, only life protecting relays were used. A rather lengthy measurement series has shown that the source of the noise was at that time in the astrogeodetic hut near to the geophysical part of the observatory. As it was found an electrician worked there who did not know about our prescriptions, and he connected the motor moving the top window of the hut with the earth. Again, after eliminating this connection, the noise ceased. This trouble shooting is described in the 1969 Observatory Report (Märcz and Verő 1969).

Noise, more correctly, disturbances could also be due to meteorological effects. Namely lightning strokes hit several times during thunderstorms the observatory. Perhaps the fracture indicating the Western boundary of Alpine rocks, some km to the West of the observatory causes the high lightning activity. Curiously enough, the very sensitive galvanometers used in the recording instruments were never damaged, either the motor for the film transmission or the cable heads, sometimes the network cables, including the watt-meter were hit. A most curious experience was that the potential between the electrodes changed due to the lightning stroke quite significantly, by some tens of mV/km, and the level remained for an extended interval of time, up to ten hours or one day, when it slowly returned to the previous level. The same experience was also made during the regional earth current measurements at several other localities, too. It is as if static charge would build up in the vicinity of the electrodes and this charge would remain for a rather long time. This is, however, impossible due to the conductivity of the soil. Thus the phenomenon remained unexplained.

Another meteorological effect is due to very strong precipitation or to very quick melting of snow. If the precipitation was more than 40 to 50 mm in two days, then flowing water reached the E-electrode, which is above a layer of impermeable rocks. As the surface of this layer is sinking toward North, toward Lake Fertő in a depth of about 2 m, i.e. in the depth of the electrodes, the water inundated the electrodes and in the flowing water the potential jumped. Such disturbances lasted several days, the change was quick, and the potential returned slowly to the pre-disturbance level. Once following very heavy snowfall in winter (snow height reached 2 m), the melting of the snow masses caused similar disturbances in early spring.

The "Observatoriumsbericht" 1968 included a short description of the observatory, the recordings made there, as well as the processing methods used. This description included information about the geological-tectonic setting of the observatory. As it is situated on the western boundary of the Little Hungarian Plain, geophysical exploration of this Plain covered several times the vicinity of the observatory. It is interesting to note that gravimetric data are very unclear in this description due to the fact that such data were at that time strictly confidential, thus numerical values could not be given. It is remarked that the gravity anomaly at the observatory corresponds to a final member of the series of negative anomalies starting from the Little Carpathians toward the foot of the Sopron Mts. The boundary of the crystalline rocks at the surface is a few km-s to the west from the observatory, at a fracture which is well indicated in the very strong canalisation of the earth currents as well as in the earliest magnetotelluric (MT) measurements. Seismic refraction measurements have shown that the site is on the southwards dipping northern slope of a deep being about 2000 m deep, while the Observatory is underlain by about 1700 m of sediments. The sediment complex is rather simple, it consists of sand and clay with a specific resistance of about 20 Ωm, interrupted between 5 and 20 m depth by a gravel layer of 90 Ωm, being the same which caused water to flow toward the lake after heavy rain. MT measurements confirmed the rather strong anisotropy (the ratio of the apparent resistivities ρ_y/ρ_x is about 1.5, the MT ellipse is quite exactly E-W oriented. The MT sounding indicated below the 1.5 Ωm layer (MT resistivities are generally less than those from geoelectric soundings) a 13 km thick layer with 60, below it the conducting astenosphere with a thickness of about 10 km, underlain by the high resistivity zone. The higher E-W resistivity adds to the predominance of the Ey-component in the pulsation range.

This description closed the first section of the activity of the observatory. As

mentioned earlier, in 1965 the continuous pulsation recording was started, geomagnetic data were afterwards used for the determination of activity indices and "special phenomena", the processing was simplified, values which proved to be superfluous were deleted from the reports, and also the language of the reports switched from German to English, indicating a slow change in the international connections. Nevertheless, it was not to easy to get such a change accepted in that time. In such problems, the reputation of Professor Tárczy-Hornoch as director was a serious help.

After 6 years of use of the new processing method of pulsation records a series on the method and its results was started (Holló et al. 1972, Holló and Verő 1972, Verő 1972, Tátrallyay and Verő 1973, Takács 1975, Cz Miletits et al. 1978). The first part of the series described all processing methods used in Nagycenk with details and examples for the processing are also given.

Part III of this series deals with the connection geomagnetic activity-pulsation activity, at the end, however, a short reference is made to connections with the parameters of the interplanetary medium. The study is based partly on daily indices in the 12 period ranges, partly on the values in the catalogue. Results are not discussed here, only the results in connection with the original aim of the papers, namely with the study of the applicability of the Nagycenk indices and other parameters are shortly surveyed. Concerning the daily indices, it was found that the geomagnetic activity of complete days can be estimated rather exactly based on the three (P3, P4, P6) daily indices, i.e. of the periods 15–20, 20–25 and 30–40 s while the inverse task, estimation of the pulsation activity from the geomagnetic activity is impossible. That means that in addition to geomagnetic activity, other factors have to play a significant role in the formation of the pulsation spectrum. The connections with Pi-type pulsations is less close. Concerning results obtained from the catalogue, the dependence of the actual activity on previous geomagnetic activity should be mentioned. Namely the activity on a certain day is the higher in the range 30 to 60 s, the higher the previous activity was. The situation is just the opposite in case of periods around 3 s and 2 min; here the activity is the lower, the higher the previous geomagnetic activity was. This situation was later studied in more details as non-Markovian character of the series of daily pulsation indices (Verő 1974). Daily pulsation indices were found to be clearly non-Markovian, especially in the range of the field line resonance, i.e. around 25 to 30 s, and in the range of Pi, 1 to 2 min.

In Part IV, comparisons are made between results obtained from 20 mm/min and 6 mm/min records, using the slightly different processing methods described previously. It is perhaps interesting to repeat the list of causes for differences in the two sets.

Random differences can be caused:

1. Subjective choice of the pulsation series the parameters of which are estimated
2. 20 mm/min records are made on world days which include about 10 percent of days, among them more disturbed days, thus in this sample disturbed days have too great weights

Systematic differences are caused:

3. Short periods (below 10 s) cannot be well distinguished on 6 mm/min records
4. The weights are obtained in different methods (see earlier)
5. The bandwidths for which occurrence/amplitudes are estimated, are not the same.

Concerning the last item, experiments are presented for the correction for bandwidth, however, these experiments were not fully successful. The most important point concerning the processing was that comparisons of the activities in certain period ranges are rather satisfactory, while absolute levels are much less reliable.

Part V dealt with comparisons between two mid-latitude stations (Nagycenk and Niemegk) and an auroral zone station (Sodankylä), where data of the stations were processed using similar methods. It was found that correlations e.g. between Nagycenk and Sodankylä activities are high in the period ranges below 20 s and above 1 min, indicating that in the field line resonance range correlations are poor, else reach values up to 0.5.

The final, VI. Part of the series summarised the experiences with the characterisation. The first part is concerned with the comparison of energetic (E) and spectral (S) indices, geomagnetic activity, and the difference of the energetic and spectral (E-S) indices. The E and S indices are rather highly correlated (correlation

coefficients 0.7 to 0.8), nevertheless the effect of the geomagnetic activity is rather different on the different period ranges. That is why geomagnetic activity can be estimated from pulsation indices.

The other question attacked in this summary is the correlation between pulsation activities at distant observatories (Nagycenk – Memambetsu, Nagycenk – College). It was found both in the case of great latitudinal and longitudinal differences that activities are highly correlated for short intervals (some minutes) and for complete days. Between the two extremes, the correlation is poor (e.g. for Sodankylä, it is about 0.15 for hours, 0.5 for 5 min intervals and 0.9 for days).

In addition to the (earth current) pulsation records, some other developments took also place in the field of geomagnetism in the observatory. In connection with pulsations, two perpendicular vertical coils were constructed on the wall of the absolute hut, and a corresponding horizontal coil was put in the shrubs behind the observatory area. In spite of rather high effective areas (many windings in the case of the vertical coils, large area for the horizontal coils), these brought about no significant gain. The signal coming from the horizontal coil (dZ/dt) was recorded for a rather long time together with the 20 mm/min earth current records. Game caused, however, often interruptions, as they crossed the cables, so this experiment was finally unsuccessful.

There were long-lasting experiments to record Pc1 (pearl-type) pulsations, too. The first idea was to record them on analogue tape, then following an earphone survey, records without Pc1 were deleted, Pc1-events recorded on analogue way. This system seemed to be effective, nevertheless, the continuous necessity of supervision and hearing of the records meant a severe burden on the few people working in the observatory or with observatory data. Therefore we switched over to continuous analogue recording on paper, then data obtained were processed similarly to pulsation records, substituting the shortest period range, 1 to 5 s by more reliable data. Namely below 10 s, the oil immersion galvanometers used for pulsation recording are severely damped, therefore only the strongest Pc1 events were seen in the records. The sensors of the recording were high permeability core coils with about one million windings. The instrument used and the processing was published in the 1976 Observatory Report (Ádám et al. 1976). In this connection it is interesting to note that in the first days of the continuous Pc1 recording disturbances were quite often seen on the records. It was observed that these disturbances occurred during strong wind. At first it was supposed that the wooden house is shaken by the wind. Thus

the sensors were put outside of the house, but the disturbance remained. In a next step sensors were dug into the soil near the house, the disturbance remained. By putting the sensors far away from the house, the disturbance ceased in some cases, while at other places it was present. At last it became clear that the shakes are transmitted by trees to the soil, therefore we looked for a treeless site, where the sensors were dug about 1 m deep into the soil into subsurface channels. With this system, wind caused no disturbance.

In the seventies, digital recording became more and more necessary. In the then political situation, taking the embargo for high-tech instruments into account, experiments were made to construct own digital instruments. This experiment failed, not due difficulties with the construction, but due to the lack of parts which could endure continuous, long-lasting functioning. That is why digital recording was introduced comparatively late in the Nagycenk Observatory.

As a result originating from the processing method presented in the series mentioned previously, some papers from the late seventies are to be mentioned here, which discussed the influence of interplanetary parameters on the pulsation activity. Such investigations became possible as soon as interplanetary data were available, as the continuous processing, catalogue and daily indices offered possibilities for comparison with any available data set.

The first paper (Verő 1975) used daily pulsation indices in the 12 ranges for the estimation of the solar wind velocity. The basis were products in which each factor expressed the probability of the occurrence of the given index in the given range for a certain solar wind velocity (simplified form of Bayes' law). The highest product of the probabilities was then used as most likely solar wind velocity. This method yielded solar wind velocity estimates superior to those estimated from Kp. It should be mentioned that here the indices were used separately, not in combinations. Using combinations, the estimates could be surely made even more accurate.

The second paper (Verő and Holló 1978) used catalogue (hourly) data to confirm the connection between interplanetary magnetic field and pulsation periods and amplitudes. Based on data of the year 1972, the reciprocal connection discovered earlier by Gringauz, Troitskaya and Gul'elmi between interplanetary magnetic field magnitude and pulsation periods was confirmed. In this respect the new factor was the very large amount of data used. The connection between pulsation amplitudes and cone angle was also confirmed, including Kovner's theoretically deduced optimum cone angle 30°, differing from that generally supposed (0°).

Finally the third paper (Verő 1980) presented a survey of pulsation amplitudes vs. Kp, solar wind velocity, interplanetary magnetic field. In this paper, the effects due to two sources of pulsations, upstream waves coming from the interplanetary medium and geomagnetic field line resonance in the magnetosphere, are evaluated, too. For the study of the field line resonance, which was an important part of the activity from the early seventies on, the processing presented here is not applicable, as in that case precise period values are needed, to be obtained by direct determination (be it by the measurement of periods on analogue records, as made initially, or from Fourier transformation, digital filtering and dynamic spectra, as made later.

In the eighties, several problems emerged in connection with the observatory. The first of them was connected with financial and personnel problems. The amount of data produced previously could not be followed, there were several reductions in the published data.

The second problem was rather inexplicable. In the Observatory Report 1985, a detailed description is given on an explicable change in the earth current activity. The events are listed as follows:

1980, December: the cables which were used from the beginning of the observatory get damaged. They had a lifetime of 25 years, nevertheless, forest machine transporting cut trees from the forest behind the observatory turned at an unfavourable place, made a deep hole in the soil reaching the cables, they were damaged, thus they had to be substituted by new ones.

1985, October: the component E_y starts to increase with respect of the component E_x. Simultaneously with the scatter, the dispersion of the transfer coefficients between the H and E-components increases significantly.

1986, March: Unambiguous detection of the change. Magnetotelluric digital measurements by the GKV (Geophysical Exploration Company) in the observatory.

1986, December: parallel recording with an independent system, other types of electrodes, special cables.

1987, January: conclusion drawn from previous experiments: there is an inexplicable change in the electric components with respect to the geomagnetic components.

As repeated tests and experiments could not find any cause for the change, all scale values, cable resistivities etc. were several types checked and found being correct, and MT measurements also did not offer an explanation, the change had to be accepted as an inexplicable one. The increase amounted to about 10 percent

in the (more influenced) component E_y. Not only the normal, but the pulsation records were influenced by this inexplicable change, the connection between average pulsation amplitudes and solar wind velocity confirmed this 10 percent change. The simultaneous increase of the scatter in the parameters of the $H \rightarrow E$ transfer function remained also unexplained.

This change in the transfer function was, however, soon put in shadow by a much more important problem. Namely the railway line Győr-Sopron-Ebenfurt being one of the few international companies existing during the communist era, wanted to electrify the line. Previously, the 16 2/3 Hz frequency from Austrian electrified railway lines was present in the observatory, disturbing e.g. the records of Schumann resonance. The nearest point to the observatory is about only 1.5 km away, thus it was expected that serious noise would result. The railway company was rather co-operative, thus a provisional line with a length of about 2 km was constructed in the part nearest to the observatory, and a locomotive supplied current into the rails along the line. Several temporary MT-instruments and the observatory recorded simultaneously. In spite of the fact that this experiment proved to give no noise, the concern about the future of the observatory remained. That fear was well founded, as with the start of the electrified fraction, the noise level significantly increased in the earth current records. Pc1 recording became simply impossible, and was stopped. Following several discussions with railway experts, an experiment was carried out during which the traffic of the railway line was controlled from the observatory. In addition, observatory records are compared to the current consumption from the Sopron power station.

The results of these experiments were the following: there were two distinguishable noise forms in the observatory. One of them was due to trains leaving or approaching a station. Detailed comparisons have shown that these impulses lasting a few fractions of one second (with maximum at about 5 Hz) were due to crossing of points. Perhaps the small jerk disrupted the power supply, more exactly, it was sustained by an electric arch, and this sudden change influenced the currents flowing in the soil. The other type of noise was simultaneous with high current consumption from the Sopron power station. In such cases heavy goods trains circulated between the fracture bordering the Alps, between the city Sopron and the observatory near the village Kópháza and the next power station in Dőr. In such events the 50 Hz current in the soil was so strong that the highly damped galvanometers etc. could detect it. As the section of the railway next to the observatory was built

keeping all possible restrictions to avoid currents in the soil, no remedy could be found. As compensation, the railway company paid a compensation from which a digital geomagnetic system, enabling connection to the Intermagnet network was purchased.

The loss due to the electrification of the railway was quite serious. Pcl recording had to be stopped, and earth current records had an increased noise level, making period determinations below 10 s very unsure. Most likely due to slow changes in the resistivity between rails and soil, the disturbance level increased slightly, but continuously in the following years, and this increase led to the stop of the processing of analogue pulsation records. Sometimes the noise level was high, especially during winter fog, when humid objects caused leakage currents flow into the soil. A few most curious events were explained accidentally. Namely sometimes, mainly during the night strong disturbances appeared without any evident cause. Sometimes the railway experienced simultaneous problems, too. In one such case a burnt owl was found near to the railway line. It was supposed that similar disturbances are also due to owls taking off from the cables, but no bird was found as cats ate them.

Not only the observatory, but also the observatory reports changed significantly. The state-owned Sopron printing office became a private office, too, in the transitional time emergency solution were necessary.

The events of the last years, the decrease of the personnel, problems with material necessary for recording (e.g. recording paper, spare galvanometers etc.) and the nearly exclusive use of digital methods led to severe changes in the observatory reports in general. Even their complete substitution by data carriers other than paper is imminent. Thus, it seemed to us necessary to summarise the past of the observatory reports, the data published there and the methods to obtain them, also explaining the ideas lying behind the different parameters published there. In the digital era, some kinds of disturbances cannot be detected any more, or the source of the detected noise can be discovered with more difficulties. Together with a strongly increasing noise level, all these factors justify a closing act in the series of Nagycenk observatory reports.

1957–1959	Observatoriumsberichte (in German) as reprints from Acta Technica Hungarica. Content: earth current data, processed with the initial method (activity indices, daily variation of amplitudes in several period ranges, special phenomena etc.), pulsations only from 20 mm/min records
1960–1966	separate booklets in German, printed at the Sopron printing office
1961	geomagnetic data started, processed similarly to earth current data
1962	reductions in the content. atmospheric electricity data started
1966	description of the observatory: geology, instrument, processing methods
1967–1985	separate booklets, now in English, printed at the Sopron printing office
1967	reductions in amount of data published, e.g. geomagnetic data about the period ranges less than 6 min are omitted, the list of special phenomena is common from geomagnetic and earth current records; ionospheric absorption data started
1969	technical paper on the elimination of a noise source
1971	daily pulsation indices in 12 period ranges included
1972	geomagnetic data reduced, no data on amplitudes in period ranges; ionospheric absorption data lacking due to the construction of a new equipment
1975	average pulsation amplitudes in 12 period ranges included; data of ionospheric absorption re-started
1976	Pc1 data included together with description of the instrument; ionospheric absorption data lacking due to maintenance of the transmitter
1978	ionospheric absorption data re-started
1980	special phenomena now include Pc1 events
1985	report on an unexplainable change in the earth current activity

1986–1987	home-made volume containing data of two years, earth current data for the frequency ranges 2 to 20 min dropped, activity indices common from earth current and geomagnetic records, pulsation amplitudes omitted, simplified form of the parameters of special phenomena; Pc1 recording stopped due to noise from electrified railway line near the observatory
1988–1989	again booklet with two years' data, printed at the printing office of the Sopron University (EFE)
1990–1993	booklets printed at the Hillebrand's printing office
1990–1991	re-arrangement of the data
1992–1993	daily averages of the geomagnetic elements included

References

Ádám A, Verő J 1958: Das Erdstrom-Observatorium bei Nagycenk. *Geof. Pura e Appl.*, 39, 126–151.

Ádám A, Verő J, Wallner Á 1966: Tellurische und Erdmagnetische Messungen im Observatorium bei Nagycenk. Observatoriumsberichte des Geophysikalischen Forschungslaboratoriums der UAdW vom Jahre 1966, 129–141.

Ádám A, Cz Miletits J, Horváth J, Verő J 1976: Pc1-type pulsations recording system – Data processing. Geophysical Observatory Reports of the Geodetic and Geophysical Research Institute of the Hung. Acad. Sci. 1976, 121–130.

Angenheister G 1955: Registrierungen erdmagnetischer Pulsationen, 1952–53. *Gerlands Beitr. Geoph.*, 64, 108.

Cz Miletits J, Verő J 1965: A földi elektromágneses tér pulzációinak kapcsolata a hosszabb periódusú variációkkal. *MTA Műsz. Tud. Oszt. Közl.*, 35, 107–117.

Cz Miletits J, Holló L, Tátrallyay M, Verő J 1978: Experimental results with the characterization of geomagnetic micropulsations. VI. Summary of results, recommendations. *Acta Geod. Geoph. Mont. Hung.*, 13, 231–238.

Holló L, Verő J 1967: Zur charakterisierung der Pulsationstätigkeit des Erdmagnetischen Feldes für Einzelne Tage und deren Anwendung. *Acta Geod. Geoph. Mont. Hung.* 2, 335–349.

Holló L, Verő J 1972: Experimental results with the characterization of geomagnetic micropulsations. II. Micropulsation index. Auto- and cross-correlation functions of micropulsations and geomagnetic activity. *Acta Geod. Geoph. Mont. Hung.*, 7, 167–175.

Märcz Gy, Verő J 1969: Prevention of electric disturbances in the observatory near Nagycenk. Geophysical Observatory Reports of the Geodetic and Geophysical Research Institute of the Hung. Acad. Sci. 1969, 143–146.

Takács L 1975: Experimental results with the characterization of geomagnetic micropulsations. V. Comparison of the geomagnetic pulsation activity at the observatories Nagycenk, Niemegk and Sodankylä. *Acta Geod. Geoph. Mont. Hung.*, 10, 307–320.

Tátrallyay M, Verő J 1973: Experimental results with the characterization of geomagnetic micropulsations. IV. Comparison of occurrence frequency and amplitude spectra from different type records. *Acta Geod. Geoph. Mont. Hung.*, 7, 217–224.

Verő J 1958: Über einige Ergebnisse des Erdstrom-Observatoriums bei Nagycenk in Ungarn. *Z. Geophys.*, 24, 307–317.

Verő J 1959: Earth-current variations of different period in the Observatorium Near Nagycenk. *J. Atmos. Terr. Phys.*, 13, 375–376.

Verő J 1961: Ein Versuch zur Trennung der Einzelnen Frequenzbänder der Erdstromvariationen. *Geof. Pura e Appl.*, 49, 83–118.

Verő J 1963: Die Abgenderte Methode zur Bearbeitung der Tellurischen Schnellregistrierungen, von 1960 an, im Observatorium bei Nagycenk. *Acta Techn. Hung.*, 43, 101–108.

Verő J 1965: Seasonal distribution of Geomagnetic Pulsations. *J. Geophys. Res.*, 70, 2254–2257.

Verő J 1972: Experimental results with the characterization of geomagnetic micropulsations. III. Effect of the geomagnetic activity on Pc 3–4 and Pi-2 type geomagnetic micropulsations. *Acta Geod. Geoph. Mont. Hung.*, 7, 177–190.

Verő J 1974: Pulsation activity as a non-Markovian process. *Acta Geod. Geoph. Mont. Hung.*, 9, 291–296.

Verő J 1975: Determination of the solar wind velocity from pulsation indices. *J. Atmos. Terr. Phys.*, 37, 561–564.

Verő J 1980: Geomagnetic pulsations and parameters of the interplanetary medium. *J. Atmos. Terr. Phys.*, 42, 371–380.

Verő J 1997: Solved and unsolved problems of pulsation research 40 years ago and today. *Publ. Univ. of Miskolc, Series A Mining*, 52, No.1, 65–79.

Verő J, Holló L 1978: Connections between interplanetary magnetic field and geomagnetic pulsations. *J. Atmos. Terr. Phys.*, 40, 857–865.

Verő J, Wallner Á, Wesztergom V 1985: An unexplained change in the geoelectric activity at the Observatory Nagycenk. Geophysical Observatory Reports of the Geodetic and Geophysical Research Institute of the Hung. Acad. Sci. 1985, 141–146.

ELECTRIC ACTIVITY INDICES

The 3-hour electric activity indices T for the E_x and E_y component, have a linear scale with a step of 1.8 mV/Km. The range of values is 0 to 9.

The index K_1 refers to complete days and expresses the activities in the period range 0–2 min (pulsations).

Limits between K1-values								
0–1	1–2	2–3	3–4	4–5	5–6	6–7	7–8	8–9
2	4	7	13	18	23	29	41	54

These values are given in units of 10^{-5} V/km.

Values in brackets mean extrapolated data, where the lacking intervals were substituted by the average of recorded intervals.

Times are given in CET (i.e. UT + 1 h), nearly corresponding to LT (–7 min)

A detailed description of the processing and compilation is found in the Report of the Observatory for 1966 in German and Ádám A, Verő J, Cz. Miletits J, Holló L, Wallner Á: The geophysical observatory near Nagycenk. I. Electromagnetic measurements and processing of data (*Acta Geod. Geoph. Mont. Hung.*, 16, 1981, 333).

See CD (program Seenck.exe, menu item Tellurics/Indices).

Date	T	Sum	K1	Date	T	Sum	K1
940101	32343423	24	5	940211	64645869	48	6
940102	12334343	23	6	940212	53446747	40	7
940103	21222442	19	4	940213	53344696	40	7
940104	01111011	6	4	940214	34446947	41	7
940105	00011011	4	5	940215	22355573	32	7
940106	22021313	14	4	940216	55333441	28	5
940107	00011112	6	4	940217	22222222	16	7
940108	01111101	6	3	940218	11111101	7	6
940109	00001010	2	2	940219	23356364	32	7
940110	00001000	1	3	940220	33231231	18	6
940111	00225796	31	5	940221	11399999	50	7
940112	55464973	43	8	940222	99664522	43	4
940113	.33246334	28	7	940223	23222142	18	5
940114	53435833	34	7	940224	11111100	6	4
940115	22222285	25	6	940225	12234121	16	3
940116	22233343	22	7	940226	12112100	8	6
940117	33111000	9	7	940227	00122200	7	4
940118	01100002	4	6	940228	10121011	7	4
940119	22444341	24	7	940301	31221111	12	5
940120	23232334	22	6	940302	32222118	21	4
940121	34223112	18	3	940303	43433012	20	3
940122	11123212	13	4	940304	10214000	8	4
940123	11111142	12	4	940305	10121116	13	6
940124	22334444	26	3	940306	31211123	14	5
940125	35343784	37	2	940307	53235799	43	5
940126	34444253	29	3	940308	55547475	42	6
940127	32212432	19	5	940309	45776789	53	5
940128	10111126	13	5	940310	34645599	45	6
940129	32111112	12	5	940311	53454376	37	5
940130	22111111	10	4	940312	43335273	30	6
940131	10011112	7	5	940313	43333213	22	7
940201	11111000	5	5	940314	33255547	34	6
940202	01223220	12	4	940315	44547874	43	7
940203	00122332	13	5	940316	23334553	28	7
940204	11111457	21	6	940317	43434454	31	5
940205	24123349	28	3	940318	35444311	25	7
940206	84255799	49	4	940319	51202121	14	6
940207	47567996	53	6	940320	22011243	15	5
940208	67675496	50	5	940321	23454545	32	7
940209	63646694	44	6	940322	34236314	26	7
940210	95765796	54	6	940323	33345422	26	7

Date	T	Sum	K1	Date	T	Sum	K1
940324	11133213	15	4	940504	34533545	32	6
940325	42122345	23	5	940505	24545854	37	7
940326	22122112	13	7	940506	44443336	31	7
940327	11122118	17	4	940507	84545455	40	6
940328	11234222	17	7	940508	44556676	43	5
940329	11221111	10	6	940509	34645563	36	5
940330	11223242	17	6	940510	45757455	42	5
940331	11121111	9	6	940511	55434275	35	5
940401	01122111	9	6	940512	44222212	19	7
940402	52235999	44	5	940513	21121112	11	6
940403	74878999	61	7	940514	12433234	22	6
940404	98855474	50	6	940515	33367594	40	7
940405	54336758	41	5	940516	64556734	40	7
940406	44555966	44	5	940517	45333221	23	7
940407	45555666	42	7	940518	52444323	27	7
940408	34556446	37	7	940519	33234201	18	5
940409	45667565	44	7	940520	13112101	10	5
940410	53437868	44	6	940521	01112110	7	3
940411	54455637	39	6	940522	01112113	10	3
940412	42336495	36	7	940523	02122212	12	3
940413	23334664	31	7	940524	34322223	21	4
940414	42435453	30	7	940525	52333125	24	6
940415	32222132	17	5	940526	31232212	16	6
940416	32222219	23	6	940527	21101230	10	5
940417	59995433	47	5	940528	10017999	36	4
940418	56544543	36	6	940529	57755744	44	7
940419	74332112	23	7	940530	44557489	46	7
940420	21232201	13	5	940531	44446545	36	7
940421	21112121	11	6	940601	44655423	33	7
940422	11111112	9	4	940602	44455534	34	7
940423	10133315	17	4	940603	33354374	32	7
940424	10111111	7	5	940604	35344324	28	7
940425	21211011	9	3	940605	33334345	28	6
940426	11112001	7	2	940606	32234422	22	6
940427	02211111	9	2	940607	23434224	24	6
940428	11000100	3	3	940608	33332221	19	6
940429	11110002	6	4	940609	22322210	14	5
940430	00100111	4	3	940610	11234624	23	5
940501	01123689	30	5	940611	23444122	22	7
940502	87573479	50	6	940612	33436543	31	6
940503	55656744	42	6	940613	34223342	23	6

Date	T	Sum	K1	Date	T	Sum	K1
940614	43434523	28	7	940725	22122312	15	5
940615	22212111	12	4	940726	01101010	4	2
940616	11211111	9	4	940727	27111222	18	5
940617	02121111	9	2	940728	23435225	26	7
940618	12111212	11	3	940729	23332322	20	7
940619	01134236	20	3	940730	32223114	18	6
940620	35324423	26	5	940731	12222216	18	6
940621	23234222	20	6	940801	23122212	15	7
940622	22212101	11	6	940802	21101111	8	3
940623	11111112	9	4	940803	11111012	8	4
940624	11101100	5	4	940804	11001101	5	2
940625	00111100	4	3	940805	12210111	9	3
940626	24333326	26	4	940806	01111112	8	4
940627	34533412	25	7	940807	00101110	4	2
940628	22222259	26	5	940808	10000011	3	3
940629	44443444	31	7	940809	01111131	9	2
940630	45423436	31	5	940810	13112232	15	2
940701	35534346	33	6	940811	22122222	15	4
940702	23433442	25	6	940812	63123244	25	5
940703	52323223	22	7	940813	34423742	29	6
940704	21223222	16	7	940814	33433141	22	6
940705	21210111	9	4	940815	52321213	19	6
940706	22212128	20	5	940816	21011122	10	6
940707	54555242	32	4	940817	31111211	11	5
940708	11111100	6	5	940818	11122211	11	6
940709	11111311	10	6	940819	11101111	7	4
940710	01211210	8	3	940820	11121112	10	6
940711	21001110	6	2	940821	22102310	11	3
940712	11000100	3	1	940822	11012213	11	4
940713	02111121	9	2	940823	11011111	7	4
940714	11134625	23	3	940824	01011233	11	4
940715	74323225	28	6	940825	12132220	13	4
940716	97444449	45	6	940826	10120012	7	3
940717	43353223	25	5	940827	31332232	19	6
940718	23313321	18	6	940828	12120111	9	7
940719	32222123	17	4	940829	11111103	9	5
940720	11111100	6	5	940830	00011121	6	3
940721	11222111	11	6	940831	10112111	8	4
940722	11112110	8	4	940901	22011121	10	4
940723	01111222	10	3	940902	11101010	5	3
940724	21232122	15	3	940903	11110111	7	3

Date	T	Sum	K1	Date	T	Sum	K1
940904	21111100	7	3	941015	13213111	13	7
940905	12122111	11	3	941016	11211101	8	6
940906	12132112	13	4	941017	11121011	8	5
940907	01334388	30	6	941018	21111112	10	4
940908	23433343	25	7	941019	11011233	12	3
940909	33346657	37	7	941020	42112223	17	4
940910	42434322	24	6	941021	11010000	3	4
940911	32122232	17	7	941022	00145242	18	4
940912	21222242	17	7	941023	72533983	40	2
940913	02221214	14	7	941024	32323744	28	4
940914	62112101	14	5	941025	12311010	9	4
940915	11111111	8	5	941026	11111022	9	4
940916	21232211	14	6	941027	00011011	4	2
940917	11111111	8	6	941028	10001001	3	3
940918	21222101	11	7	941029	52137931	31	4
940919	20100120	6	4	941030	24344899	43	6
940920	11111001	6	3	941031	42265553	32	5
940921	21112111	10	3	941101	22222263	21	5
940922	31110102	9	4	941102	32212524	21	4
940923	01000012	4	2	941103	11113521	15	5
940924	12021111	9	3	941104	24222373	25	5
940925	21101178	21	2	941105	53022327	24	4
940926	23233321	19	6	941106	44344691	35	3
940927	22121244	18	4	941107	11011040	8	3
940928	23122111	13	6	941108	00001000	1	4
940929	01111001	5	4	941109	20012355	18	4
940930	21011112	9	3	941110	25335242	26	7
941001	11111101	7	2	941111	22221112	13	6
941002	11111245	16	3	941112	11112011	8	6
941003	55477996	52	7	941113	11122221	12	7
941004	33234973	34	8	941114	11111123	11	5
941005	33265744	34	6	941115	21122222	14	6
941006	42444558	36	6	941116	12111010	7	5
941007	32332687	34	7	941117	02111022	9	4
941008	42233133	21	7	941118	00111111	6	4
941009	22221161	17	5	941119	14323242	21	4
941010	31112325	18	5	941120	22134312	18	4
941011	41123242	19	3	941121	11111011	7	3
941012	12111035	14	3	941122	10111214	11	4
941013	22132212	15	7	941123	01111003	7	4
941014	31212233	17	6	941124	11100220	7	2

Date	T	Sum	K1
941125	00001001	2	2
941126	00487741	31	3
941127	13445642	29	6
941128	22232340	18	6
941129	11112212	11	5
941130	22233222	18	3
941201	33232315	22	4
941202	22225268	29	4
941203	43233112	19	5
941204	21001121	8	3
941205	00011112	6	2
941206	22554545	32	6
941207	24432333	24	5
941208	42332222	20	6
941209	22122123	15	5
941210	31131121	13	6
941211	11111252	14	5
941212	32433355	28	6
941213	22223331	18	5
941214	11012113	10	5
941215	12113542	19	4
941216	43343412	24	6
941217	11111132	11	3
941218	10000121	5	3
941219	01111000	4	2
941220	21122322	15	5
941221	21121110	9	5
941222	01010000	2	3
941223	11111221	10	3
941224	33365468	38	6
941225	42223243	22	4
941226	22223333	20	5
941227	11111126	14	4
941228	11021112	9	4
941229	31112210	11	3
941230	11111111	8	4
941231	00000111	3	2

Date	T	Sum	K1	Date	T	Sum	K1
950101	00000021	3	1	950211	21333353	23	3
950102	01132264	19	4	950212	42232378	31	6
950103	93343834	37	6	950213	83334954	39	5
950104	33243222	21	6	950214	53235984	39	5
950105	32334455	29	6	950215	21132354	21	6
950106	11224337	23	7	950216	11211222	12	4
950107	11342212	16	7	950217	11221110	9	5
950108	21112220	11	7	950218	32111240	14	5
950109	10111112	8	6	950219	11111011	7	4
950110	00111113	8	5	950220	01121100	6	3
950111	21134221	16	4	950221	10011001	4	3
950112	21111112	10	3	950222	00000000	0	2
950113	11111101	7	4	950223	11111000	5	1
950114	10000101	3	3	950224	00000010	1	2
950115	10011001	4	3	950225	00000000	0	2
950116	12232239	24	3	950226	12152122	16	2
950117	12231239	23	4	950227	13123253	20	4
950118	96632112	30	3	950228	33332298	33	5
950119	20021010	6	3	950301	63343655	35	7
950120	00011124	9	5	950302	35444772	36	7
950121	11111113	10	4	950303	21121112	11	6
950122	11012211	9	3	950304	21135229	25	6
950123	22111111	10	5	950305	30121315	16	4
950124	11101000	4	3	950306	12101100	6	2
950125	00110000	2	3	950307	00110110	4	4
950126	00000100	1	2	950308	11111010	6	2
950127	10011000	3	3	950309	01212265	19	4
950128	01000011	3	2	950310	92323222	25	7
950129	24234469	34	4	950311	43533677	38	7
950130	65344788	45	7	950312	77543679	48	6
950131	53325397	37	5	950313	42266691	36	5
950201	23242323	21	7	950314	42525442	28	6
950202	13335743	29	6	950315	11122212	12	7
950203	33245886	39	6	950316	32122233	18	5
950204	52233452	26	6	950317	12211122	12	4
950205	11111110	7	4	950318	11111112	9	5
950206	32112111	12	6	950319	10110011	5	3
950207	41111005	13	4	950320	10011010	4	3
950208	43424111	20	3	950321	00000000	0	2
950209	11110000	4	2	950322	00100101	3	3
950210	00001101	3	4	950323	00063111	12	2

Date	T	Sum	K1	Date	T	Sum	K1
950324	21212122	13	2	950504	45354453	33	7
950325	10121111	8	4	950505	33346665	36	6
950326	11134735	25	3	950506	46273323	30	7
950327	31224232	19	4	950507	33245342	26	6
950328	22222431	18	5	950508	53224212	21	5
950329	23332112	17	5	950509	22222242	18	5
950330	21123111	12	4	950510	12111111	9	5
950331	11122132	13	4	950511	11121121	10	5
950401	10101163	13	2	950512	11114111	11	3
950402	46122100	16	2	950513	11126232	18	3
950403	10100000	2	2	950514	21211111	10	3
950404	10000000	1	0	950515	01111211	8	2
950405	21022132	13	2	950516	33498757	46	3
950406	20001012	6	3	950517	43324241	23	4
950407	16439995	46	5	950518	10212133	13	4
950408	94334834	38	5	950519	31212121	13	4
950409	32445422	26	6	950520	21221342	17	4
950410	21443323	22	6	950521	11111102	8	4
950411	23432273	26	6	950522	11112103	10	3
950412	32222322	18	5	950523	31132245	21	5
950413	02111111	8	4	950524	35744362	34	7
950414	21101110	7	5	950525	21322421	17	7
950415	00010110	3	3	950526	21114313	16	5
950416	00111001	4	2	950527	11112220	10	5
950417	31110110	8	4	950528	11112211	10	5
950418	32124132	18	3	950529	11113224	15	5
950419	01111012	7	4	950530	23457665	38	6
950420	11111210	8	4	950531	44434646	35	7
950421	00000010	1	1	950601	33335742	30	6
950422	10012232	11	2	950602	33325623	27	6
950423	12122322	15	5	950603	23453333	26	5
950424	73122151	22	6	950604	12122111	11	7
950425	43312121	17	7	950605	21111112	10	6
950426	12134245	22	6	950606	11122141	13	4
950427	44745332	32	7	950607	10011111	6	4
950428	11343122	17	5	950608	12100001	5	3
950429	21112222	13	5	950609	11011111	7	3
950430	10011002	5	4	950610	22121011	10	3
950501	10100101	4	2	950611	21101110	7	4
950502	14538596	41	7	950612	01110000	3	3
950503	66665634	42	7	950613	00000000	0	2

Date	T	Sum	K1	Date	T	Sum	K1
950614	00001121	5	2	950725	51110000	8	5
950615	21111110	8	3	950726	11111010	6	4
950616	22212231	15	3	950727	11210122	10	5
950617	11111112	9	3	950728	21111112	10	4
950618	11522211	15	3	950729	21010611	12	5
950619	23368632	33	4	950730	10011122	8	2
950620	22533522	24	7	950731	11000112	6	4
950621	22223211	15	6	950801	21111010	7	4
950622	22112211	12	5	950802	11111121	9	3
950623	12122210	11	5	950803	21312211	13	4
950624	12211111	10	5	950804	11110112	8	3
950625	01114333	16	4	950805	11123111	11	3
950626	33222123	18	7	950806	11101103	8	3
950627	11220011	8	5	950807	00023423	14	4
950628	11111223	12	3	950808	33422384	29	6
950629	11111211	9	3	950809	34435444	31	7
950630	21124557	27	5	950810	43331221	19	7
950701	52122122	17	3	950811	11121112	10	5
950702	10011111	6	2	950812	31122112	13	6
950703	32122114	16	4	950813	12112113	12	5
950704	32212311	15	3	950814	63232333	25	6
950705	11111101	7	3	950815	22312133	17	7
950706	11011011	6	3	950816	12211110	9	4
950707	02110100	5	3	950817	12123312	15	3
950708	01111110	6	3	950818	11111110	7	4
950709	00011311	7	2	950819	21121124	14	4
950710	01211111	8	3	950820	21112111	10	3
950711	00000001	1	2	950821	11010000	3	4
950712	10000110	3	1	950822	10006228	19	3
950713	22211110	10	3	950823	42221111	14	3
950714	10000122	6	3	950824	21001113	9	3
950715	31121111	11	4	950825	32232221	17	6
950716	11114755	25	4	950826	21111011	8	4
950717	63234522	27	6	950827	03122112	12	5
950718	42223121	17	5	950828	01112211	9	5
950719	11211113	11	4	950829	21112122	12	4
950720	22122211	13	5	950830	11121111	9	5
950721	01011110	5	4	950831	10010111	5	4
950722	01111111	7	3	950901	10011120	6	3
950723	22021121	11	3	950902	00001111	4	3
950724	16637233	31	4	950903	11000221	7	3

Date	T	Sum	K1	Date	T	Sum	K1
950904	10121111	8	3	951015	31121111	11	4
950905	21125598	33	4	951016	11011142	11	2
950906	64333313	26	7	951017	12221111	11	4
950907	22433446	28	7	951018	00117499	31	4
950908	33363642	30	5	951019	93331222	25	3
950909	32333312	20	7	951020	46643942	38	6
950910	11121134	14	5	951021	21114423	18	6
950911	55333423	28	7	951022	31123153	19	4
950912	11122274	20	6	951023	23121143	17	4
950913	33334321	22	7	951024	20132622	18	4
950914	21111124	13	5	951025	11110000	4	3
950915	23124931	25	4	951026	00111111	6	5
950916	22233112	16	7	951027	11111111	8	4
950917	21011220	9	5	951028	31010001	6	3
950918	00010012	4	4	951029	10011000	3	3
950919	10010122	7	3	951030	10113332	14	5
950920	01122222	12	4	951031	24221263	22	6
950921	22122112	13	4	951101	33435262	28	7
950922	11011111	7	4	951102	32336662	31	6
950923	32122141	16	5	951103	11121111	9	6
950924	21111111	9	4	951104	00022721	14	4
950925	01110100	4	3	951105	21124316	20	6
950926	01010111	5	3	951106	63324262	28	7
950927	11123899	34	4	951107	11122113	12	6
950928	22644101	20	3	951108	21111211	10	5
950929	10101101	5	2	951109	00111110	5	6
950930	00020002	4	3	951110	02111020	7	5
951001	10010014	7	3	951111	01011013	7	4
951002	11123324	17	4	951112	11111170	13	6
951003	44122962	30	7	951113	00001111	4	4
951004	64347995	47	6	951114	10110011	5	4
951005	42465225	30	7	951115	11111000	5	3
951006	22243293	27	6	951116	10011101	5	3
951007	73336432	31	6	951117	32121102	12	4
951008	42134786	35	6	951118	10010012	5	4
951009	12233834	26	5	951119	21100004	8	3
951010	22221101	11	5	951120	10110001	4	3
951011	02222322	15	6	951121	10010000	2	3
951012	23323122	18	5	951122	11011101	6	3
951013	22221132	15	7	951123	21000001	4	3
951014	11122221	12	7	951124	10000100	2	3

Date	T	Sum	K1
951125	00100001	2	4
951126	11100000	3	3
951127	00097343	26	3
951128	01121142	12	5
951129	32311421	17	4
951130	11112100	7	5
951201	01013446	19	3
951202	41112211	13	3
951203	10010124	9	3
951204	33321101	14	4
951205	10011103	7	5
951206	00111110	5	5
951207	10011100	4	6
951208	00100000	1	3
951209	12111101	8	4
951210	12111000	6	5
951211	11001101	5	3
951212	10000141	7	3
951213	10000000	1	3
951214	02011110	6	3
951215	10112352	15	4
951216	23522111	17	3
951217	01121151	12	4
951218	10010000	2	3
951219	20011120	7	3
951220	00013110	6	3
951221	00111222	9	3
951222	21111259	22	3
951223	21121020	9	4
951224	11578443	33	5
951225	11254432	22	6
951226	22332341	20	6
951227	21122122	13	6
951228	10111101	6	6
951229	01100102	5	4
951230	11011000	4	3
951231	20312220	12	4

Date	T	Sum	K1	Date	T	Sum	K1
960101	11011113	9	3	960211	56132232	24	6
960102	10011312	9	5	960212	22224233	20	5
960103	32123100	12	5	960213	21313134	18	5
960104	11123110	10	5	960214	33132221	17	5
960105	11123224	16	5	960215	12111145	16	5
960106	21111112	10	5	960216	12212313	15	4
960107	11111113	10	5	960217	31111112	11	4
960108	11010011	5	3	960218	32122322	17	6
960109	00001111	4	3	960219	51111032	14	5
960110	20001133	10	4	960220	11112222	12	5
960111	01001104	7	4	960221	21111100	7	4
960112	10011114	9	3	960222	12221121	12	4
960113	54432522	27	2	960223	11123431	16	5
960114	31135658	32	5	960224	45221262	24	4
960115	45223322	23	6	960225	11112736	22	5
960116	22112243	17	6	960226	53233214	23	6
960117	13111263	18	5	960227	21212234	17	6
960118	21321131	14	5	960228	31212112	13	5
960119	01112135	14	5	960229	11111126	14	3
960120	41344110	18	5	960301	01011141	9	4
960121	11131023	12	4	960302	10110002	5	5
960122	21101231	11	4	960303	11111121	9	3
960123	11121110	8	3	960304	01312231	13	4
960124	01011133	10	3	960305	11111012	8	4
960125	11111112	9	5	960306	00112300	7	3
960126	12012221	11	6	960307	00101000	2	2
960127	21112112	11	5	960308	11222100	9	1
960128	11211114	12	6	960309	11111121	9	3
960129	42443444	29	5	960310	10122262	16	5
960130	23213222	17	7	960311	54324225	27	6
960131	32223232	19	6	960312	42233345	26	7
960201	21111131	11	5	960313	42334342	25	6
960202	22122341	17	5	960314	21421111	13	6
960203	10211112	9	6	960315	21111120	9	3
960204	01111113	9	5	960316	02121111	9	3
960205	13111011	9	3	960317	13333312	19	6
960206	10111010	5	4	960318	21111221	11	4
960207	11111114	11	4	960319	12221154	18	5
960208	22111231	13	5	960320	42223285	28	7
960209	22111123	13	5	960321	62255729	38	7
960210	11111142	12	3	960322	22222372	22	6

Date	T	Sum	K1	Date	T	Sum	K1
960323	22111021	10	5	960503	11112212	11	3
960324	22232439	27	7	960504	31214223	18	4
960325	72224411	23	7	960505	20111200	7	4
960326	11111111	8	6	960506	21011011	7	3
960327	010 0001	2	2	960507	11012102	8	2
960328	01001112	6	4	960508	11111111	8	3
960329	11111122	10	5	960509	11111111	8	3
960330	11112212	11	5	960510	01111121	8	4
960331	11211112	10	3	960511	11112111	9	3
960401	22112112	12	3	960512	11101012	7	2
960402	01011112	7	4	960513	32224222	19	4
960403	21122312	14	4	960514	32121122	14	4
960404	21114411	15	4	960515	11122221	12	3
960405	21111202	10	5	960516	11211234	15	3
960406	10110000	3	3	960517	21121001	8	4
960407	00001000	1	2	960518	01000010	2	3
960408	00004112	8	2	960519	01121112	9	4
960409	13123232	17	5	960520	41112122	14	5
960410	11221111	10	6	960521	22111121	11	5
960411	21111211	10	5	960522	12122112	12	5
960412	72333344	29	5	960523	11101111	7	3
960413	21111114	12	5	960524	22311121	13	4
960414	31224227	23	6	960525	12111121	10	3
960415	93423221	26	6	960526	11121111	9	4
960416	41212211	14	5	960527	11111322	12	3
960417	44222636	29	6	960528	10101101	5	4
960418	63333528	33	7	960529	11144322	18	3
960419	42345763	34	7	960530	32211121	13	3
960420	32333122	19	7	960531	22223122	16	4
960421	32122124	17	4	960601	11101100	5	4
960422	12112111	10	5	960602	01201011	6	1
960423	33212112	15	6	960603	01101102	6	2
960424	11111131	10	4	960604	21100111	7	3
960425	11212020	9	4	960605	11100012	6	3
960426	20001110	5	3	960606	25422321	21	3
960427	11001213	9	4	960607	12111110	8	3
960428	21111010	7	5	960608	11111003	8	4
960429	10322111	11	3	960609	01100211	6	3
960430	12212110	10	4	960610	11111110	7	2
960501	12122122	13	4	960611	01111121	8	3
960502	01123111	10	3	960612	10111110	6	2

Date	T	Sum	K1	Date	T	Sum	K1
960613	01110001	4	2	960724	02201111	8	4
960614	11111001	6	3	960725	11121141	12	4
960615	01111112	6	2	960726	12111113	11	6
960616	11111110	7	4	960727	11111100	6	4
960617	11011211	8	3	960728	21102442	16	2
960618	11111132	11	3	960729	11110100	5	4
960619	68323222	28	5	960730	13210021	10	3
960620	11121101	8	5	960731	41233332	21	5
960621	20112101	8	3	960801	42222211	16	4
960622	10001110	4	3	960802	31221211	13	4
960623	11011110	6	3	960803	11022011	8	3
960624	12111131	11	4	960804	21121111	10	3
960625	01111112	8	4	960805	11101011	6	3
960626	11110121	8	2	960806	10011223	10	4
960627	11133121	13	3	960807	10110124	10	4
960628	21111110	8	4	960808	00001100	2	3
960629	22012314	15	2	960809	11113111	10	5
960630	11111011	7	2	960810	11100110	5	4
960701	11001132	9	3	960811	12100112	8	4
960702	22111111	10	4	960812	11100112	7	4
960703	43121111	14	5	960813	42121111	13	5
960704	22111111	10	6	960814	11123152	16	4
960705	13112211	12	4	960815	21321111	12	6
960706	01111111	7	5	960816	02123424	18	5
960707	21111210	9	5	960817	15222102	15	6
960708	12212312	14	4	960818	00112211	8	5
960709	21131000	8	5	960819	11111101	7	5
960710	11111000	5	4	960820	11235120	15	4
960711	11101101	6	3	960821	01121112	9	4
960712	11111123	11	4	960822	01001111	5	4
960713	21112121	11	4	960823	12432110	14	4
960714	11211112	10	3	960824	11111112	9	4
960715	21111462	18	2	960825	51211341	18	6
960716	11201110	7	2	960826	31121113	13	5
960717	21211101	9	2	960827	23231130	15	5
960718	11111221	10	5	960828	31112333	16	5
960719	11011002	6	3	960829	56335662	36	7
960720	22111211	11	4	960830	93433321	28	7
960721	01112322	12	5	960831	12222131	14	5
960722	11111231	11	5	960901	12111021	9	7
960723	21210110	8	4	960902	01111201	7	5

Date	T	Sum	K1	Date	T	Sum	K1
960903	00001001	2	4	961014	43132310	17	7
960904	11131215	15	4	961015	11111320	10	5
960905	21111101	8	4	961016	22133211	15	5
960906	21222101	11	6	961017	10131113	11	5
960907	112120	7	5	961018	37454234	32	7
960908			-	961019	43334927	35	7
960909	111114	9	3	961020	33421412	20	7
960910	58364252	35	5	961021	01121331	12	7
960911	13323215	20	5	961022	42335779	40	7
960912	63333827	35	6	961023	99743362	43	5
960913	61332334	25	7	961024	15111122	14	5
960914	32222211	15	5	961025	11111122	10	5
960915	11123426	20	6	961026	21010100	5	5
960916	14222513	20	6	961027	10022001	6	3
960917	11121131	11	7	961028	34345324	28	8
960918	42133233	21	4	961029	42234233	23	7
960919	10122564	21	7	961030	11122673	23	5
960920	63456433	34	7	961031	31111111	10	4
960921	83433465	36	7	961101	11111111	8	6
960922	32345911	28	7	961102	01011001	4	5
960923	23344993	37	7	961103	00100020	3	5
960924	31122232	16	6	961104	22133213	17	5
960925	11222222	14	4	961105	21111111	9	5
960926	36223398	36	5	961106	21121024	13	7
960927	63233113	22	5	961107	10110101	5	5
960928	11232260	17	4	961108	01111120	7	5
960929	21122110	10	5	961109	02212162	16	4
960930	11111121	9	5	961110	41211121	13	4
961001	01110012	6	5	961111	00110220	6	4
961002	11114312	14	4	961112	22112102	11	4
961003	22252355	26	5	961113	11112165	18	4
961004	11221211	11	6	961114	62122435	25	4
961005	10111121	8	5	961115	31233532	22	7
961006	11020000	4	3	961116	10210101	6	5
961007	00001113	6	4	961117	11111184	18	6
961008	11122252	16	5	961118	33222322	19	6
961009	14212354	22	6	961119	12111212	11	4
961010	23122312	16	7	961120	31111034	14	6
961011	11112221	11	6	961121	31110101	8	4
961012	21123311	14	6	961122	11001100	4	5
961013	34223124	21	6	961123	01001011	4	4

Date	T	Sum	K1
961124	01022115	12	3
961125	51121110	12	7
961126	11122111	10	6
961127	32531101	16	7
961128	22111220	11	5
961129	01111112	8	3
961130	10010001	3	5
961201	00001110	3	3
961202	10020182	14	3
961203	22012211	11	5
961204	12121032	12	6
961205	21011000	5	6
961206	00000001	1	5
961207	00111120	6	4
961208	00111011	5	4
961209	00001125	9	4
961210	73343253	30	6
961211	32355243	27	7
961212	11122321	13	5
961213	11111110	7	5
961214	00022121	8	4
961215	31122274	22	7
961216	31232222	17	6
961217	41231331	18	6
961218	11111211	9	4
961219	00000000	0	3
961220	20000100	3	3
961221	01121132	11	5
961222	11001124	10	3
961223	31111210	10	4
961224	11111220	9	3
961225	11111002	7	2
961226	10000110	3	2
961227	11010111	6	4
961228	11011100	5	3
961229	00000010	1	3
961230	32212102	13	3
961231	11110011	6	4

Date	T	Sum	K1	Date	T	Sum	K1
970101	11011101	6	4	970211	21323455	25	4
970102	10012101	6	4	970212	81111000	12	3
970103	10011111	6	5	970213	10011101	5	4
970104	10010001	3	3	970214	11111102	8	5
970105	11111201	8	6	970215	00012300	6	5
970106	00012100	4	4	970216	00012123	9	3
970107	13213231	16	5	970217	20122132	13	4
970108	12111112	10	4	970218	11111111	8	5
970109	31111111	10	5	970219	01111110	6	5
970110	36468463	40	2	970220	11112101	8	5
970111	69223121	26	5	970221	02221200	9	4
970112	11251123	16	6	970222	21011211	9	3
970113	11112210	9	7	970223	11232312	15	5
970114	11011121	8	4	970224	01132005	12	4
970115	00001110	3	2	970225	22111111	10	3
970116	00000001	1	2	970226	21224311	16	4
970117	00010011	3	2	970227	31113269	26	5
970118	12010000	4	4	970228	94524255	36	7
970119	10110221	8	3	970301	31134351	21	6
970120	00011112	6	5	970302	12112211	11	6
970121	21011321	11	4	970303	10221322	13	5
970122	11111111	8	6	970304	11111200	7	6
970123	21010001	5	3	970305	00112431	12	5
970124	01011113	8	6	970306	41111200	10	4
970125	21101003	8	5	970307	00123203	11	3
970126	11134385	26	6	970308	21101211	9	4
970127	52222456	28	6	970309	10000000	1	2
970128	44235566	35	7	970310	00010012	4	3
970129	21222224	17	7	970311	12001001	5	3
970130	22211362	19	6	970312	13333222	19	6
970131	22111213	13	7	970313	11110121	8	4
970201	20111210	8	7	970314	21111011	8	5
970202	11212343	17	6	970315	31211111	11	5
970203	41121113	14	4	970316	11111111	8	6
970204	10020011	5	3	970317	11211132	12	4
970205	00012220	7	4	970318	11111122	10	4
970206	12222102	12	4	970319	01011000	3	4
970207	11010012	6	4	970320	00110001	3	4
970208	31229953	34	5	970321	00121102	7	3
970209	21126497	32	5	970322	12132111	12	5
970210	33213234	21	3	970323	00111110	5	3

Date	T	Sum	K1	Date	T	Sum	K1
970324	01012114	10	4	970504	11101252	13	5
970325	21211234	16	4	970505	22111112	11	5
970326	22223354	23	4	970506	11111101	7	4
970327	51111121	13	7	970507	11200002	6	3
970328	10112749	25	4	970508	20001113	8	5
970329	22112258	23	5	970509	11110000	4	4
970330	21112121	11	5	970510	11111011	7	3
970331	10011122	8	4	970511	10111001	5	4
970401	25412201	17	5	970512	01000000	1	2
970402	12113121	12	6	970513	11110011	6	3
970403	22111021	10	5	970514	10011123	9	3
970404	45131122	19	6	970515	18598934	47	5
970405	31110123	12	4	970516	22212311	14	4
970406	50123311	16	5	970517	33122121	15	7
970407	31121132	14	5	970518	11211222	12	5
970408	10011011	5	3	970519	11111000	5	4
970409	10011111	6	3	970520	12311100	9	4
970410	20101246	16	4	970521	00011112	6	2
970411	45644759	44	4	970522	11111112	9	4
970412	31325210	17	5	970523	00110100	3	3
970413	12122221	13	5	970524	12122331	15	3
970414	11002000	4	3	970525	21100101	6	2
970415	10010000	2	4	970526	01023333	15	3
970416	00003466	19	4	970527	26311112	17	3
970417	73523224	8	7	970528	20112001	7	3
970418	22222321	16	5	970529	10000002	3	2
970419	21323112	15	6	970530	10102112	8	3
970420	00111012	6	6	970531	21112333	16	4
970421	00115643	20	5	970601	10111021	7	3
970422	53111021	14	4	970602	11001111	6	3
970423	10113241	13	6	970603	21311122	13	4
970424	73122143	23	6	970604	11011030	7	4
970425	14111112	12	5	970605	00100012	4	3
970426	21111011	8	5	970606	41132112	15	5
970427	00001122	6	4	970607	23112212	14	4
970428	10011100	4	3	970608	01213442	17	4
970429	10011121	7	5	970609	75365232	33	4
970430	22111132	13	5	970610	21110121	9	5
970501	31114647	27	6	970611	11111110	7	5
970502	72222323	23	6	970612	21111110	8	3
970503	32212432	19	7	970613	10101011	5	3

Date	T	Sum	K1	Date	T	Sum	K1
970614	10101000	3	4	970725	21111121	10	
970615	12111211	10	3	970726	10111111	7	
970616	01212211	10	4	970727	11111111	8	
970617	11100000	3	3	970728	11113211	11	
970618	01111100	5	2	970729	01211012	8	
970619	22211112	12	3	970730	12200013	9	
970620	20111211	9	3	970731	44222312	20	
970621	00000001	1	3	970801	11211111	9	
970622	05321322	18	3	970802	21100120	7	
970623	11112112	10	4	970803	11157645	30	
970624	01041111	9	3	970804	22321031	14	
970625	11222122	13	4	970805	10110011	5	
970626	21200012	8	3	970806	11000011	4	
970627	22155213	21	3	970807	11114313	15	
970628	22111110	9	4	970808	12111202	10	
970629	12111111	9	4	970809	00112223	11	
970630	11100011	5	3	970810	21111111	9	
970701	00000111	3		970811	12111110	8	
970702	11001111	6		970812	11111113	10	
970703	22022212	13		970813	32222214	18	
970704	21111211	10		970814	23332112	17	
970705	01112101	7		970815	11121111	9	
970706	01212011	8		970816	11121001	7	
970707	12 11335	16		970817	12112261	16	
970708	11111111	8		970818	11111121	9	
970709	12100445	17		970819	01110101	5	
970710	01112110	7		970820	11111011	7	
970711	11110111	7		970821	22111011	9	
970712	11000110	4		970822	21112211	11	
970713	11100000	3		970823	10000010	2	
970714	01000010	2		970824	11111113	10	
970715	12252321	18		970825	11010010	4	
970716	11101001	5		970826	00001010	2	
970717	01100013	6		970827	00011111	5	
970718	22212111	12		970828	12221223	15	
970719	12111211	10		970829	11122122	12	
970720	11121000	6		970830	11112423	15	
970721	01111111	7		970831	11112100	7	
970722	01112110	7		970901	11221111	10	
970723	01111012	7		970902	21102010	7	
970724	22222443	21		970903	32124449	29	

Date	T	Sum	K1	Date	T	Sum	K1
970904	85222111	22		971015	00021100	4	
970905	11112121	10		971016	11011012	7	
970906	01111424	14		971017	10032113	11	
970907	00001210	4		971018	20000100	3	
970908	00123614	17		971019	00011010	3	
970909	12221343	18		971020	11101020	6	
970910	51222265	25		971021	10010000	2	
970911	52112221	16		971022	01011002	5	
970912	33122215	19		971023	01022323	13	
970913	23100122	11		971024	11126322	18	
970914	33224321	20		971025	53223132	21	
970915	11011011	6		971026	41011445	20	
970916	00012127	13		971027	56541144	30	
970917	00012127	13		971028	51232473	27	
970918	35322212	20		971029	12111013	10	
970919	10010012	5		971030	10111111	7	
970920	11122001	8		971031	11111221	10	
970921	10121369	23		971101	02321131	13	
970922	94112000	17		971102	21000010	4	
970923	01111112	8		971103	00010132	7	
970924	21311011	10		971104	22211132	14	
970925	11311120	10		971105	01112210	8	
970926	00111112	7		971106	01119359	29	
970927	21121352	17		971107	67942633	40	
970928	42221211	15		971108	11110220	8	
970929	21121102	10		971109	11121044	14	
970930	11312121	12		971110	41210113	13	
971001	73346992	43		971111	23223202	16	
971002	12002100	6		971112	10011220	7	
971003	31244320	19		971113	11100000	3	
971004	10012001	5		971114	10100002	4	
971005	10001011	4		971115	32389786	46	
971006	00021022	7		971116	99411211	28	
971007	1 112245	16		971117	13121100	9	
971008	10133215	16		971118	20110100	5	
971009	21232162	19		971119	00001101	3	
971010	23232369	30		971120	10121236	16	
971011	78221000	20		971121	11011122	9	
971012	01121110	7		971122	41011111	10	
971013	11111010	6		971123	43135124	23	
971014	00111000	3		971124	22212224	17	

Date	T	Sum	K1
971125	10000000	1	
971126	10000001	2	
971127	00003000	3	
971128	00100001	2	
971129	00010000	1	
971130	00131110	7	
971201	00101102	5	
971202	10011001	4	
971203	10101111	6	
971204	10011114	9	
971205	01111212	9	
971206	11000001	3	
971207	00111101	5	
971208	00000000	0	
971209	00000010	1	
971210	00424335	21	
971211	21111120	9	
971212	00000000	0	
971213	00000000	0	
971214	00000011	2	
971215	00000210	3	
971216	00001112	5	
971217	10000003	4	
971218	12110001	6	
971219	11000101	4	
971220	00110111	5	
971221	20000111	5	
971222	00011010	3	
971223	12000111	6	
971224	11100010	4	
971225	00000000	0	
971226	10001000	2	
971227	10000000	1	
971228	00110000	2	
971229	01000002	3	
971230	14223481	25	
971231	01110000	3	

Date	T	Sum	Date	T	Sum
980101	00110101	4	980211	22112735	23
980102	01001101	4	980212	32111122	13
980103	00001001	2	980213	10011121	7
980104	00001011	3	980214	10011112	7
980105	00011120	5	980215	21000000	3
980106	03000643	16	980216	20011101	6
980107	57342110	23	980217	00012234	12
980108	00042115	13	980218	75132263	29
980109	51122511	18	980219	10020112	7
980110	01012211	8	980220	31111033	13
980111	11011211	8	980221	10010122	7
980112	11111020	7	980222	11123130	12
980113	00000110	2	980223	01111122	9
980114	00010101	3	980224	10100001	3
980115	00000000	0	980225	00111121	7
980116	20001133	10	980226	00100121	5
980117	10101142	10	980227	10011121	7
980118	10012100	5	980228	01122223	13
980119	00000122	5	980301	92112424	25
980120	12121255	19	980302	22221113	14
980121	42212100	12	980303	11110020	6
980122	00001113	6	980304	11012411	11
980123	11111002	7	980305	21131104	13
980124	00231012	9	980306	42322210	16
980125	12201450	15	980307	21011000	5
980126	00111110	5	980308	01010100	3
980127	12121111	10	980309	00110000	2
980128	00011121	6	980310	11266597	37
980129	00111315	12	980311	41232526	25
980130	33122311	16	980312	62122231	19
980131	11000266	16	980313	21111323	14
980201	11231112	12	980314	10121313	12
980202	21011001	6	980315	33211104	15
980203	00001110	3	980316	31111311	12
980204	22211100	9	980317	11112102	9
980205	00101100	3	980318	20010001	4
980206	10000010	2	980319	10000101	3
980207	00101011	4	980320	20022112	10
980208	10100137	13	980321	11134893	30
980209	33223121	17	980322	11443582	28
980210	22111112	11	980323	21221231	14

Date	T	Sum	Date	T	Sum
980324	00113114	11	980504	99989922	57
980325	21116641	22	980505	26513471	29
980326	01013232	12	980506	00032002	7
980327	22123213	16	980507	11113523	17
980328	11211011	8	980508	32244522	24
980329	42112362	21	980509	11212132	13
980330	21110111	8	980510	10112211	9
980331	32121000	9	980511	11311215	15
980401	11111110	7	980512	21222222	15
980402	00001011	3	980513	11111001	6
980403	10110210	6	980514	01010000	2
980404	11111111	8	980515	10000422	9
980405	11111110	7	980516	12111333	15
980406	11012011	7	980517	82111112	17
980407	01001042	8	980518	11212211	11
980408	11100021	6	980519	11211100	7
980409	01111021	7	980520	10114241	14
980410	11121446	20	980521	21222123	15
980411	11112223	13	980522	30311211	12
980412	22111011	9	980523	11212123	13
980413	00100012	4	980524	31212332	17
980414	01111111	7	980525	01211121	9
980415	01110100	4	980526	20101131	9
980416	11141115	15	980527	11111102	8
980417	11122221	12	980528	11100014	8
980418	11222000	8	980529	33222944	29
980419	00001232	8	980530	62323321	22
980420	00113210	8	980531	11110001	5
980421	21111012	9	980601	11110111	7
980422	01001111	5	980602	21112110	9
980423	01101058	16	980603	21144123	18
980424	53434313	26	980604	32121110	11
980425	23223373	25	980605	11123211	12
980426	32226434	26	980606	21124443	21
980427	43212211	16	980607	34231212	18
980428	11111102	8	980608	21111211	10
980429	00001002	3	980609	00122122	10
980430	00032422	13	980610	12128635	28
980501	11111113	10	980611	51111110	11
980502	55669757	50	980612	12211001	8
980503	65779699	58	980613	01000032	6

Date	T	Sum	Date	T	Sum
980614	23212101	12	980725	21332211	15
980615	01121211	9	980726	20111100	6
980616	11111211	9	980727	01111100	5
980617	11100000	3	980728	01102113	9
980618	01110104	8	980729	11321211	12
980619	31233221	17	980730	12111132	12
980620	05521121	17	980731	53624986	43
980621	52332112	19	980801	21224993	32
980622	21111122	11	980802	12121031	11
980623	11111123	11	980803	10132111	10
980624	41222633	23	980804	12311121	12
980625	44221543	25	980805	11122111	10
980626	44675562	39	980806	24258225	30
980627	12101110	7	980807	46424113	25
980628	00001000	1	980808	11121110	8
980629	00011101	4	980809	00000010	1
980630	00101000	2	980810	24322134	21
980701	00010121	5	980811	31111101	9
980702	32212112	14	980812	22210112	11
980703	41012112	12	980813	32110200	9
980704	21111121	10	980814	00122220	9
980705	23223242	20	980815	00011112	6
980706	23636412	27	980816	01000000	1
980707	11121100	7	980817	00000000	0
980708	01200000	3	980818	00040001	5
980709	10111765	22	980819	11011133	11
980710	41011111	10	980820	51213221	17
980711	22212232	16	980821	20000001	3
980712	21211001	8	980822	21213463	22
980713	11001021	6	980823	42333312	21
980714	00001010	2	980824	10112114	11
980715	00000002	2	980825	52211121	15
980716	25565443	34	980826	11556788	41
980717	31222110	12	980827	99988999	70
980718	10011111	6	980828	44522351	26
980719	01110001	4	980829	22421392	25
980720	11100001	4	980830	32232242	20
980721	03622111	16	980831	11322223	16
980722	11112313	13	980901	13323331	19
980723	43856544	39	980902	20143221	15
980724	43554544	34	980903	51112311	15

Date	T	Sum	Date	T	Sum
980904	21111101	8	981015	00011110	4
980905	01111211	8	981016	00001001	2
980906	21011000	5	981017	12223312	16
980907	01111121	8	981018	10132242	15
980908	32110021	10	981019	29439765	45
980909	12111112	10	981020	62172293	32
980910	22111121	11	981021	64232471	29
980911	00021113	8	981022	32345754	33
980912	31212321	15	981023	21126435	24
980913	21111101	8	981024	32121123	15
980914	10000003	4	981025	22211310	12
980915	01011020	5	981026	01110000	3
980916	10011012	6	981027	20112113	11
980917	13111112	11	981028	41132112	15
980918	12339994	40	981028	22434223	22
980919	51122121	15	981029	22311000	9
980920	30112101	9	981030	10011141	9
980921	22222100	11	981101	01112010	6
980922	01121121	9	981102	21001021	7
980923	12213132	15	981103	01111111	7
980924	34241125	22	981104	31131121	13
980925	99999921	57	981105	10012222	10
980926	12134338	25	981106	12222234	18
980927	51232211	17	981107	41155883	35
980928	01121014	10	981108	99949644	54
980929	02121133	13	981109	76889689	61
980930	03123123	15	981110	42111000	9
981001	62443263	30	981111	00024002	8
981002	52554497	41	981112	00111001	4
981003	43233110	17	981113	29584999	55
981004	10111100	5	981114	44278752	39
981005	41120011	10	981115	11113223	14
981006	00010221	6	981116	21121222	13
981007	31134595	31	981117	11111000	5
981008	32132113	16	981118	02111211	9
981009	23222304	18	981119	12122112	12
981010	11122122	12	981120	01122024	12
981011	21112003	10	981121	11111212	10
981012	21111011	8	981122	11211010	7
981013	11121002	8	981123	12112224	15
981014	01000000	1	981124	22323253	22

Date	T	Sum
981125	11222445	21
981126	12122321	14
981127	22112200	10
981128	11111110	7
981129	11122032	12
981130	11431183	22
981201	45323421	24
981202	11121012	9
981203	11111330	11
981204	11122321	13
981205	22222241	17
981206	00112212	9
981207	11011313	11
981208	11011200	6
981209	11111310	9
981210	10110113	8
981211	35335533	30
981212	21111002	8
981213	11000011	4
981214	11111101	7
981215	20011001	5
981216	31252320	18
981217	00000000	0
981218	00011000	2
981219	10111223	11
981220	21122230	13
981221	00011100	3
981222	20001041	8
981223	10111121	8
981224	01011111	6
981225	11032212	12
981226	12212112	12
981227	20011001	5
981228	01011144	12
981229	11111339	20
981230	32210011	10
981231	11111000	5

MAGNETIC MEASUREMENTS AND DATA PROCESSING

V. WESZTERGOM

Magnetic houses

Geomagnetic elements are measured in 3 separate places. Absolute measurements are made in the quite large absolute house which is constructed of non-magnetic limestone and covered with reeds. This house comprises of two rooms, the bigger one has four stable pillars, two of them serves for calibration. There are two external pillars, too. One azimuth mark for the determination of declination is fixed on the pillar of entrance at a distance of 50 m, the other is on the top of the church about 5km from the observatory. The underground variometer chamber is constructed also of non-magnetic limestone. It comprises four separate rooms. Variometers are placed in separate well insulated rooms 1m below the level of the ground. The temperature variation can be maintained by this way within 0.5°C between the weekly absolute observations. Standby batteries and digital recorder of the torsion photoelectric magnetometer are in the entrance hall, fluxgate data are recorded in the computer centre. The small proton magnetometer (DI/DD) hut next to the variometer chamber is made of non-magnetic concrete. Proton magnetometer is controlled also from the computer centre.

Recording of geomagnetic variations

Geomagnetic variations prior to 1991 were recorded by two sets of normal run (15 mm/h) La Cour systems. In 1991 the Geodetic and Geophysical Institute installed electronic variometers and a digital recording equipment (ARGOS) at the observatory, which allowed to participate in INTERMAGNET. ARGOS (developed by the Geomagnetism Group of British Geological Survey) is a PC based automatic observatory equipped with triaxial fluxgate and a proton magnetometer in a DD/DI configuration.

The fluxgate variometer sensors are aligned in X, Y, Z directions. 10 second samples are used to provide minute values centred on the minute by means of a 7-point cosine filter. Reported elements are: H (horizontal), Z (vertical), D (declination) and F (total force). From the year 1993 on the minute values

Table I. Main specifications of ARGOS used in Nagycenk Observatory

Device	Resolution	Dynamic range	Temperature coeff.
Triaxial Fluxgate Magnetometer	0.1 nT	±500 nT/±400 nT	~ 1 nT/°C
Proton Magnetometer (ELSEC 820)	0.1 nT	10000–90000 nT	–

are transmitted through the METEOSAT satellite to the Edinburgh Geomagnetic Information Node.

DI/DD coil system consists of two orthogonal sets of Helmholtz coils (proton head is mounted at the centre). Coils orientated so that one provides bias fields approximately perpendicular to F vector in the magnetic meridian and the other provides bias fields approximately perpendicular to F in the horizontal plane. DD and DI relative to the initial values (D0, I0) are calculated. DD/DI proton magnetometer is used in every tenth minutes from which F and almost absolute values of D an I are obtained.

Satellite transmitter, 6800 Series of Data Collection Platform, was supplied by Space Technology Systems. Power output to antenna (two linearly-polarised Yagi arranged to give circular polarisation) is 4 watts at 402 MHz. Data storage capacity is 2×40 kbytes.

Timing is produced by the IBM clock corrected by the high stability crystal built in the Proton Magnetometer.

To ensure continuous recording a high stability torsion photoelectric magnetometer (type PSM-8711) has been run from 1 January 1998. Data along with telluric data are logged by a DR-02 type digital recording system. The PSM magnetometer records the H, D and Z component with an exceptionally high parameter stability. The baseline variation has never exceeded 1.5 nT/year. Maximum resolution is 3 pT, sampling rate applied is 10 s. Frequency response: 0.3 Hz to DC. Sensitivity to tilting: less than 10 nT/′.

Data are stored in the internal memory of the digital data logger DR-02. Both the PSM and the DR-02 was developed and provided by the Institute of Geophysics Polish Academy of Sciences.

Absolute control, baselines

Baselines of the variometer systems are derived from absolute observations. Prior to 1989 the baseline was controlled by two QHM, one declinometer and one BMZ. From 1989 till the end of 1994 the standard instrument for absolute measurements was the vector proton magnetometer (NVP) constructed in Niemegk Observatory. In 1994 an Overhauser proton magnetometer (type: GSM 19 of GEM Systems) and a fluxgate theodolite (developed by the Danish Meteorological Institute) was purchased. Since then the standard instruments are the fluxgate theodolite for I and D and the Overhauser effect proton magnetometer for F.

To determine the momentary angle of declination four observations (four null positions in the horizontal plane) are taken and it is repeated at least two times. Generally the closer azimuth mark is used but it is checked regularly with the far azimuth mark. Inclination angle is determined in the plain of the momentary magnetic meridian in the same way as D. Total intensity is measured simultaneously with I-measurements on the next (F) pillar with the Overhauser magnetometer. Absolute values of all geomagnetic elements are referred to the same pillar of the absolute hut. Observation is made weekly, occasionally more often.

Absolute measurements are supplemented by quasi absolute baseline reference measurements. Declination, inclination and total intensity are determined by means of a proton vector magnetometer in every ten minutes.

Operational problems of magnetic measurements and data transmission

Three types of operational problems were experienced since the installation of ARGOS system.

I. Operational problems derived from power outages in the observatory

Although standby power is provided by an uninterruptable power supply (giving 10–20 min continuous operation), the system stopped due to power failure several times. Longer breaks had occurred quite often until the power transmission line was changed in 1995 to a more secure cable of 1.5 km between the observatory and the transformer. Regarding the limited capacity of the uninterruptable power supply the default reading of DD/DI magnetometer was changed to 10 minutes because of its rather high current consumption. In summer 1994 an especially great number

of long power outages occurred. Following a series of power outages one of the 3 batteries which provide constant power to fluxgate and proton magnetometers did not recover. This led to power failure in fluxgate electronics and short term drifts, mysterious spikes appeared in fluxgate data. Its baseline had been out of control for several weeks until the 6 Volt battery in question was changed.

II. Lightning strokes

Lightning strokes have not caused serious operational problems only the analogue to digital converter IC of the fluxgate magnetometer had to be changed twice to spare ones.

III. Unexplained interference and gaps in transmission

Data Collection Platform 6800 series of the Space Technology Systems has been connected to ARGOS since 1993. Gaps of several hours appeared in transmission since the beginning. First assumption was interference because the failure occurred almost regularly at the same time at 9.54 GMT and 16.54 GMT. After nearly 2 years of experiments in Nagycenk, Tihany and Edinburgh it could be concluded that the problem was caused by the antenna. (It consists of two linearly polarised Yagi arranged to give circular polarisation by means of a combining and phasing units.) The manufacturer repaired it free of charge. In the meantime power connector of the DCP was hurted during its journey (Nagycenk – Tihany – Edinburgh and back) and polarity was changed. This caused a total break down. Reparation took nearly one year. On top of everything a strange signal of 300 kHz of varying amplitude appeared in the system. This induced radio frequency noise led to frequent malfunction and partial loss of house keeping data. Transmission have not failed since this problem was sorted out in June, 1996.

Data processing and availability

Sampling rate of magnetic variation data is 10s both for ARGOS and PSM. Minute mean values are produced with digital filter from the raw sampled data. According to the IAGA recommendation minute mean values are stored. Hourly means are calculated from minute means, yearly means are derived from hourly means. Final absolute values of H, D and Z field component are obtained from smoothed baselines.

ARGOS data are compared continuously to PSM data and gaps are filled.

Data are logged on floppy disk too. In addition to logging data to disk INTERMAGNET V2.8 format satellite transmission packets are sent to DCP.

Presentation of the results

- plot of hourly mean values of H, D, Z
- plot of daily mean values of H, D, Z
- tables of geomagnetic activity indices, K
- table of annual mean values of geomagnetic elements
- special phenomena: SSC, sfe

See CD (program Seenck.exe, menu item Magnetics).

GEOMAGNETIC DATA

Hourly mean values of H, D, Z and F

Hourly means are derived from minute means corrected using absolute observations. The units of the elements are 0.1 nT, Declination is also scaled to 0.1 nT. Minute means of F are calculated from H and Z. F values are checked by comparing them with proton magnetometer readings taken at every 10 minutes.

Daily mean values of H, D, Z and F

Daily mean values are calculated from hourly mean values.

Geomagnetic activity indices: K-index

The K-index is determined from the amplitude ranges of H and D components for each three-hour Universal Time interval. Limit for K=9 is 350 nT in Nagycenk.

Special phenomena

List of special events is based on both magnetic and earth current records. Tables are given for SSC-s and sfe.

Annual mean values of geomagnetic elements

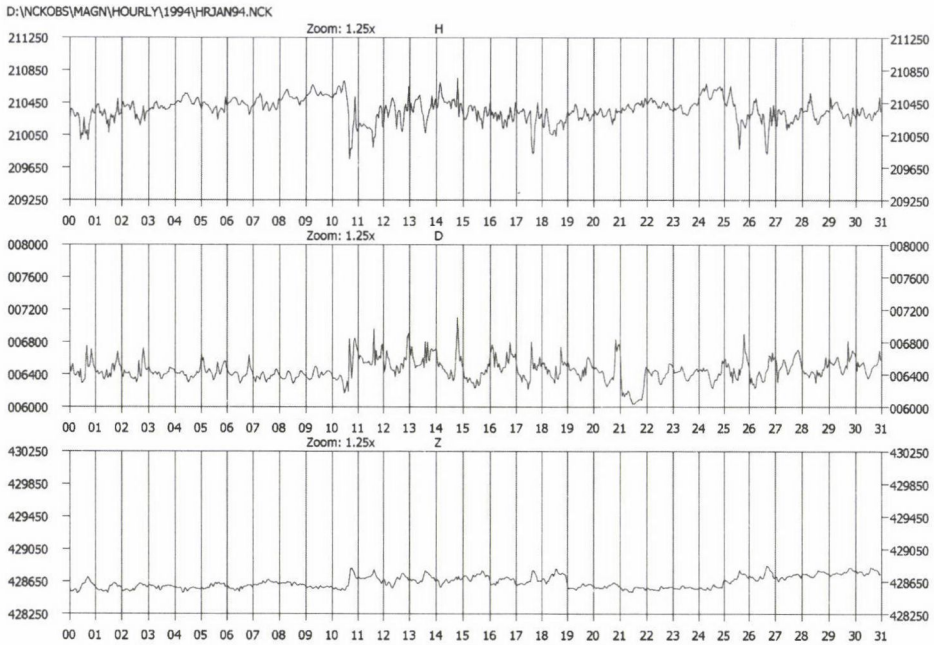
Table contains yearly means of the geomagnetic elements 1961 to 1993 in nT. These values are the results of a reevaluation of previously published data, including corrections eliminating disturbances caused by construction works in the observatory. Corrected values are noted by asterisk.

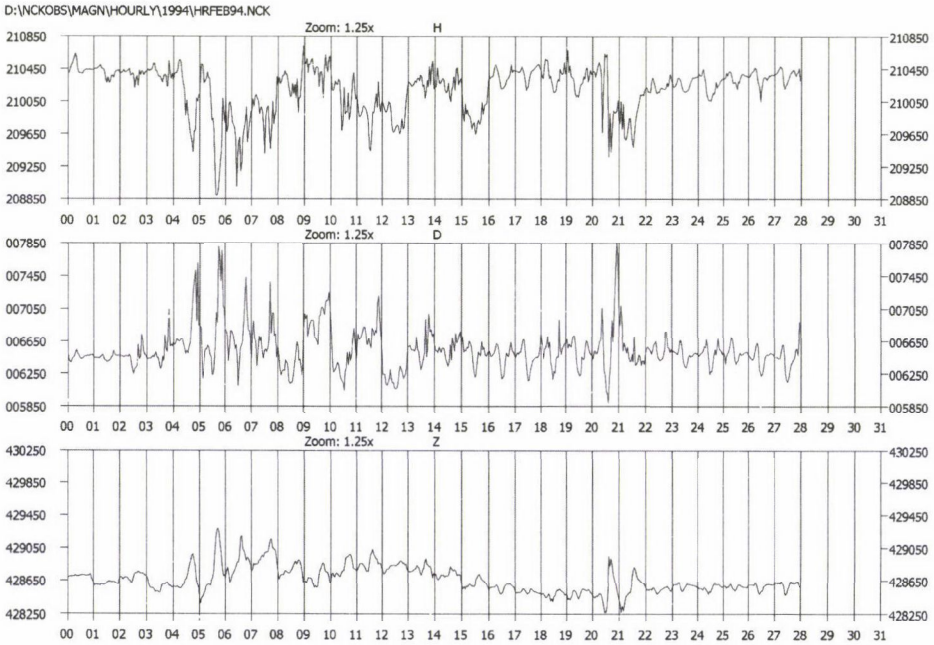
Times in this section are given in UT!

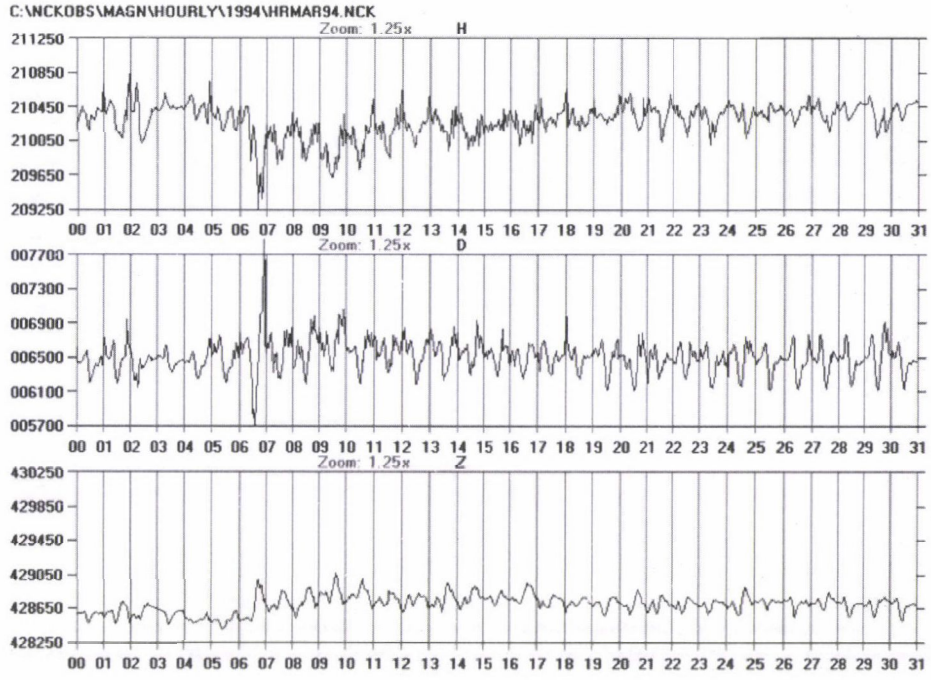
See CD (program Seenck.exe, menu item Magnetics).

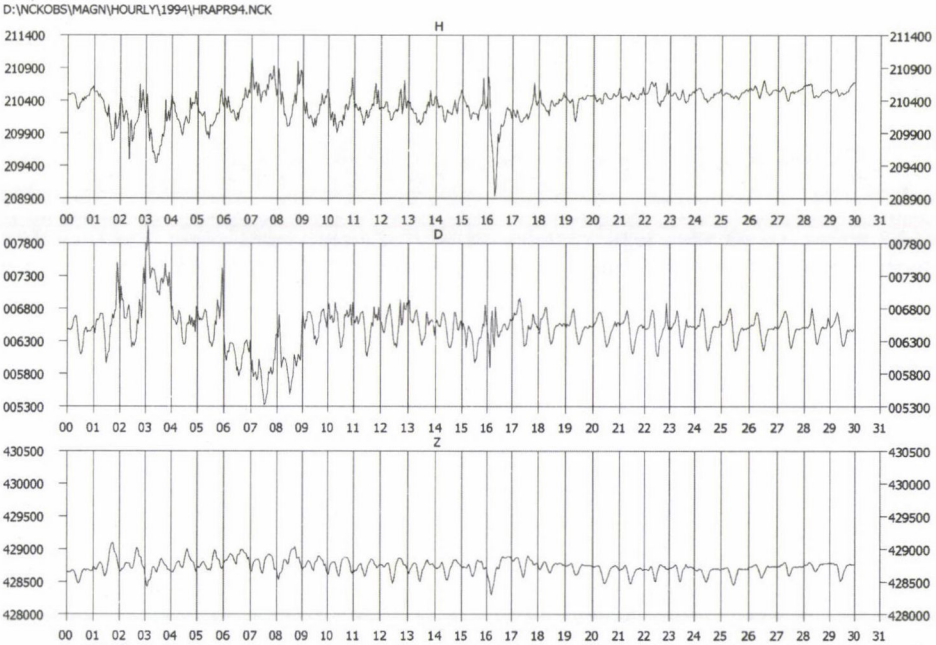
Hourly mean values of H, D, Z

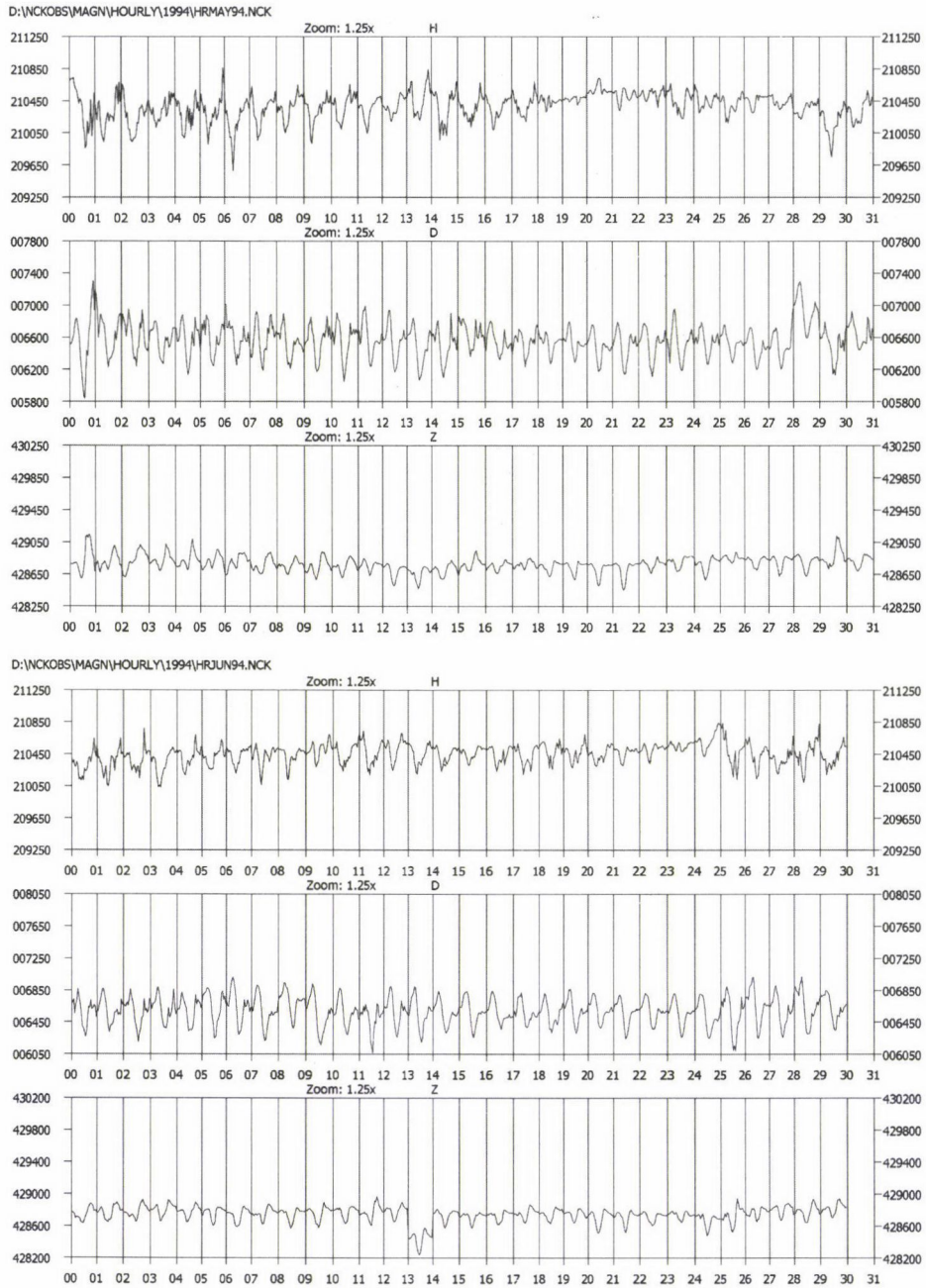
1994–1998


D:\NCKOBS\MAGN\HOURLY\1994\HRJAN94.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008000
007600
007200
006800
006400
006000
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

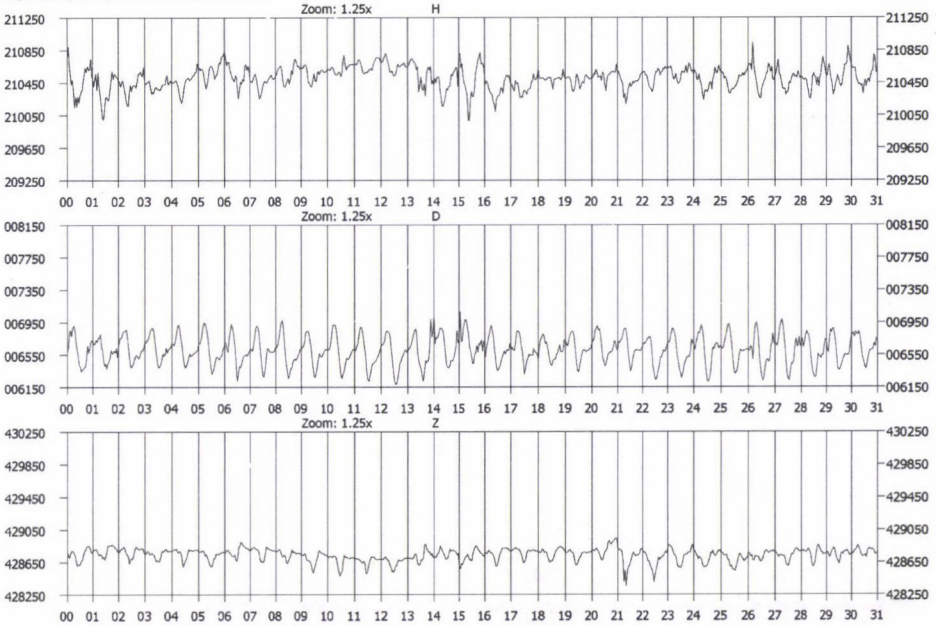

D:\NCKOBS\MAGN\HOURLY\1994\HRFEB94.NCK
Zoom: 1.25x H
210850
210450
210050
209650
209250
208850
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
007850
007450
007050
006650
006250
005850
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250


C:\NCKOBS\MAGN\HOURLY\1994\HRMAR94.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
007700
007300
006900
006500
006100
005700
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

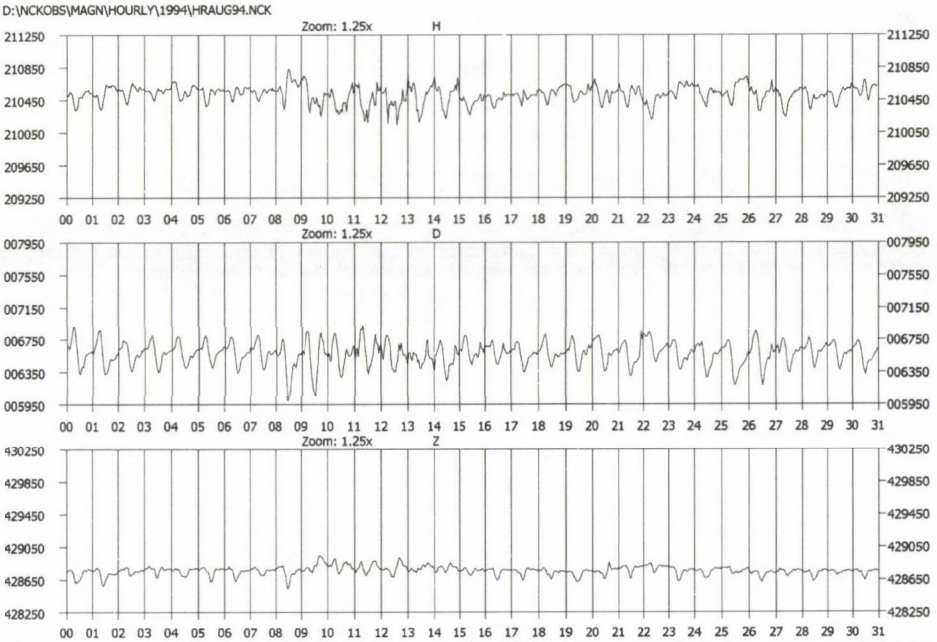

D:\NCKOBS\MAGN\HOURLY\1994\HRAPR94.NCK
H
211400
210900
210400
209900
209400
208900
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
D
007800
007300
006800
006300
005800
005300
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Z
430500
430000
429500
429000
428500
428000
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

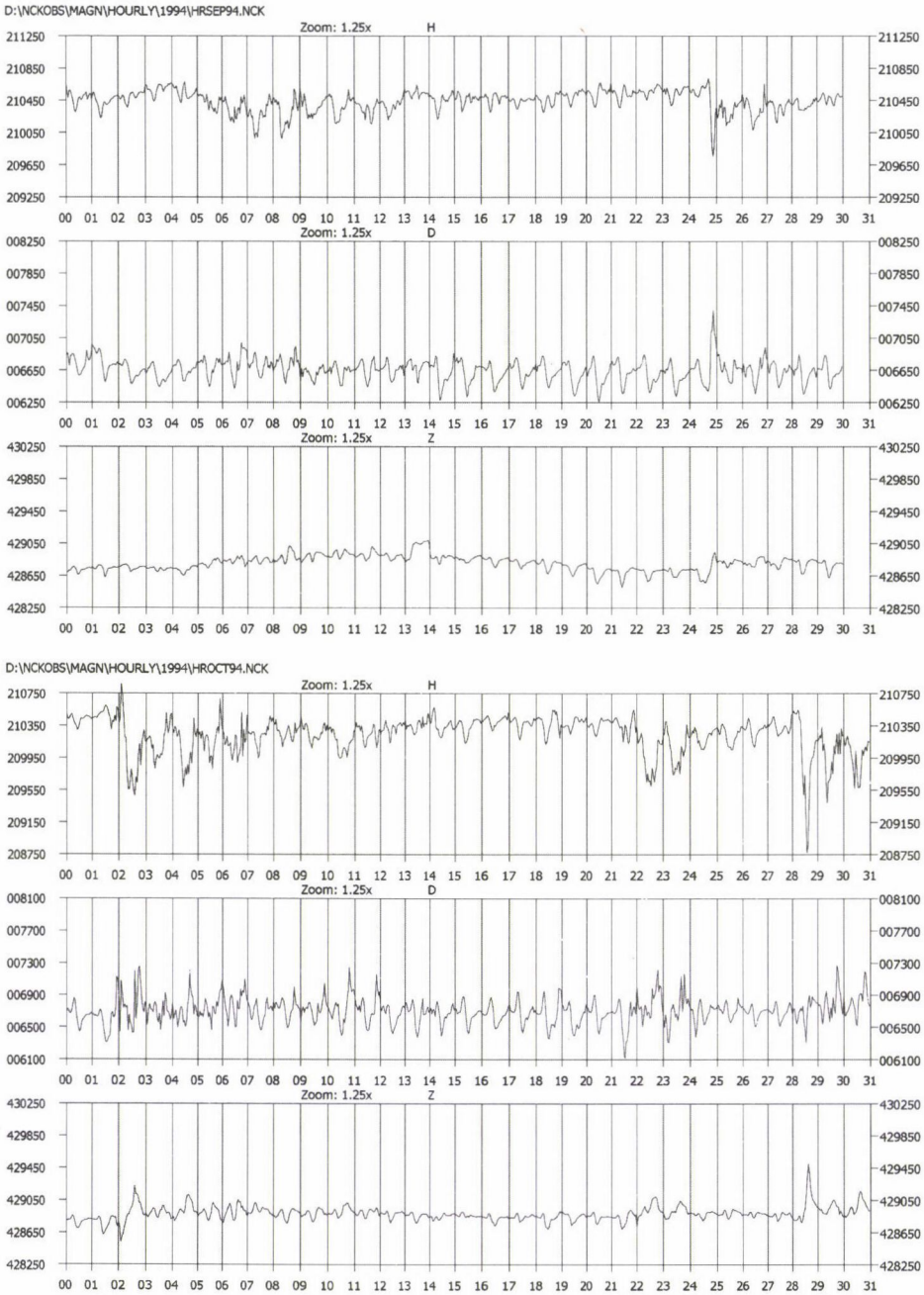

D:\NCKOBS\MAGN\HOURLY\1994\HRMAY94.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
007800
007400
007000
006600
006200
005800
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250
D:\NCKOBS\MAGN\HOURLY\1994\HRJUN94.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
Zoom: 1.25x D
008050
007650
007250
006850
006450
006050
Zoom: 1.25x Z
430200
429800
429400
429000
428600
428200

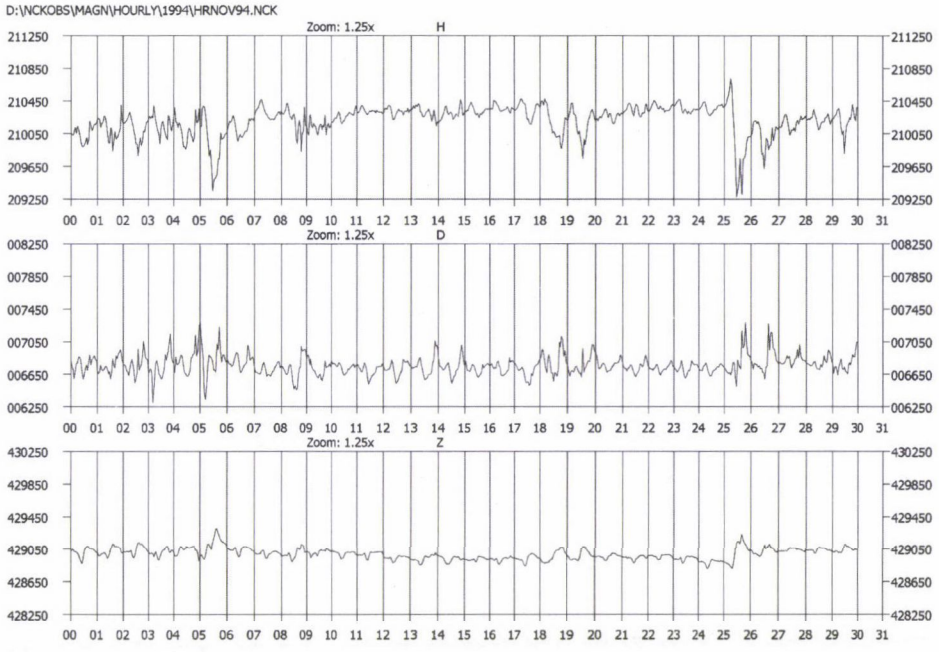
D:\NCKOBS\MAGN\HOURLY\1994\HRJUL94.NCK

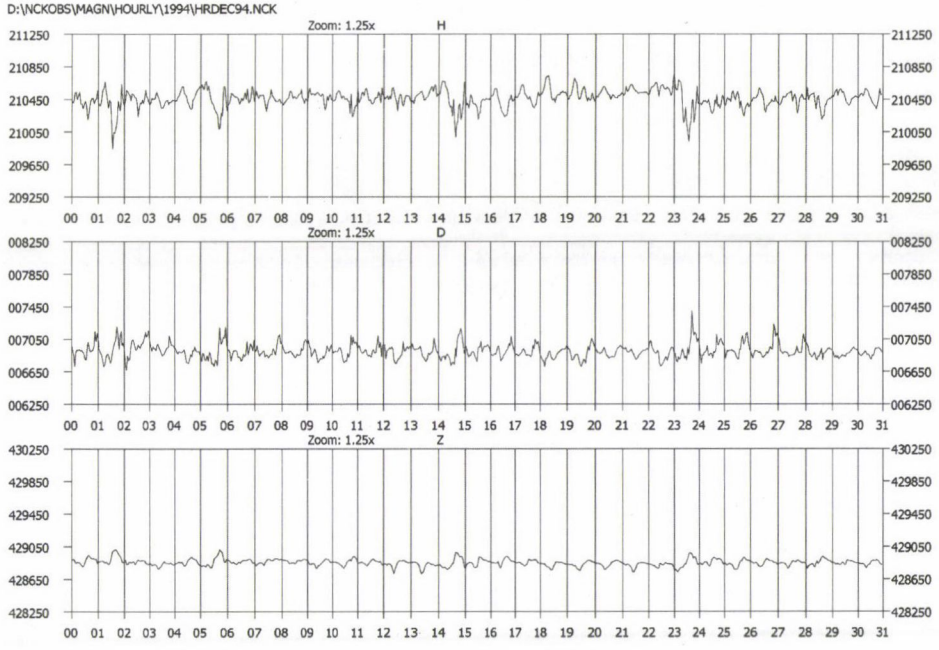


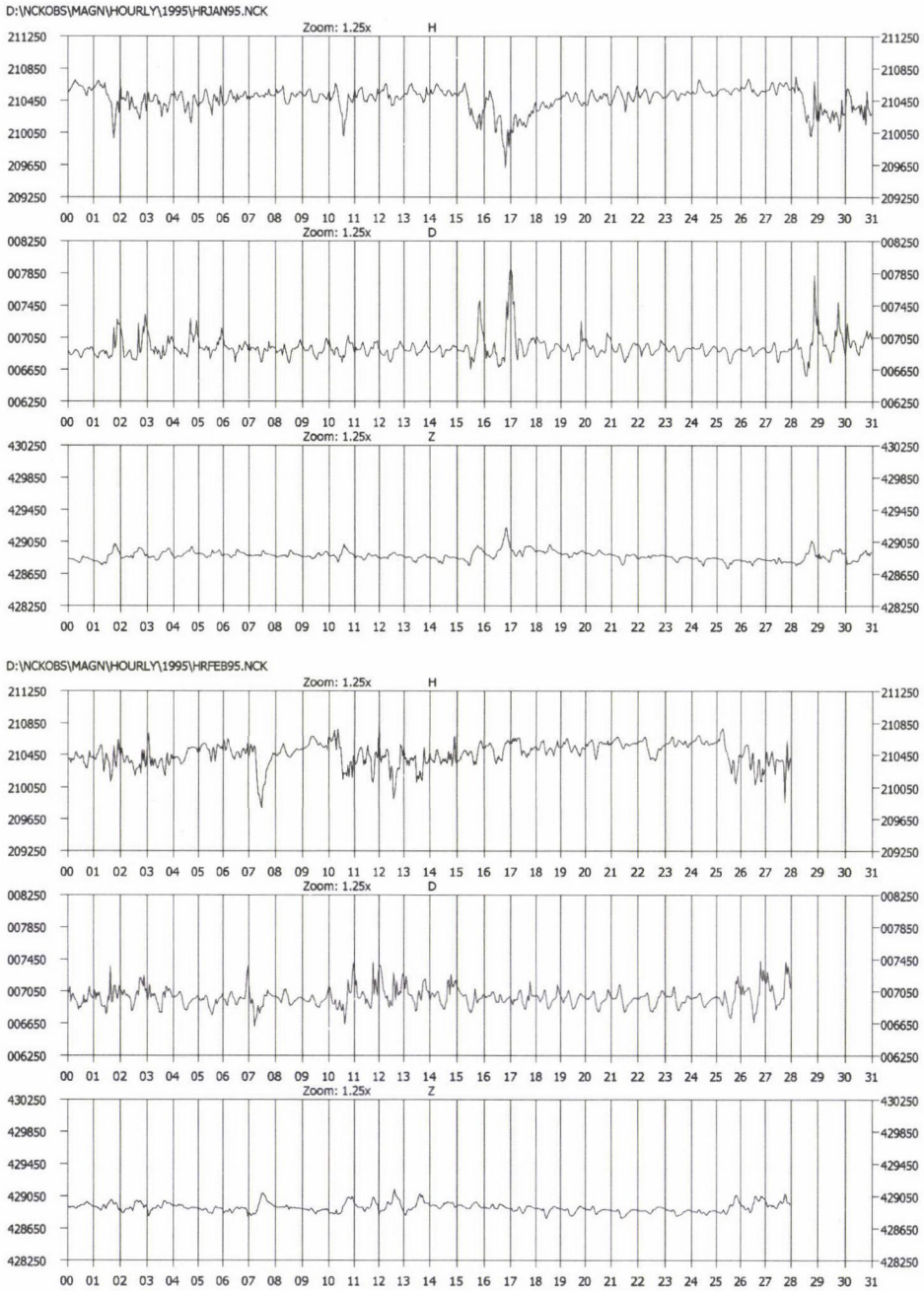
D:\NCKOBS\MAGN\HOURLY\1994\HRAUG94.NCK



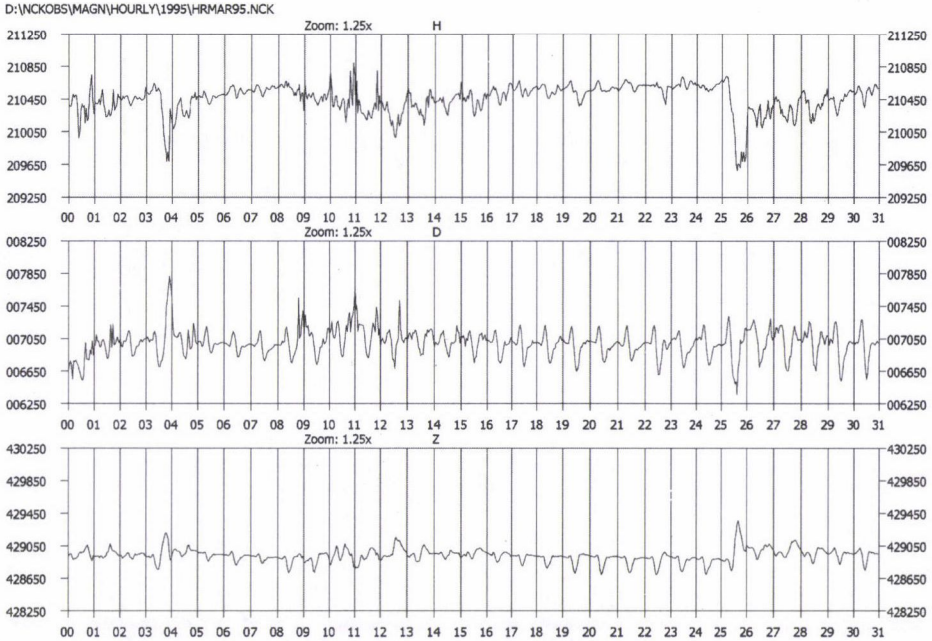

D:\NCKOBS\MAGN\HOURLY\1994\HRSEP94.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250
D:\NCKOBS\MAGN\HOURLY\1994\HROCT94.NCK
Zoom: 1.25x H
210750
210350
209950
209550
209150
208750
Zoom: 1.25x D
008100
007700
007300
006900
006500
006100
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250


D:\NCKOBS\MAGN\HOURLY\1994\HRNOV94.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

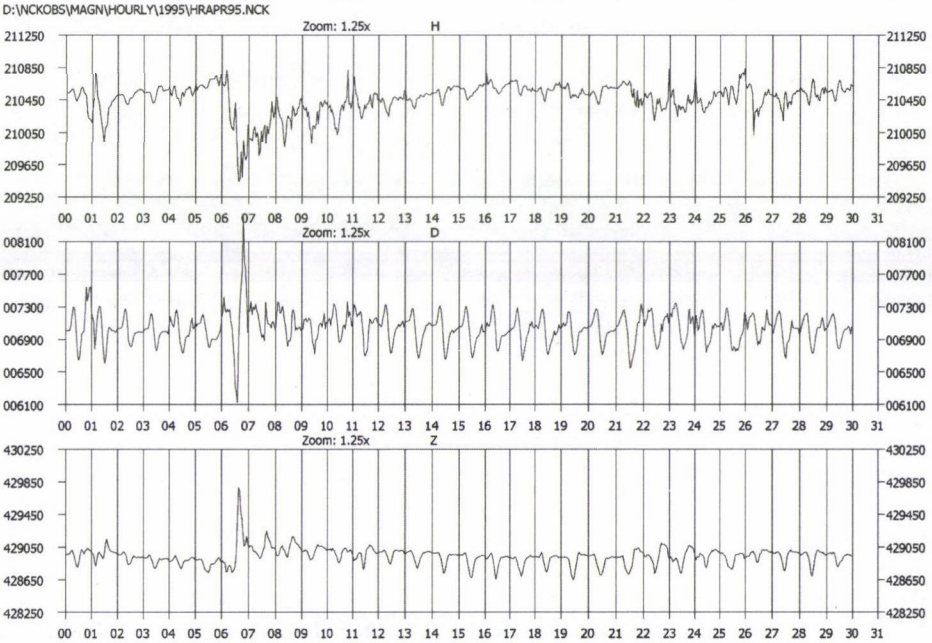

D:\NCKOBS\MAGN\HOURLY\1994\HRDEC94.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

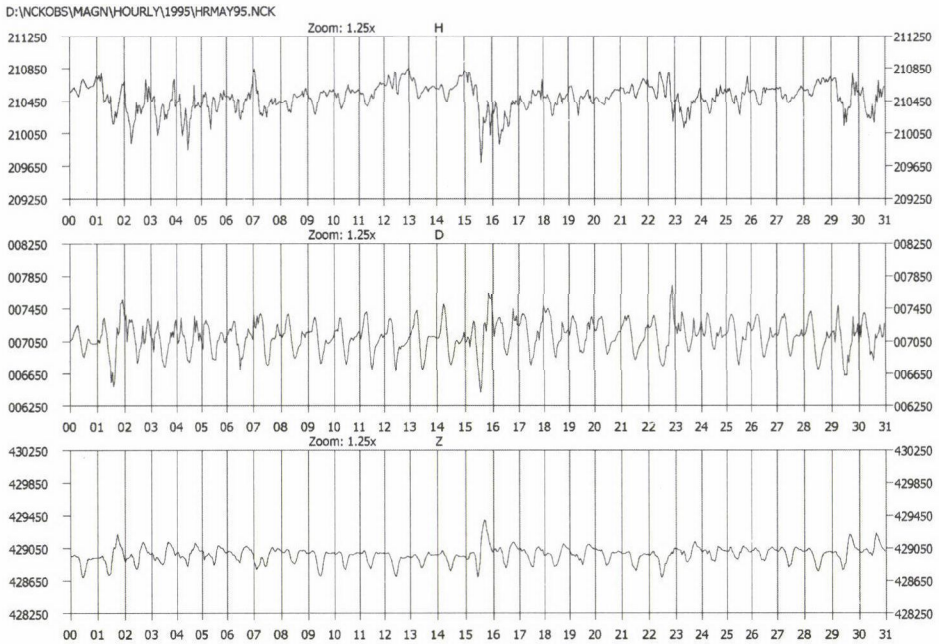

D:\NCKOBS\MAGN\HOURLY\1995\HRJAN95.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250
D:\NCKOBS\MAGN\HOURLY\1995\HRFEB95.NCK
Zoom: 1.25x H
Zoom: 1.25x D
Zoom: 1.25x Z

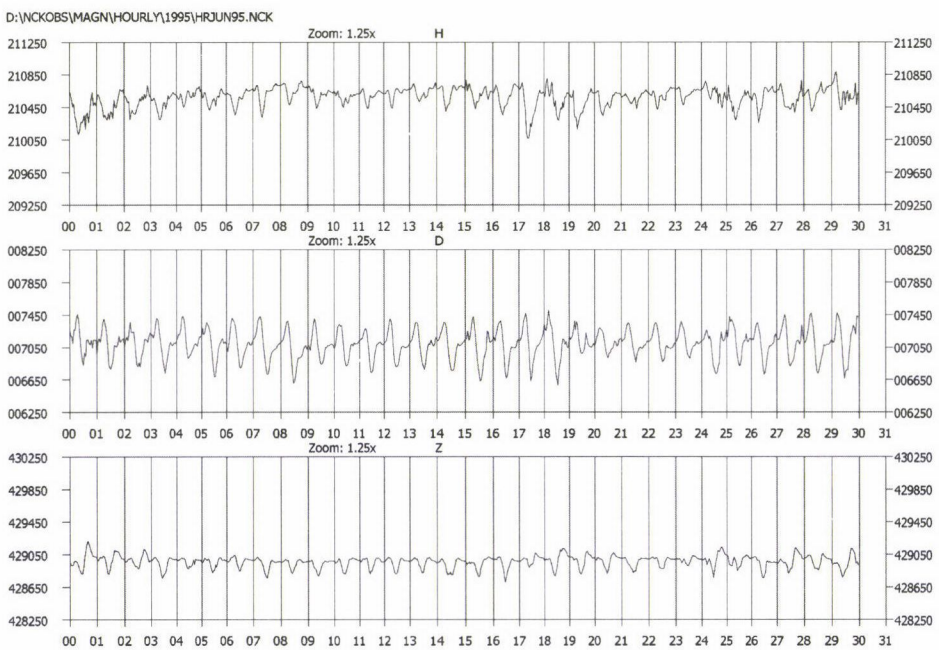
D:\NCKOBS\MAGN\HOURLY\1995\HRMAR95.NCK

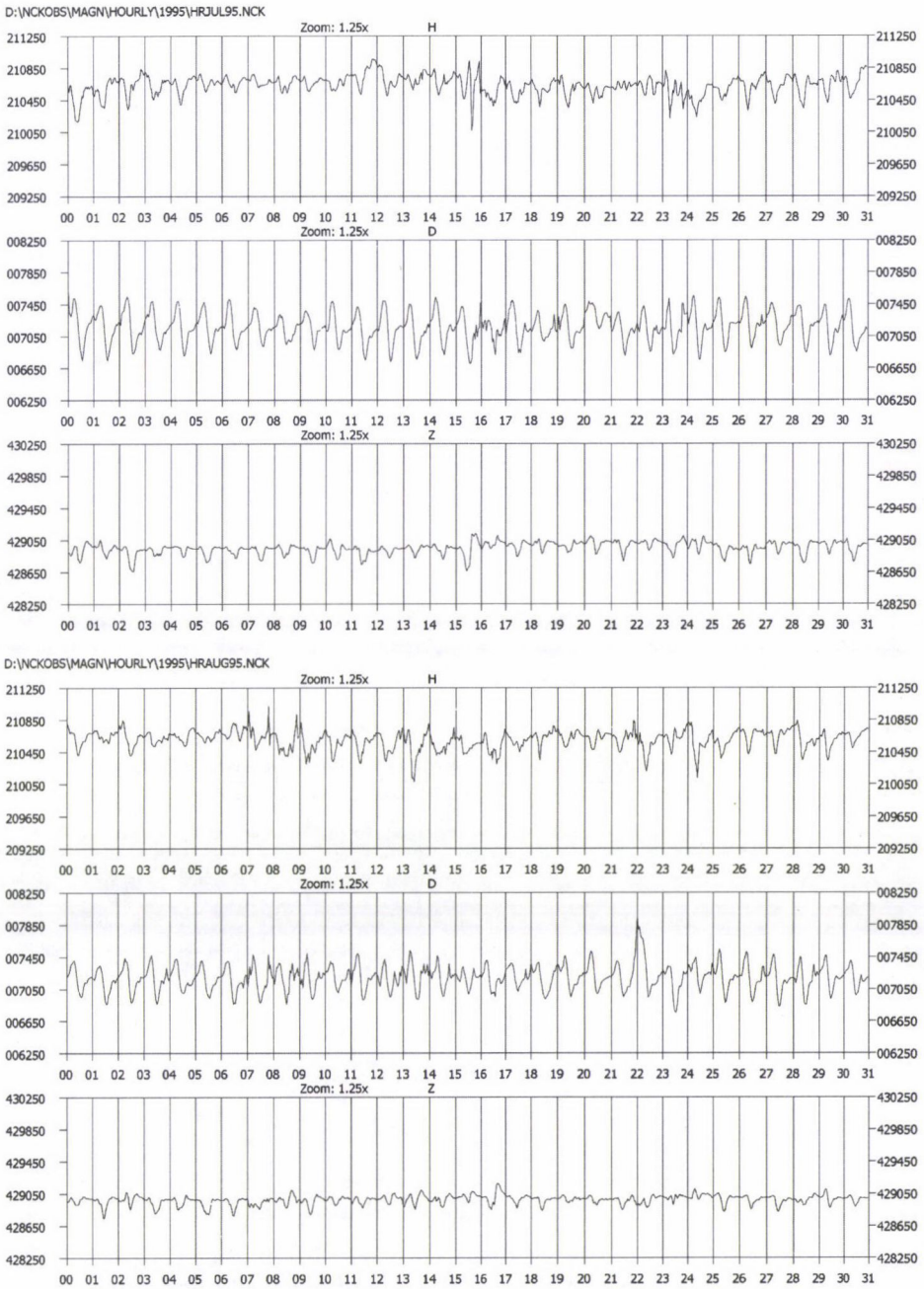


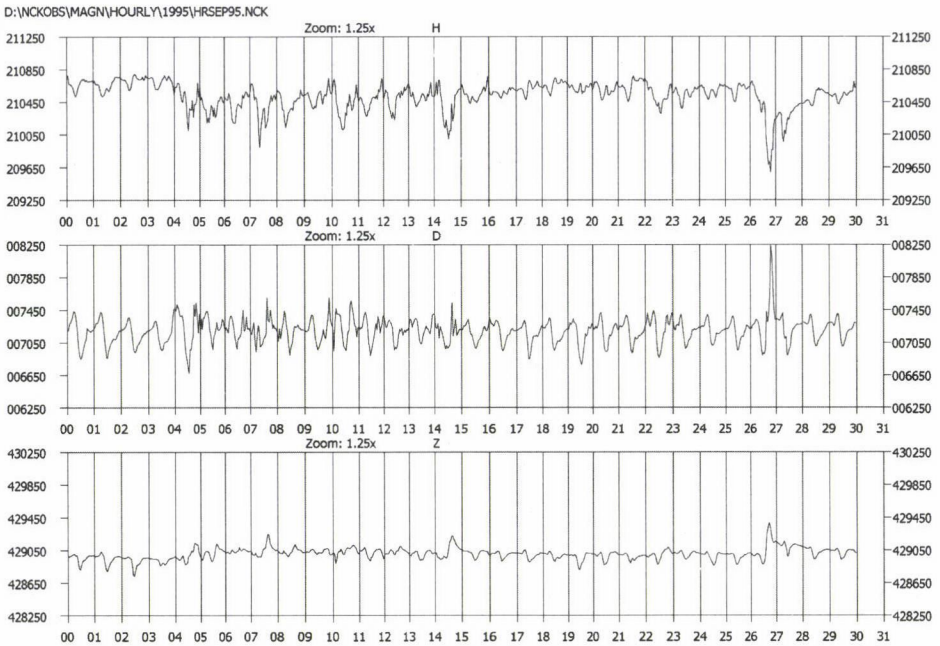
D:\NCKOBS\MAGN\HOURLY\1995\HRAPR95.NCK

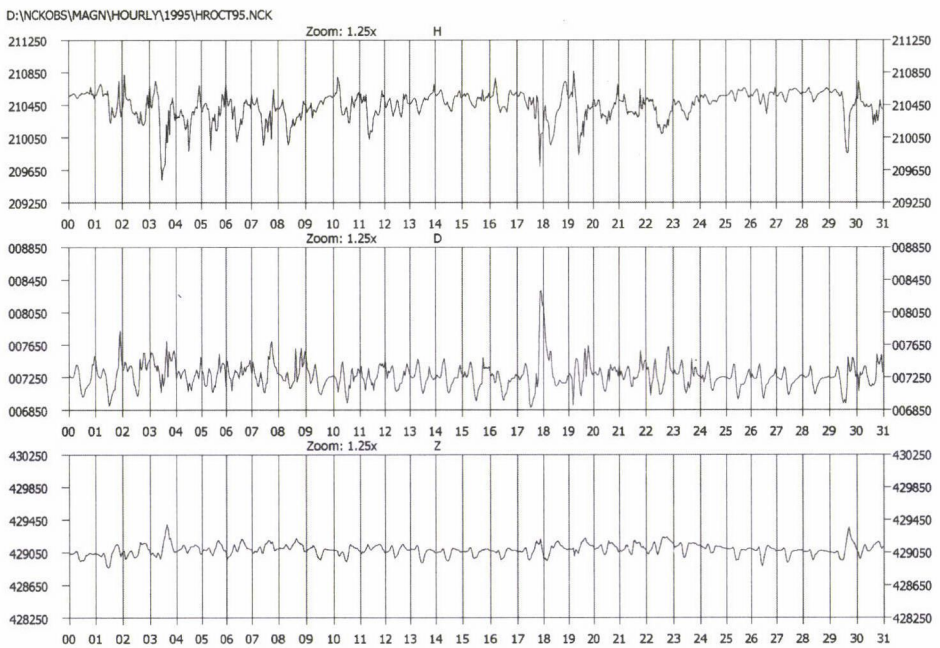


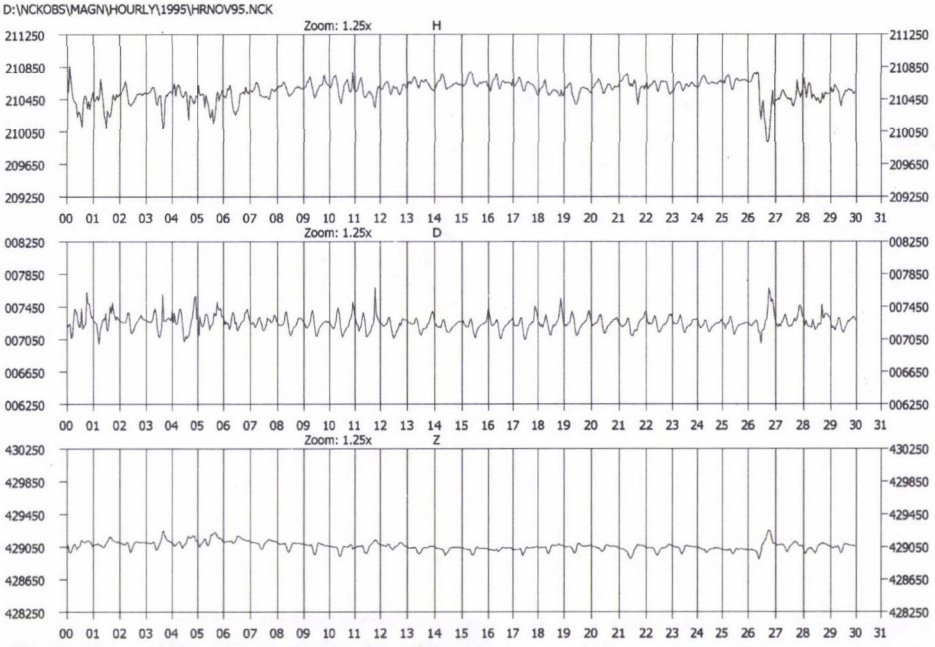

D:\NCKOBS\MAGN\HOURLY\1995\HRMAY95.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

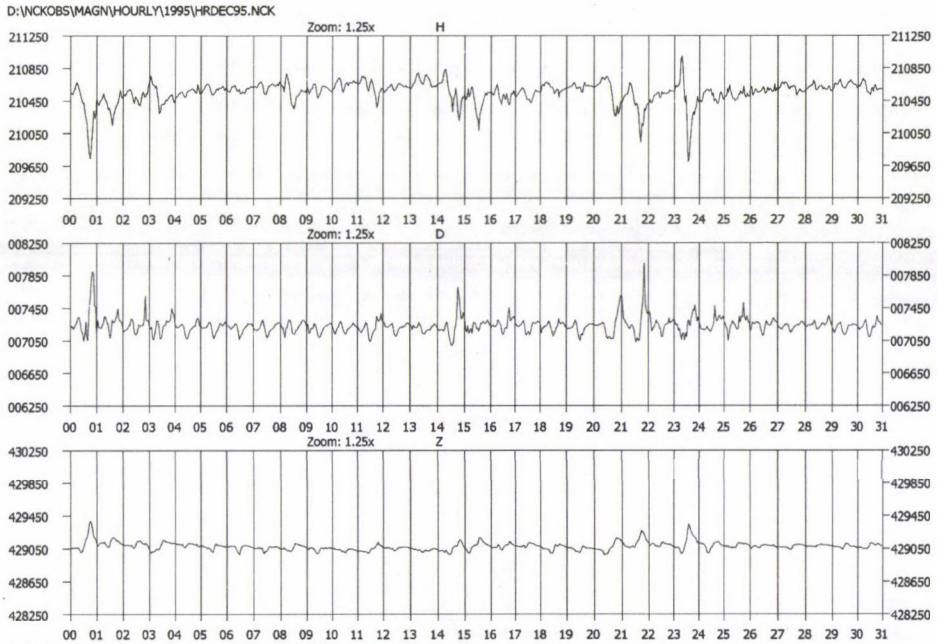

D:\NCKOBS\MAGN\HOURLY\1995\HRJUN95.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250


D:\NCKOBS\MAGN\HOURLY\1995\HRJUL95.NCK
Zoom: 1.25x
H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x
D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x
Z
430250
429850
429450
429050
428650
428250
D:\NCKOBS\MAGN\HOURLY\1995\HRAUG95.NCK
Zoom: 1.25x
H
Zoom: 1.25x
D
Zoom: 1.25x
Z

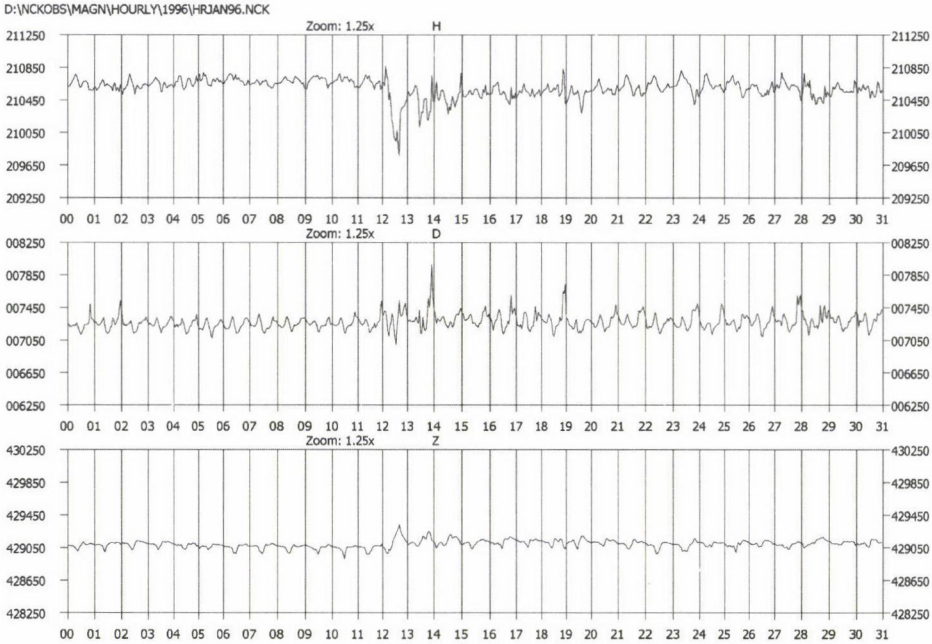

D:\NCKOBS\MAGN\HOURLY\1995\HRSEP95.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250


D:\NCKOBS\MAGN\HOURLY\1995\HROCT95.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008850
008450
008050
007650
007250
006850
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

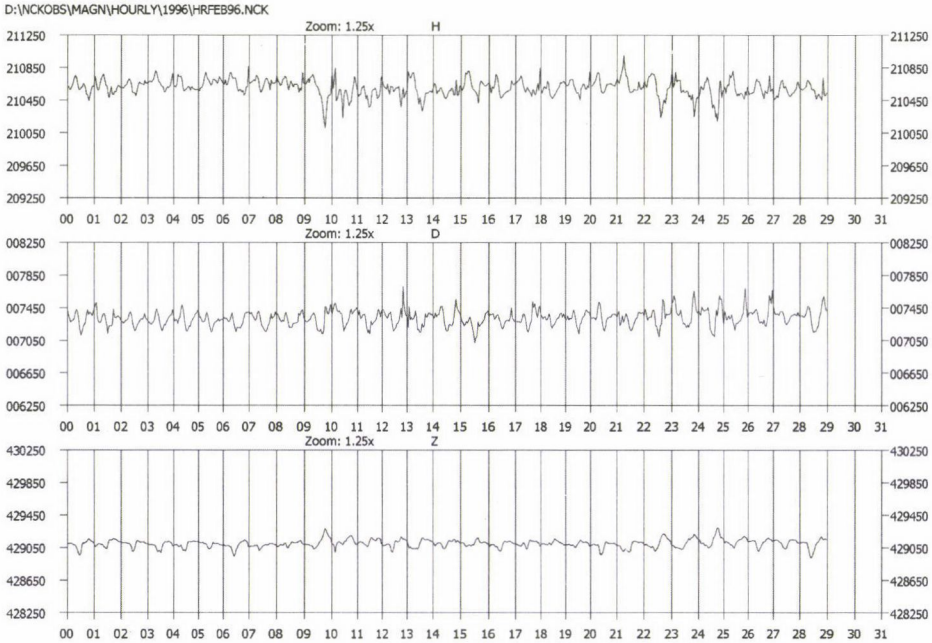

D:\NCKOBS\MAGN\HOURLY\1995\HRNOV95.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

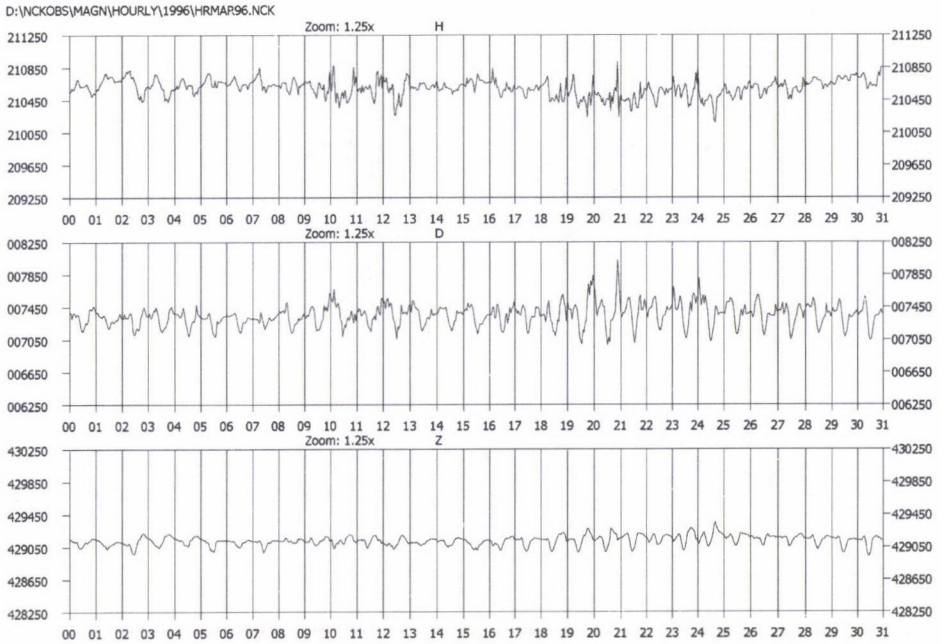

D:\NCKOBS\MAGN\HOURLY\1995\HRDEC95.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

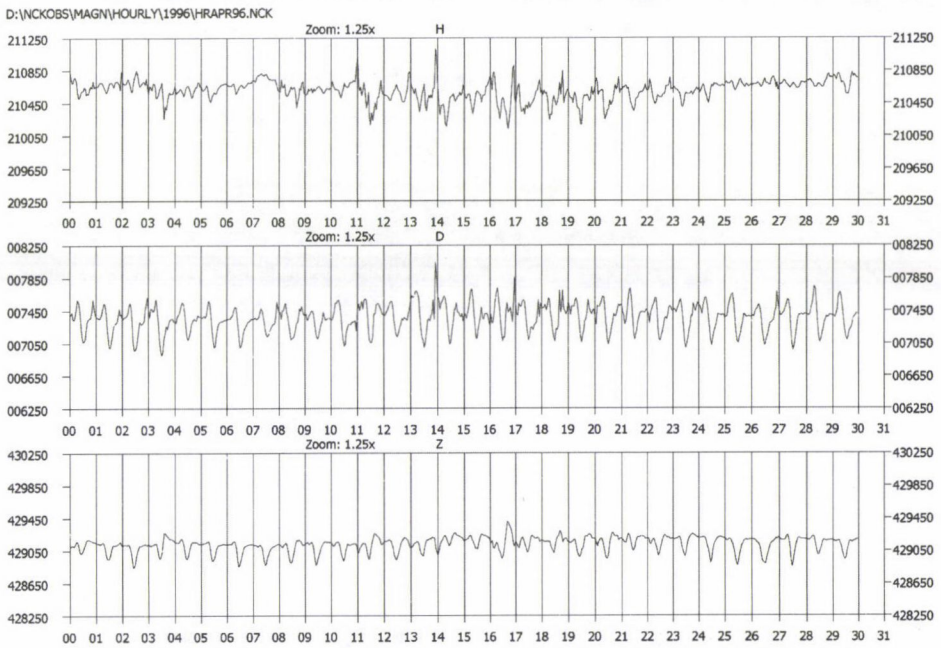
D:\NCKOBS\MAGN\HOURLY\1996\HRJAN96.NCK

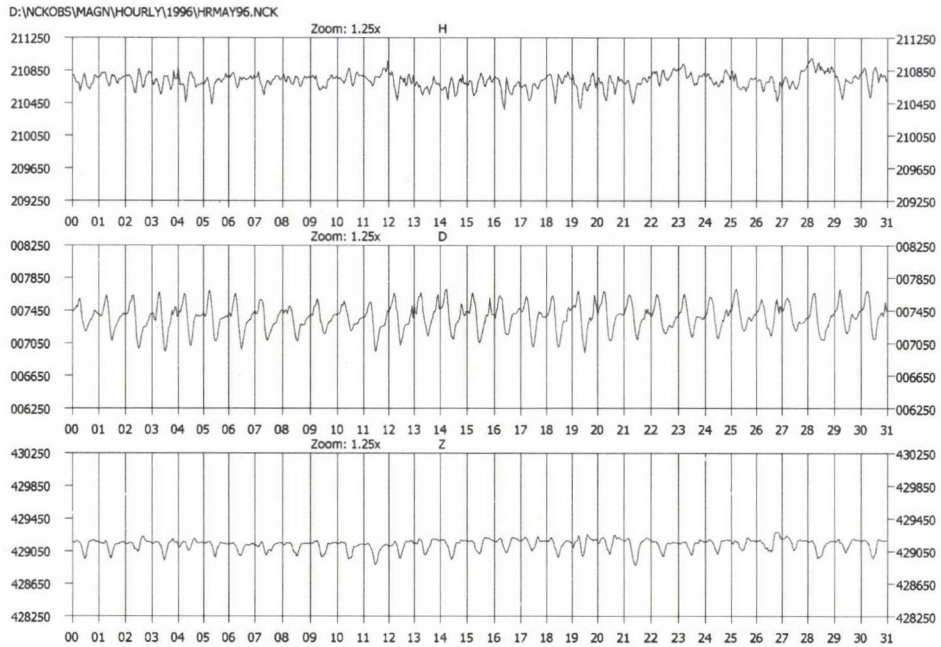


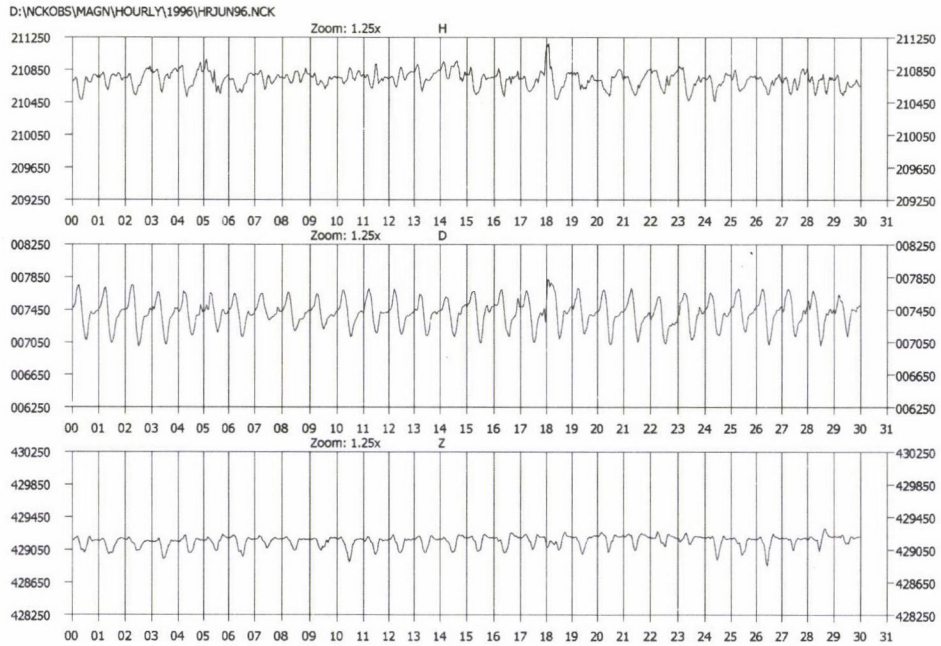
D:\NCKOBS\MAGN\HOURLY\1996\HRFEB96.NCK

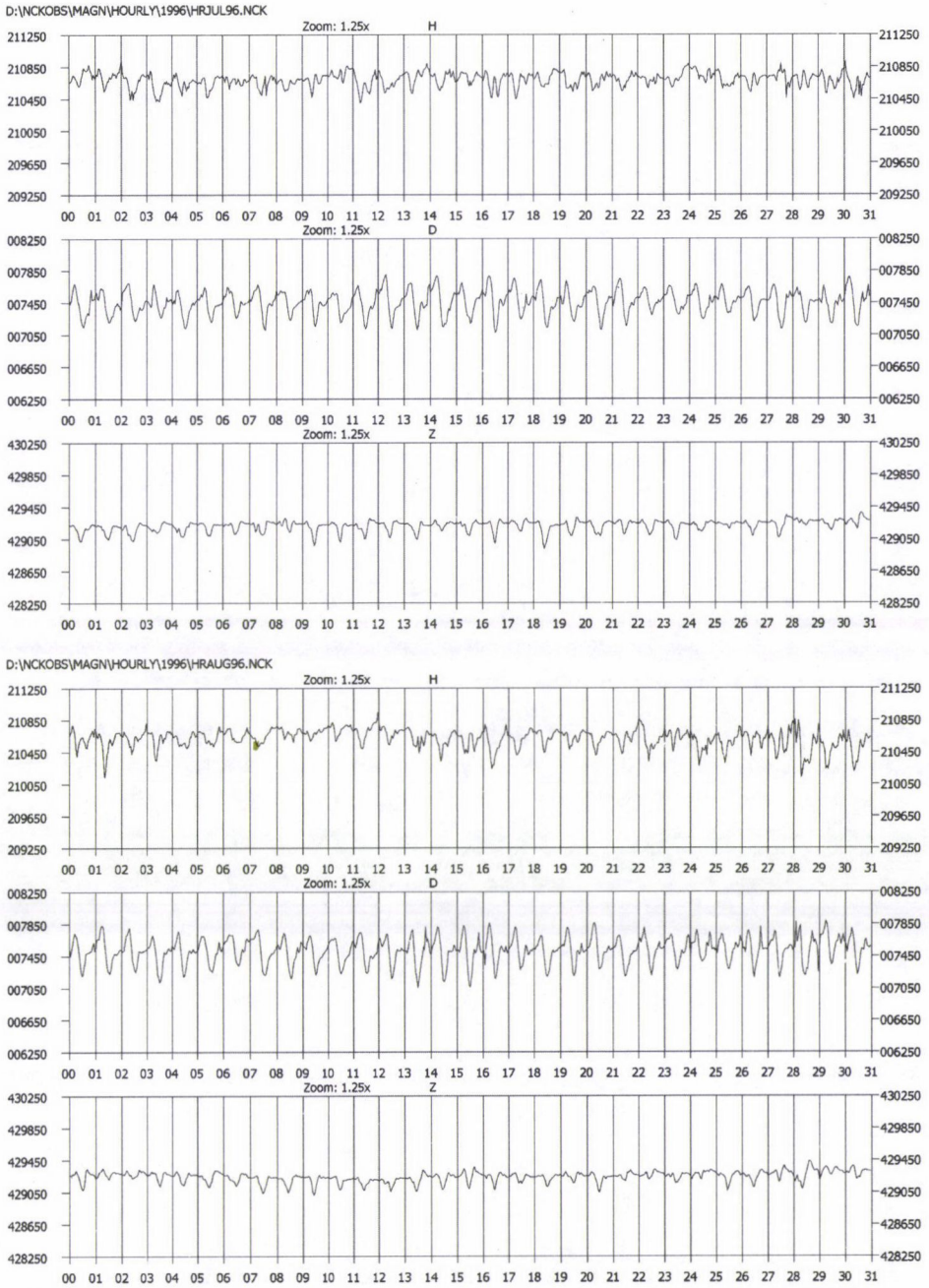


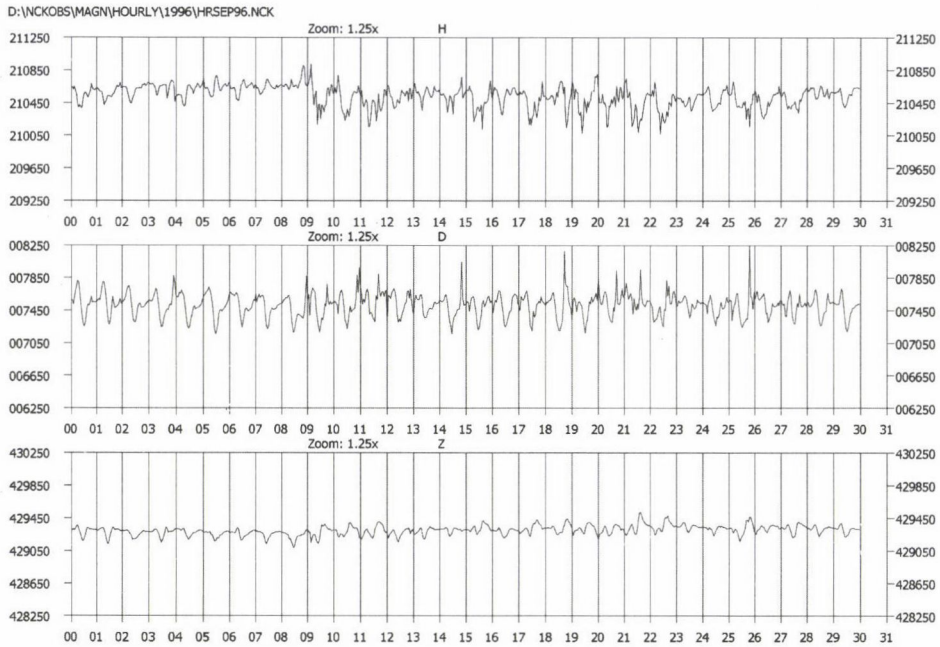

D:\NCKOBS\MAGN\HOURLY\1996\HRMAR96.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

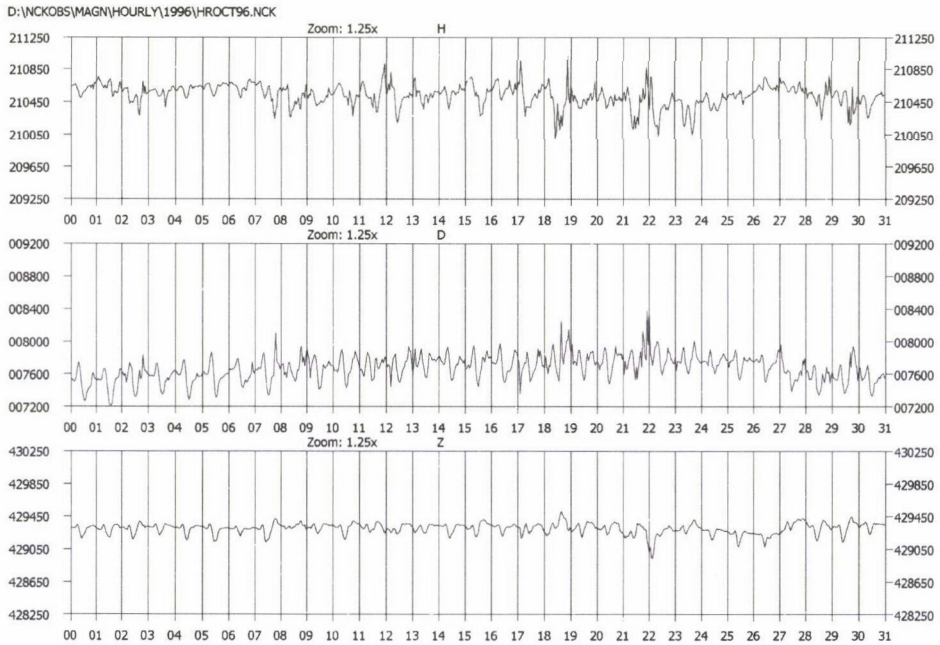

D:\NCKOBS\MAGN\HOURLY\1996\HRAPR96.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250


D:\NCKOBS\MAGN\HOURLY\1996\HRMAY96.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

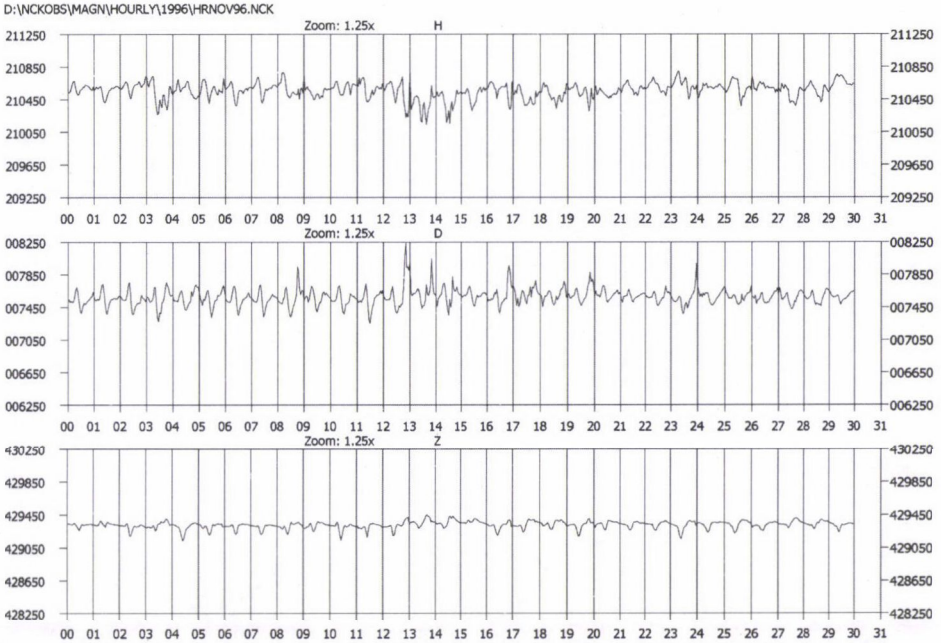

D:\NCKOBS\MAGN\HOURLY\1996\HRJUN96.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250


D:\NCKOBS\MAGN\HOURLY\1996\HRJUL96.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250
D:\NCKOBS\MAGN\HOURLY\1996\HRAUG96.NCK
Zoom: 1.25x H
Zoom: 1.25x D
Zoom: 1.25x Z

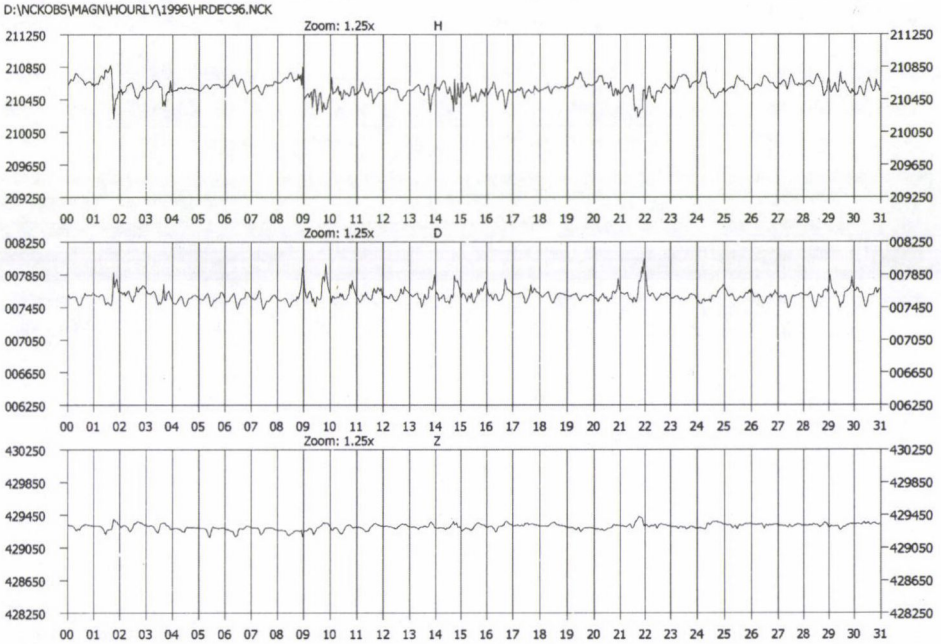

D:\NCKOBS\MAGN\HOURLY\1996\HRSEP96.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

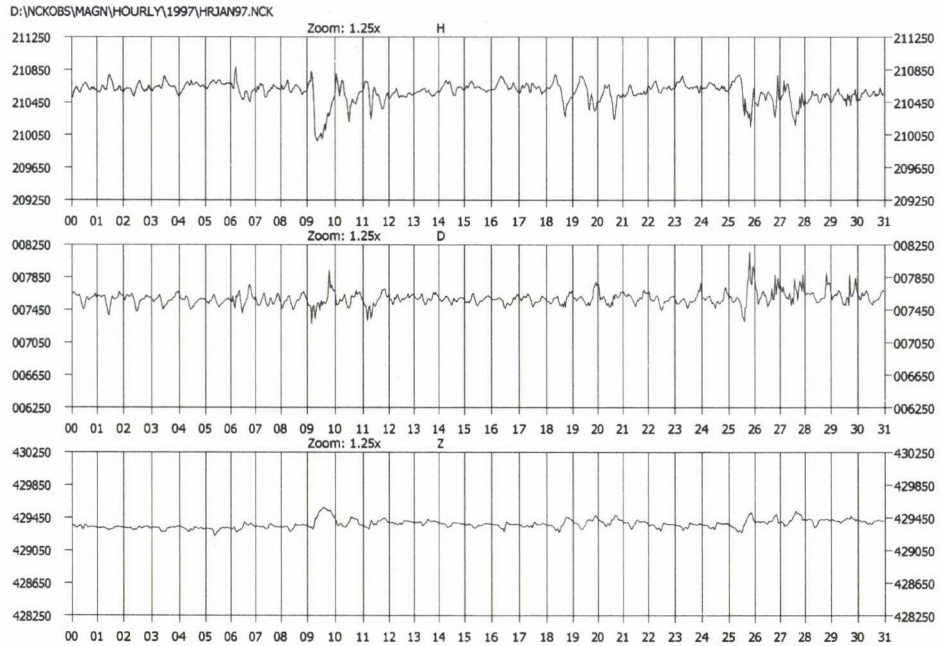

D:\NCKOBS\MAGN\HOURLY\1996\HROCT96.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
009200
008800
008400
008000
007600
007200
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

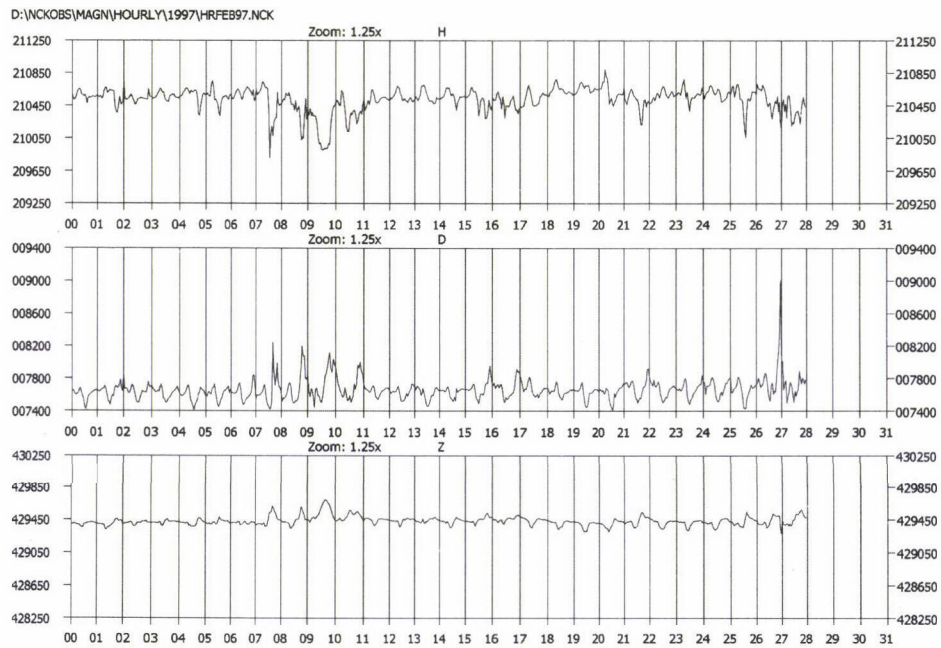
D:\NCKOBS\MAGN\HOURLY\1996\HRNOV96.NCK

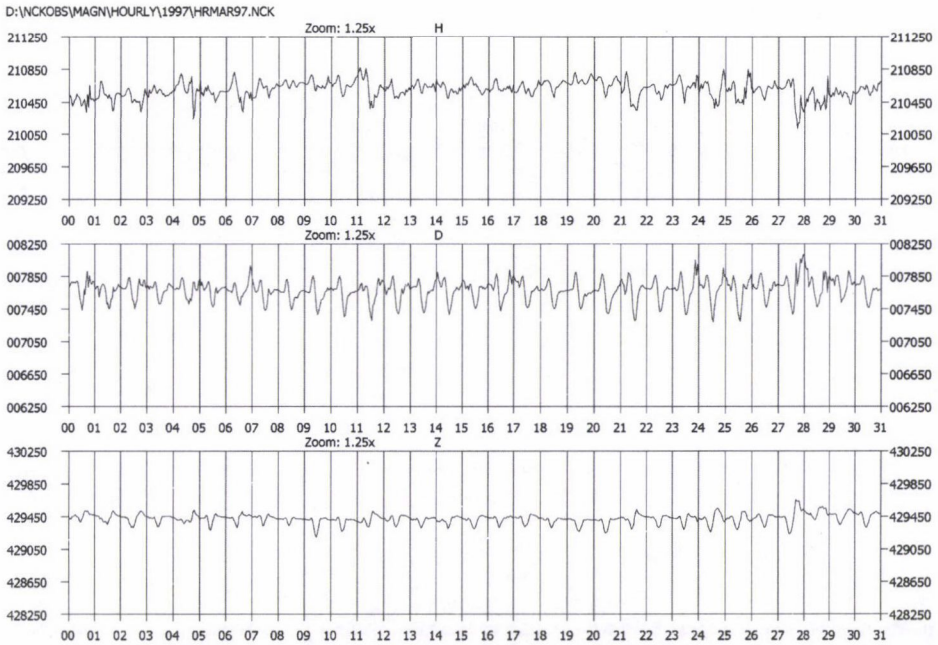


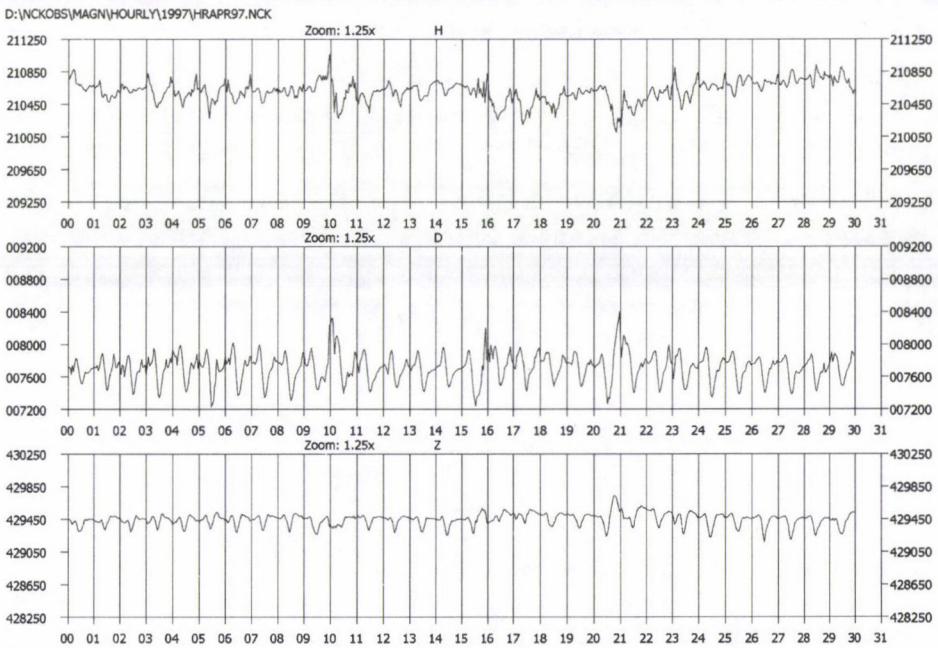
D:\NCKOBS\MAGN\HOURLY\1996\HRDEC96.NCK

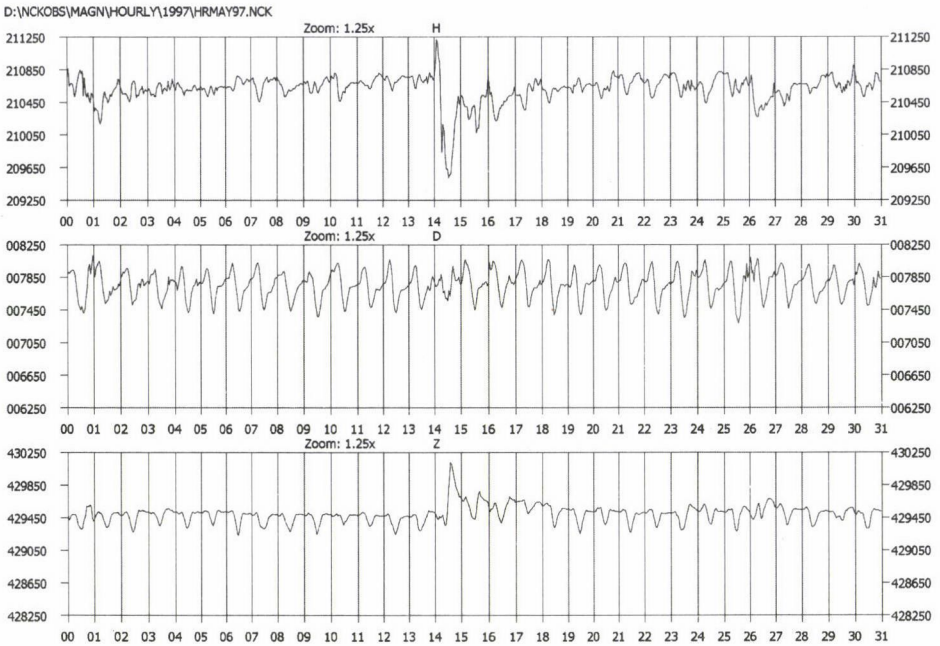


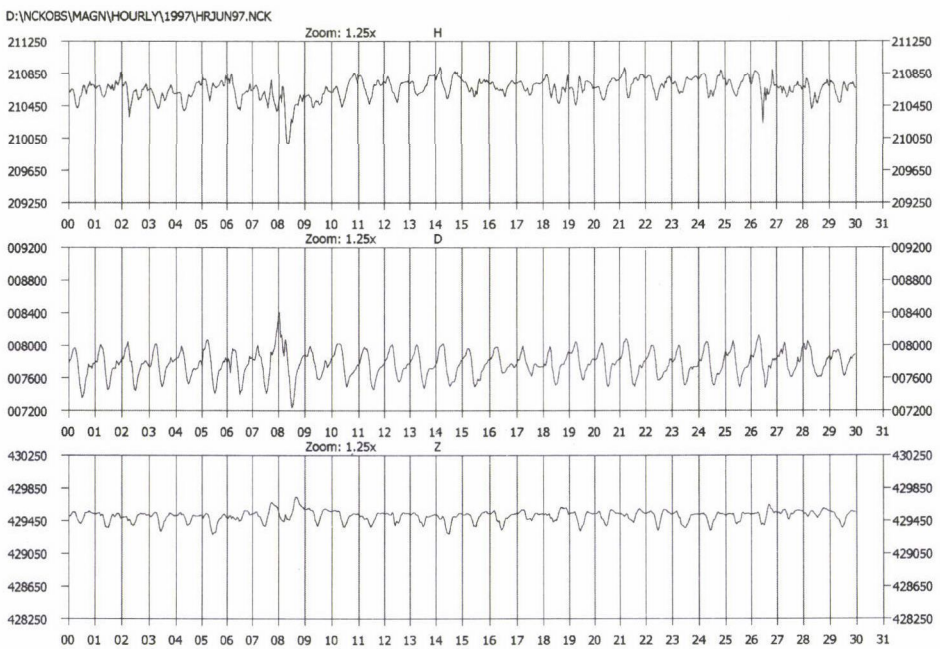

D:\NCKOBS\MAGN\HOURLY\1997\HRJAN97.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

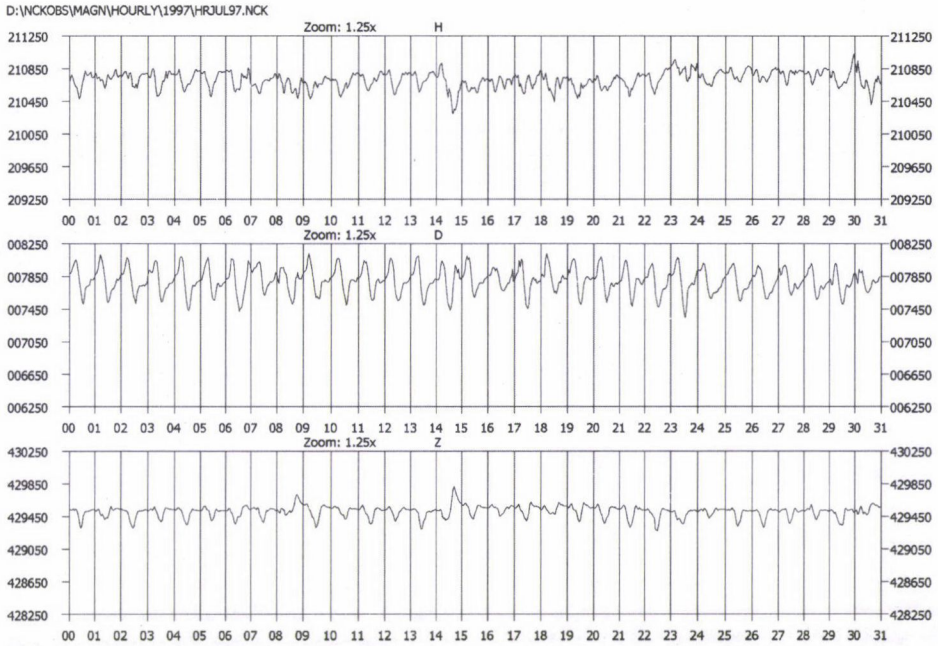

D:\NCKOBS\MAGN\HOURLY\1997\HRFEB97.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
009400
009000
008600
008200
007800
007400
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

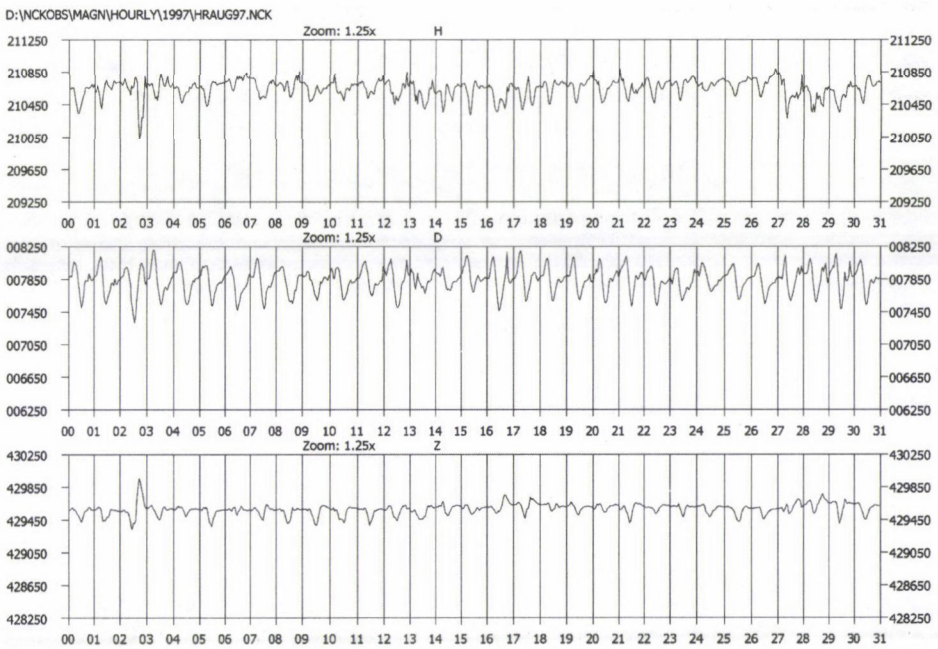

D:\NCKOBS\MAGN\HOURLY\1997\HRMAR97.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

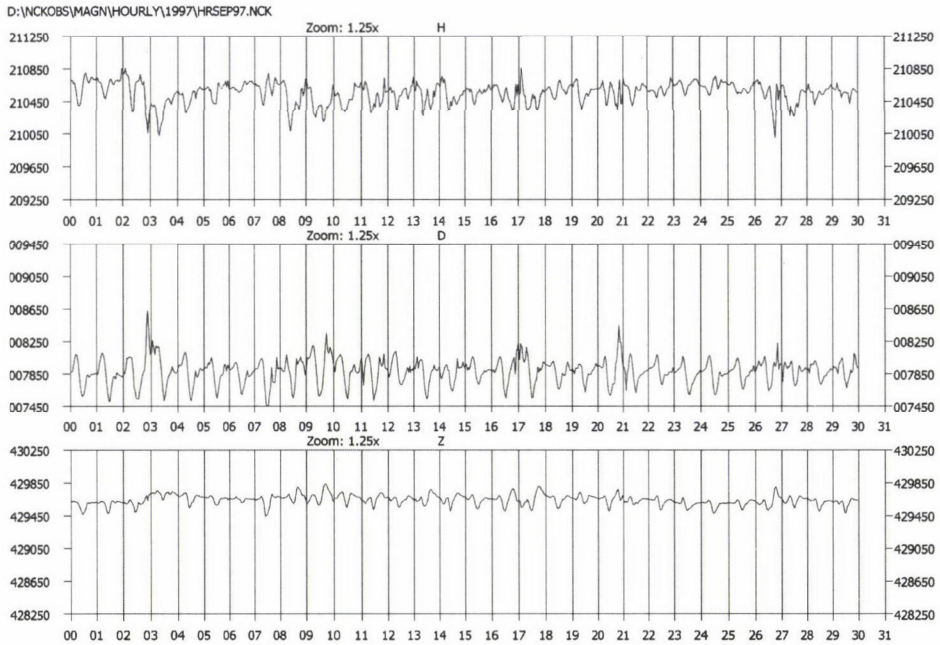

D:\NCKOBS\MAGN\HOURLY\1997\HRAPR97.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
009200
008800
008400
008000
007600
007200
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

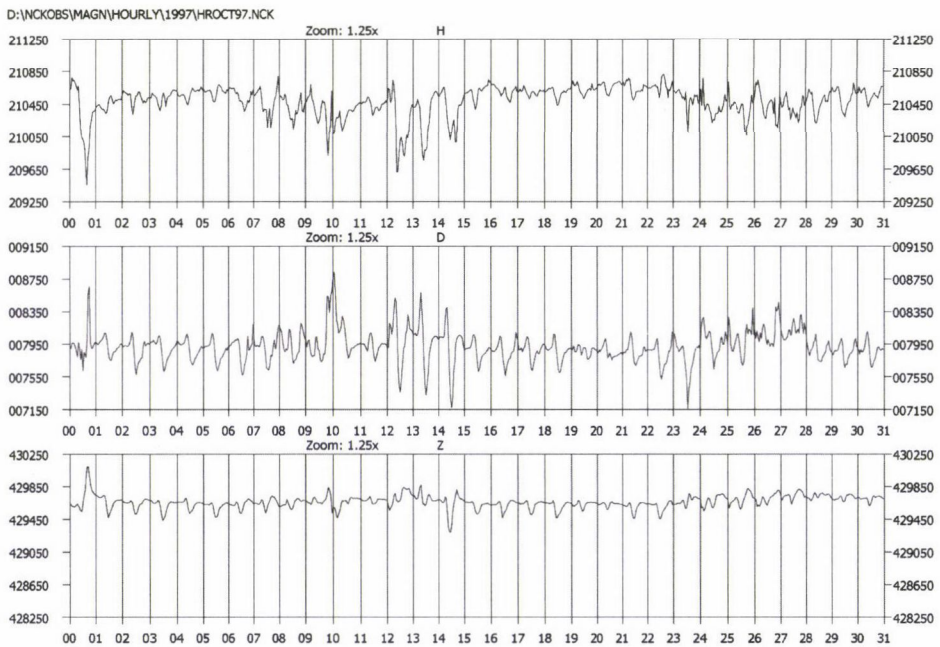

D:\NCKOBS\MAGN\HOURLY\1997\HRMAY97.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

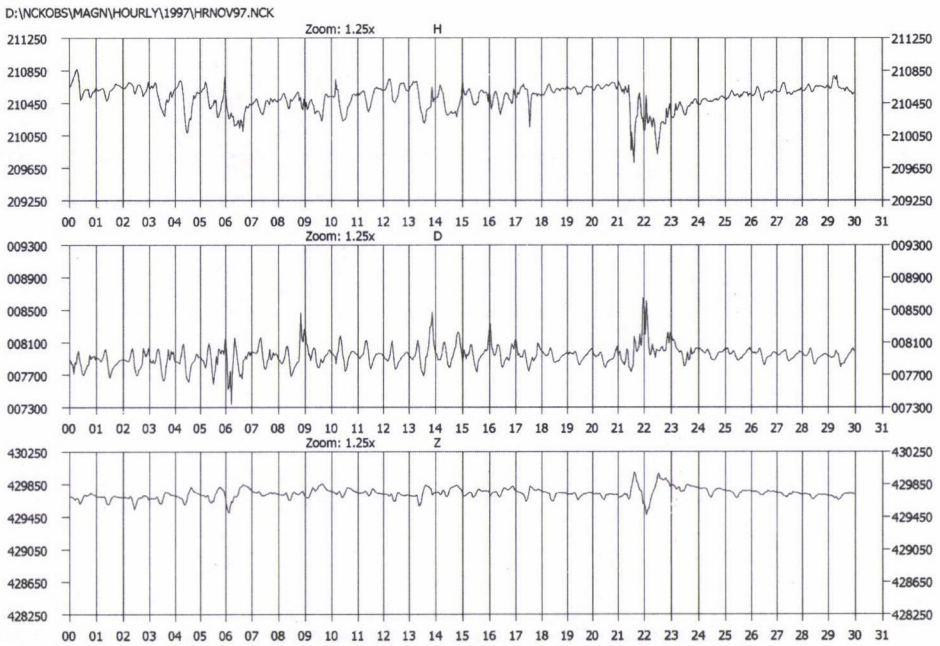

D:\NCKOBS\MAGN\HOURLY\1997\HRJUN97.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
009200
008800
008400
008000
007600
007200
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

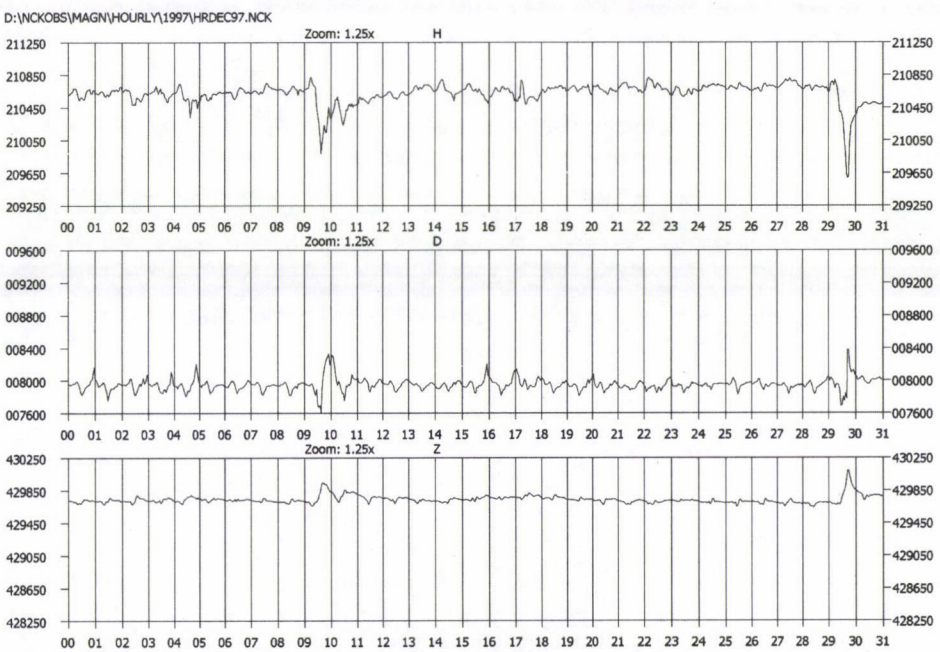

D:\NCKOBS\MAGN\HOURLY\1997\HRJUL97.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

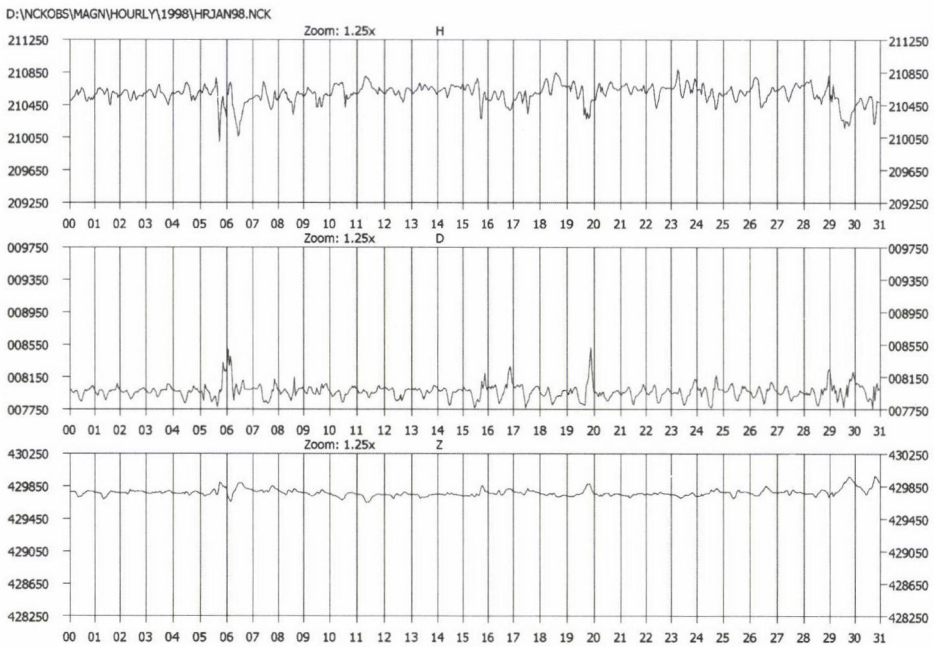

D:\NCKOBS\MAGN\HOURLY\1997\HRAUG97.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
008250
007850
007450
007050
006650
006250
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

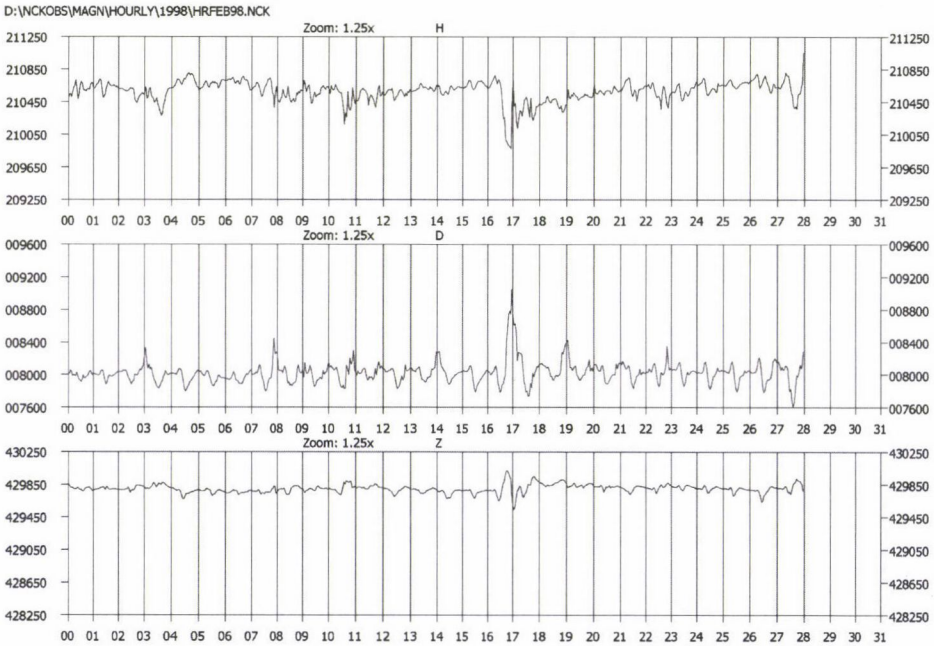


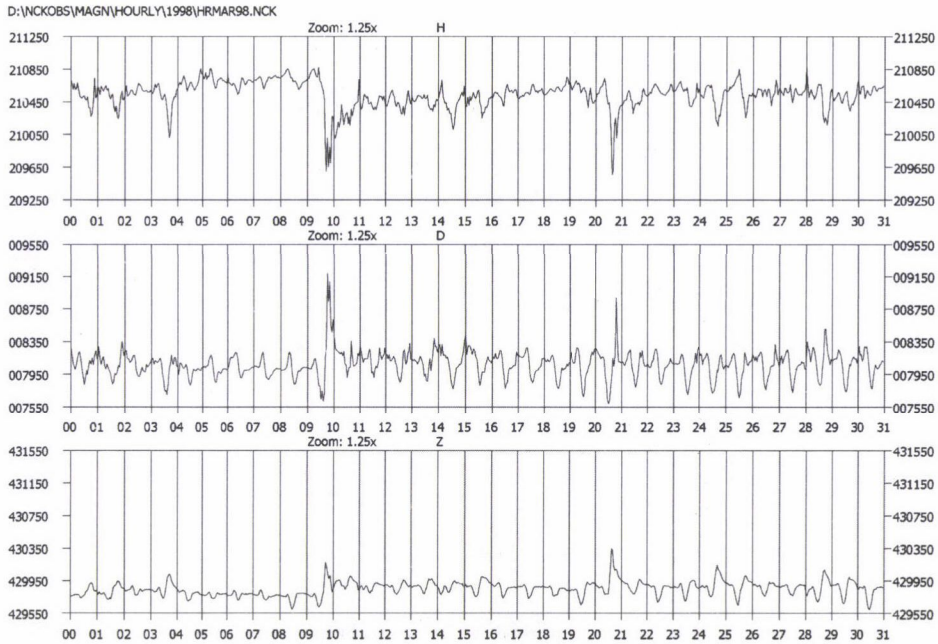


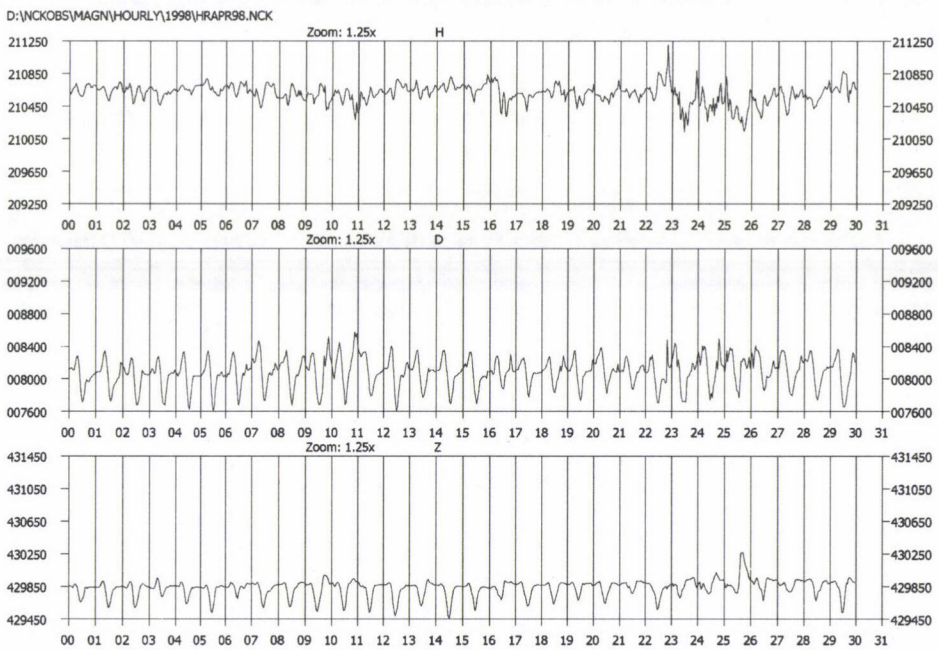

D:\NCKOBS\MAGN\HOURLY\1997\HRNOV97.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
009300
008900
008500
008100
007700
007300
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

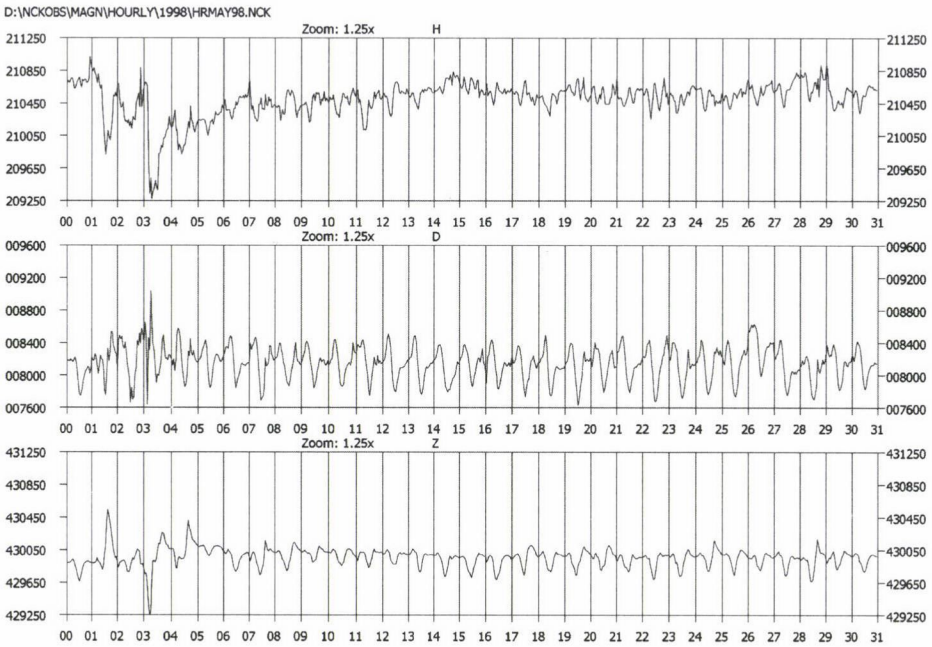

D:\NCKOBS\MAGN\HOURLY\1997\HRDEC97.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
009600
009200
008800
008400
008000
007600
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

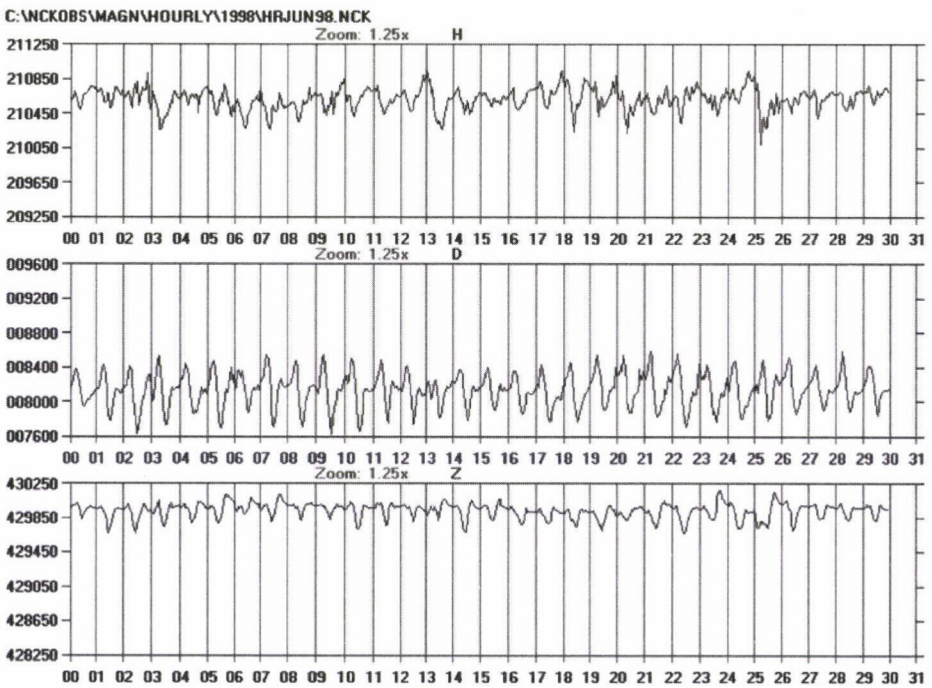

D:\NCKOBS\MAGN\HOURLY\1998\HRJAN98.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
009750
009350
008950
008550
008150
007750
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

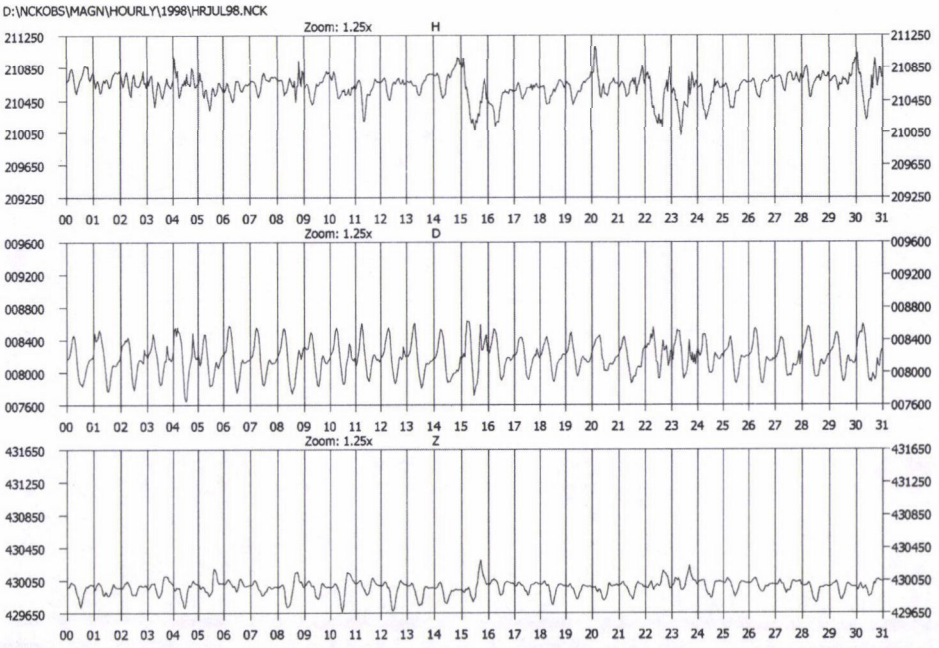

D:\NCKOBS\MAGN\HOURLY\1998\HRFEB98.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
009600
009200
008800
008400
008000
007600
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250

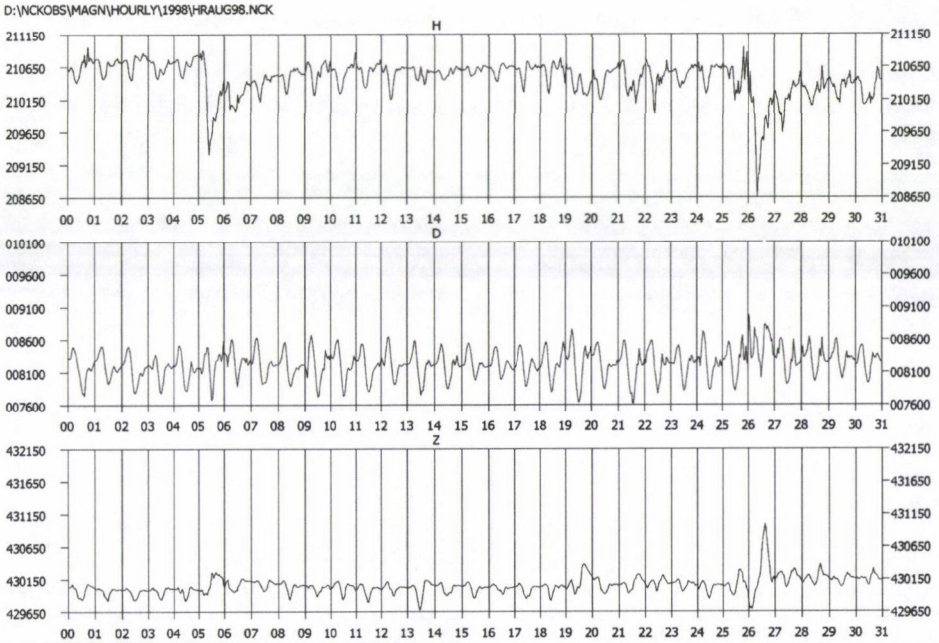

D:\NCKOBS\MAGN\HOURLY\1998\HRMAR98.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
009550
009150
008750
008350
007950
007550
Zoom: 1.25x Z
431550
431150
430750
430350
429950
429550

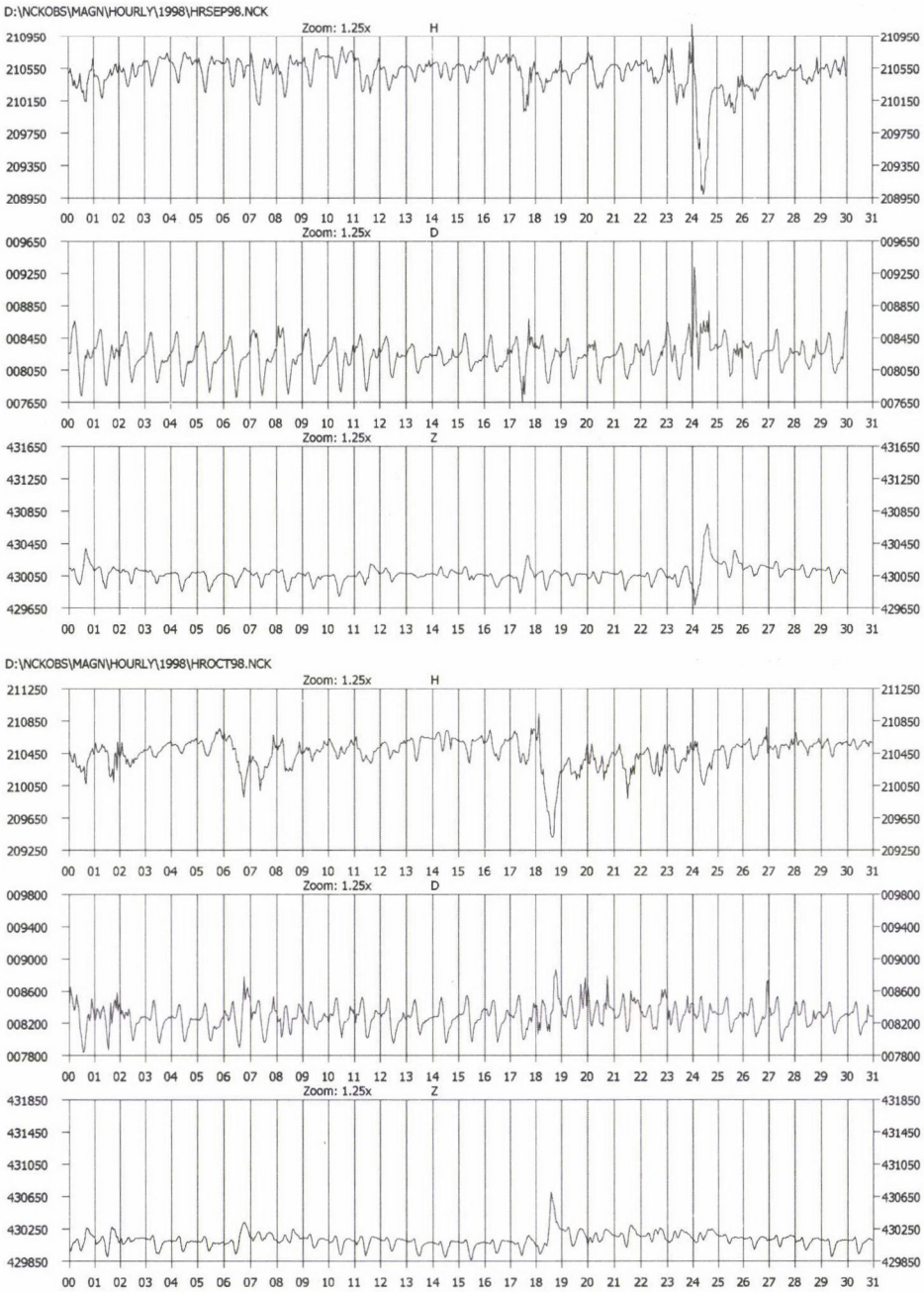

D:\NCKOBS\MAGN\HOURLY\1998\HRAPR98.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
009600
009200
008800
008400
008000
007600
Zoom: 1.25x Z
431450
431050
430650
430250
429850
429450

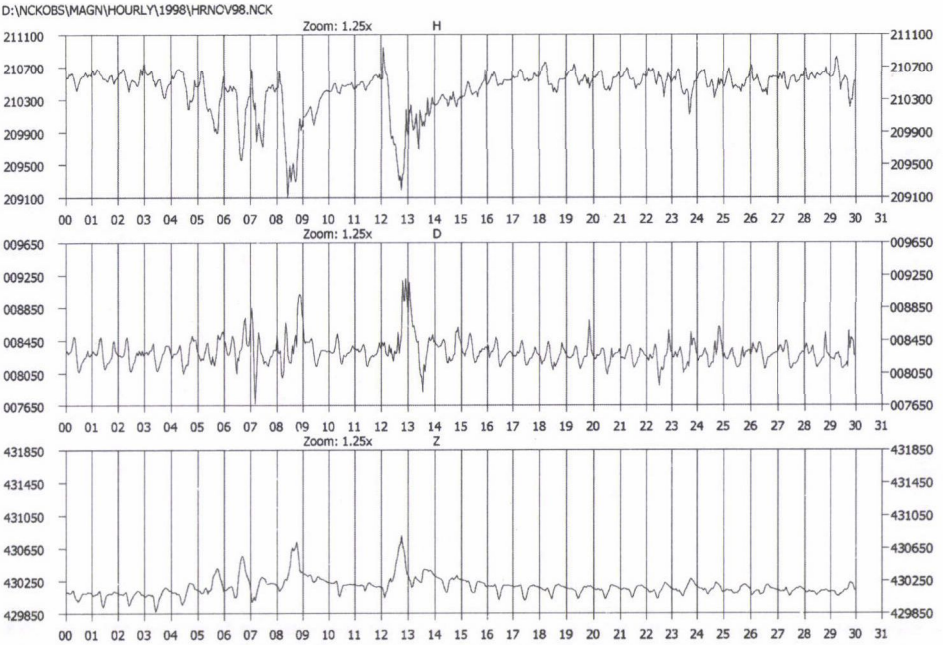

D:\NCKOBS\MAGN\HOURLY\1998\HRMAY98.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
009600
009200
008800
008400
008000
007600
Zoom: 1.25x Z
431250
430850
430450
430050
429650
429250

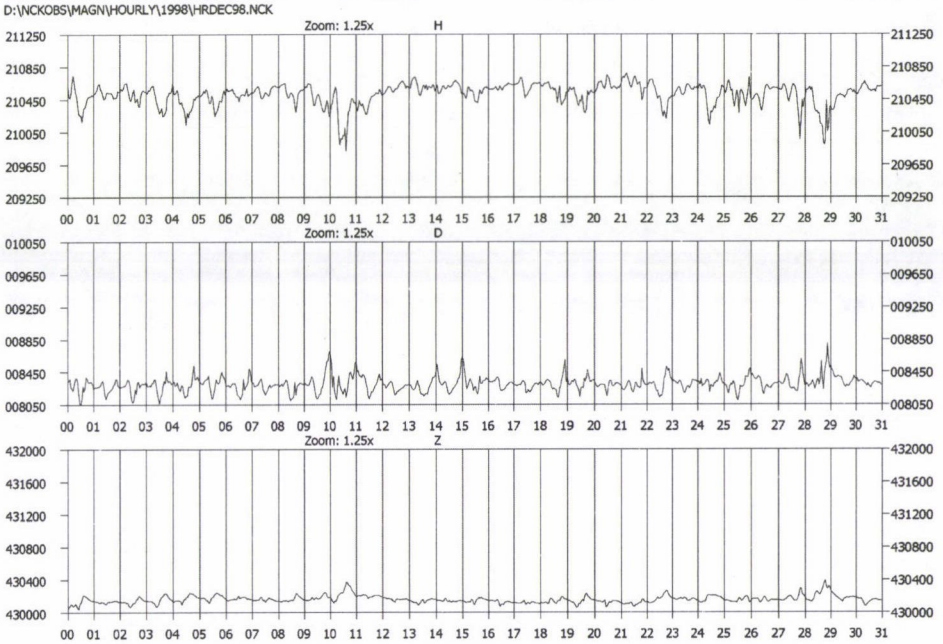

C:\NCKOBS\MAGN\HOURLY\1998\HRJUN98.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
009600
009200
008800
008400
008000
007600
Zoom: 1.25x Z
430250
429850
429450
429050
428650
428250


D:\NCKOBS\MAGN\HOURLY\1998\HRJUL98.NCK
Zoom: 1.25x
H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x
D
009600
009200
008800
008400
008000
007600
Zoom: 1.25x
Z
431650
431250
430850
430450
430050
429650

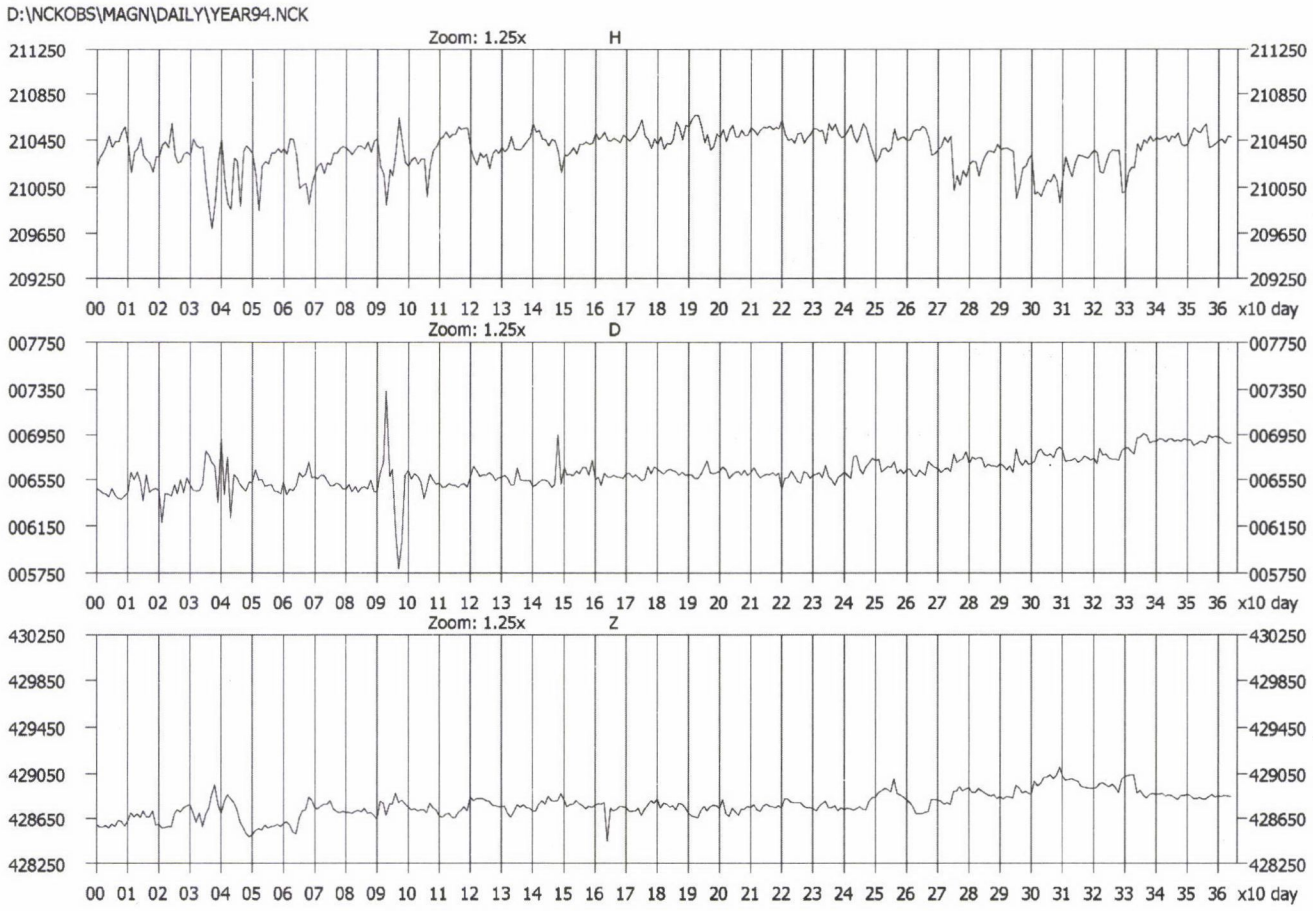

D:\NCKOBS\MAGN\HOURLY\1998\HRAUG98.NCK
H
211150
210650
210150
209650
209150
208650
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
D
010100
009600
009100
008600
008100
007600
Z
432150
431650
431150
430650
430150
429650


D:\NCKOBS\MAGN\HOURLY\1998\HRSEP98.NCK
Zoom: 1.25x H
210950
210550
210150
209750
209350
208950
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x D
009650
009250
008850
008450
008050
007650
Zoom: 1.25x Z
431650
431250
430850
430450
430050
429650
D:\NCKOBS\MAGN\HOURLY\1998\HROCT98.NCK
Zoom: 1.25x H
211250
210850
210450
210050
209650
209250
Zoom: 1.25x D
009800
009400
009000
008600
008200
007800
Zoom: 1.25x Z
431850
431450
431050
430650
430250
429850

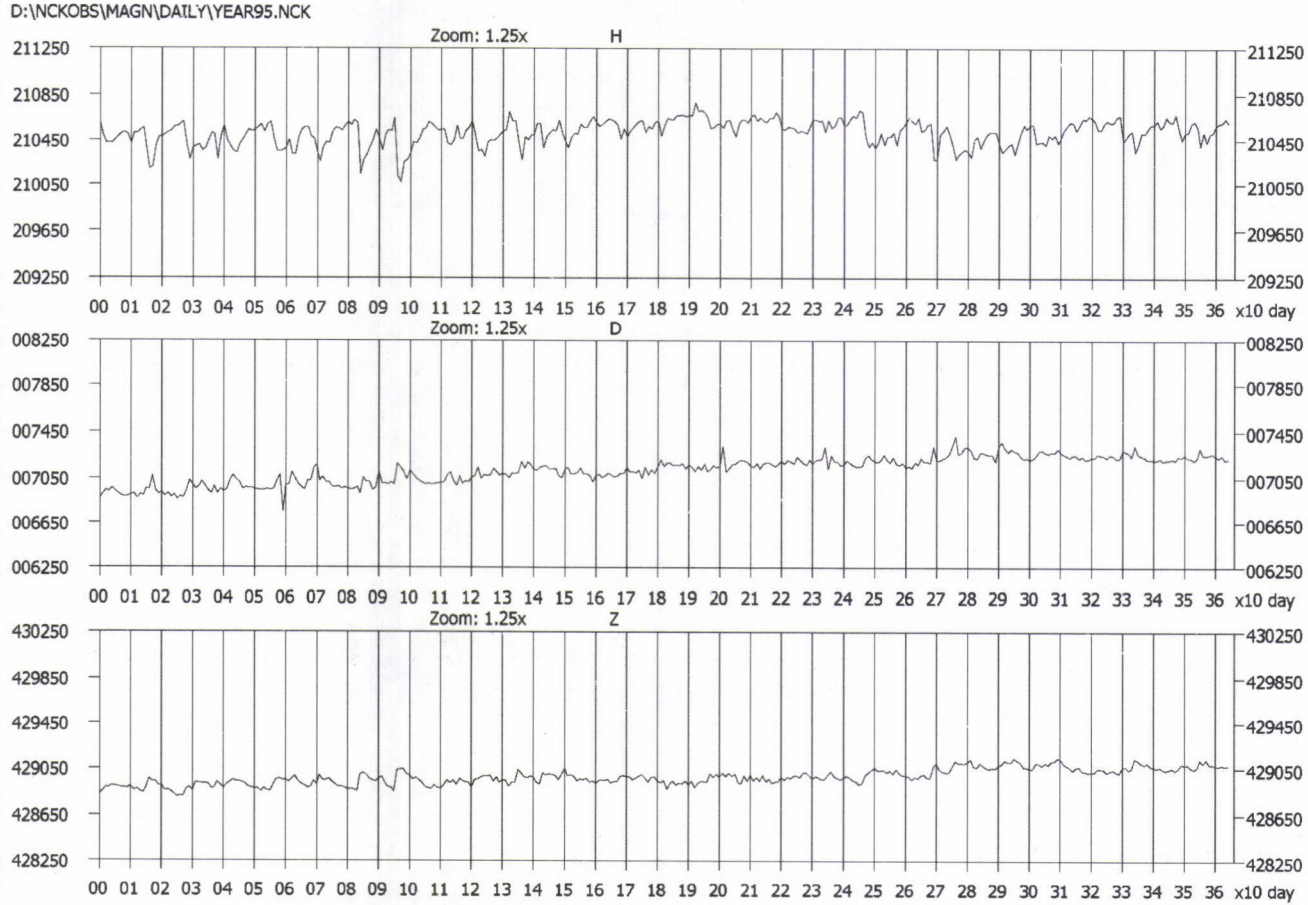

D:\NCKOBS\MAGN\HOURLY\1998\HRNOV98.NCK
Zoom: 1.25x
H
211100
210700
210300
209900
209500
209100
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x
D
009650
009250
008850
008450
008050
007650
Zoom: 1.25x
Z
431850
431450
431050
430650
430250
429850


D:\NCKOBS\MAGN\HOURLY\1998\HRDEC98.NCK
Zoom: 1.25x
H
211250
210850
210450
210050
209650
209250
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Zoom: 1.25x
D
010050
009650
009250
008850
008450
008050
Zoom: 1.25x
Z
432000
431600
431200
430800
430400
430000

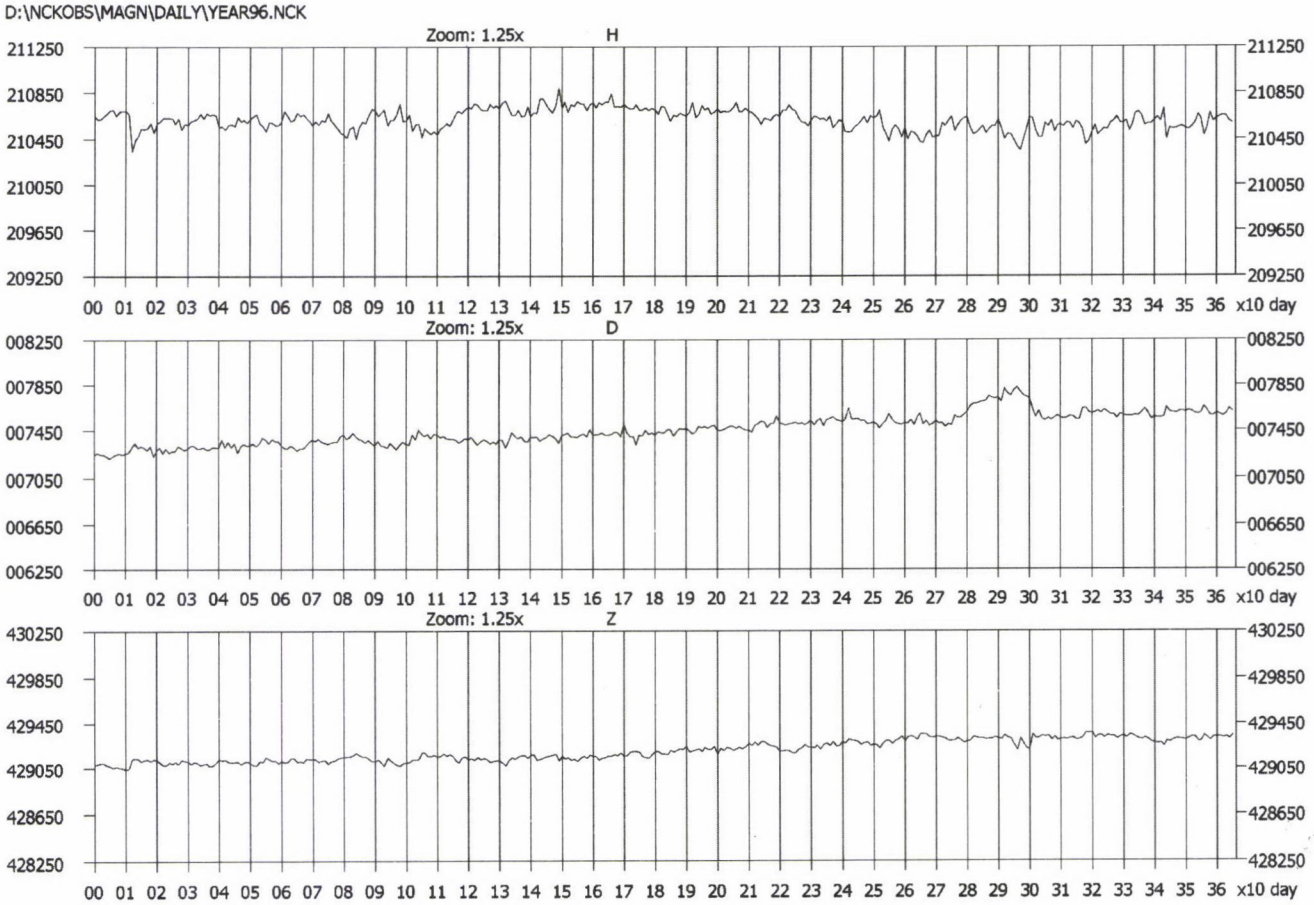
Daily mean values of H, D, Z
1994–1998



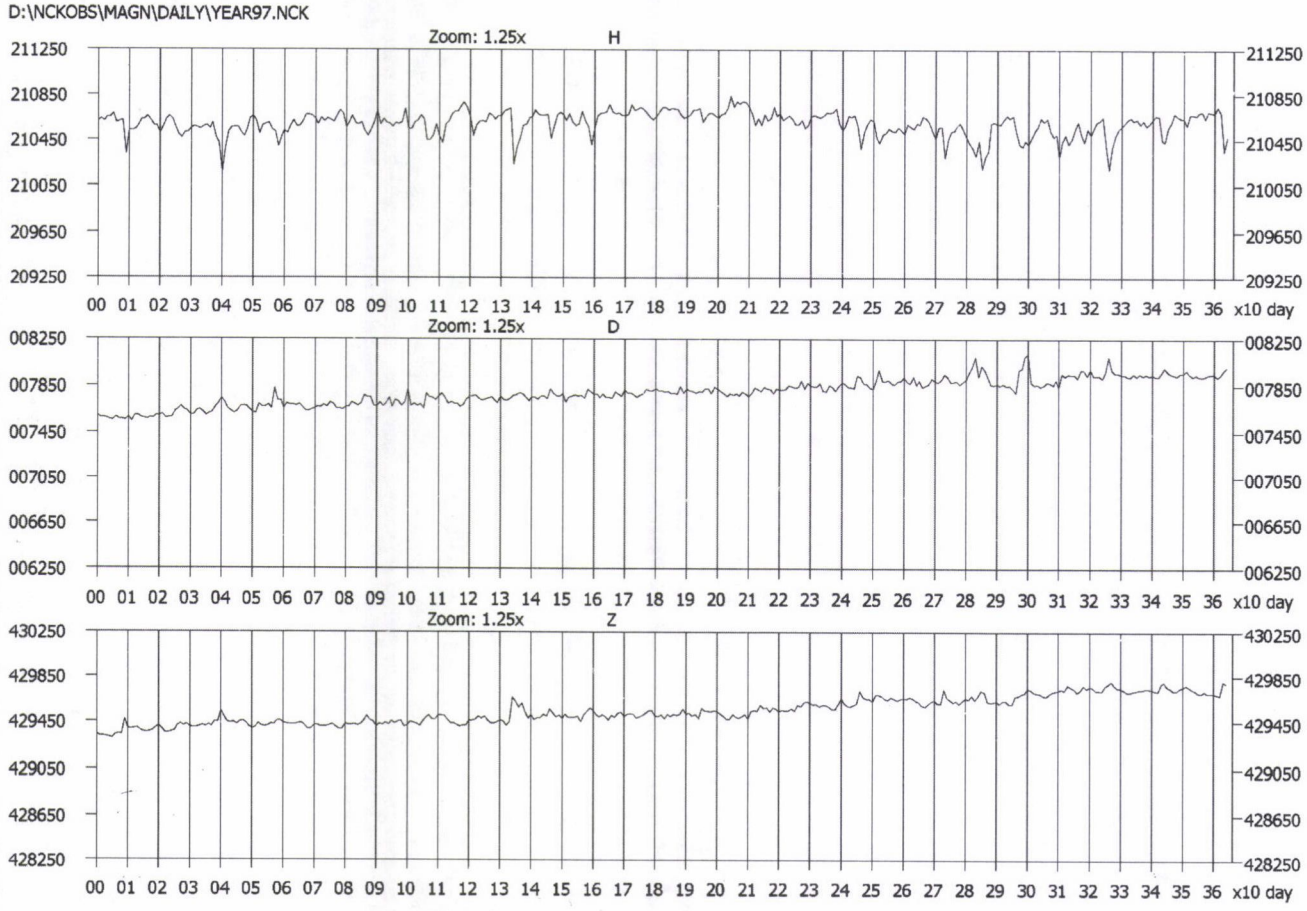
Daily mean values 1994



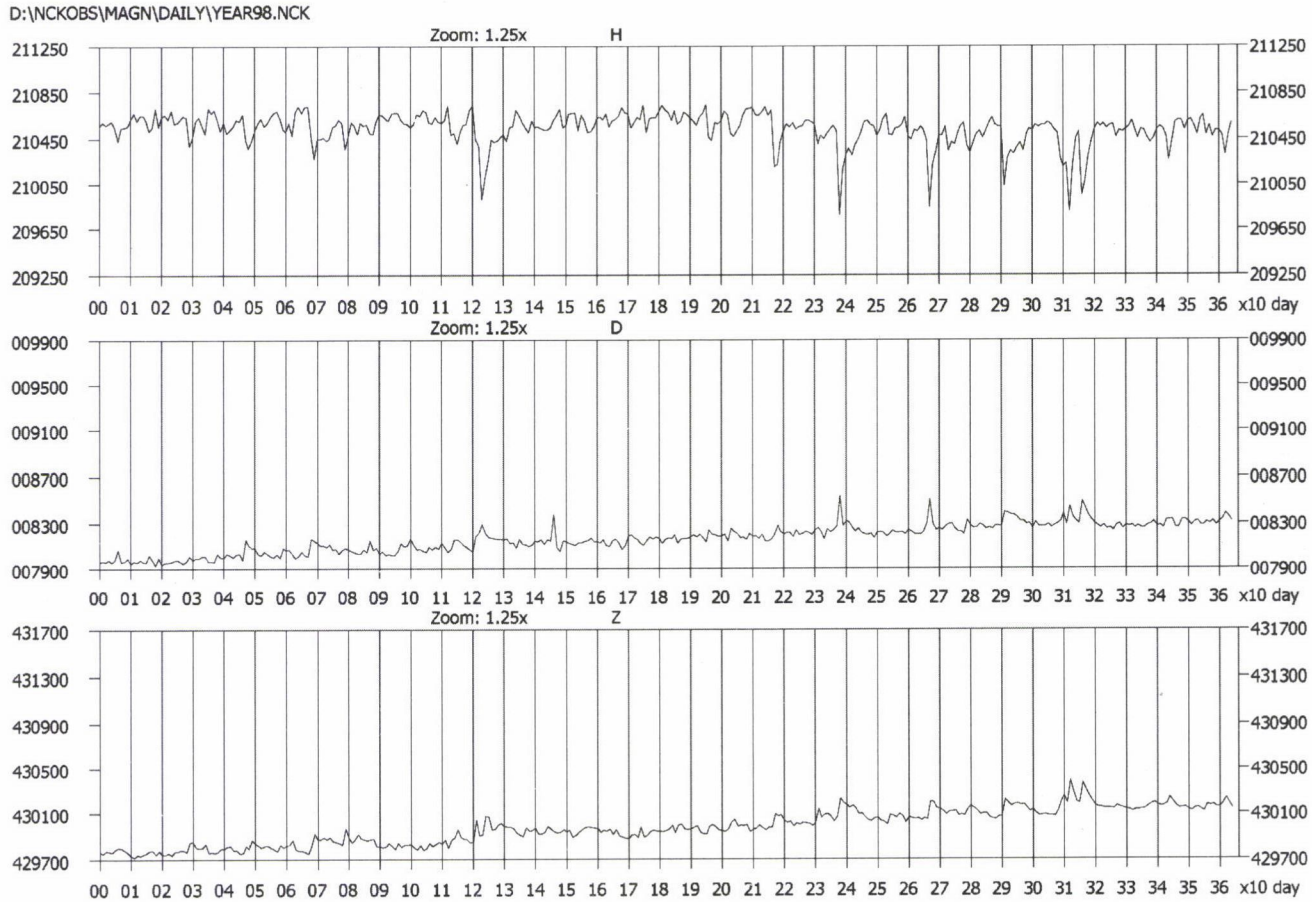
Daily mean values 1995



Daily mean values 1996



Daily mean values 1997



Daily mean values 1998

Geomagnetic K indices
1994–1998

Date	K	Sum	Date	K	Sum
940101	32234434	25	940212	42235555	31
940102	12234442	22	940213	53343675	36
940103	31234451	23	940214	43334656	34
940104	13201020	9	940215	43334555	32
940105	01110022	7	940216	54333353	29
940106	32222424	21	940217	32223332	20
940107	10111031	8	940218	11121003	9
940108	21212112	12	940219	33434354	29
940109	00010120	4	940220	53332342	25
940110	01111010	5	940221	32477866	43
940111	12233665	28	940222	66445333	34
940112	54346634	35	940223	33222243	21
940113	43235445	30	940224	21111111	9
940114	43345544	32	940225	22343232	21
940115	42223464	27	940226	32102200	10
940116	33234443	26	940227	11232201	12
940117	44333444	29	940228	00231034	13
940118	33235543	28	940301	31322324	20
940119	43434244	28	940302	42222255	24
940120	42223342	22	940303	44432132	23
940121	21022253	17	940304	10230001	7
940122	42110022	12	940305	20121025	13
940123	22111222	13	940306	33221234	20
940124	20010001	4	940307	53355666	39
940125	02100023	8	940308	44445555	36
940126	33444453	30	940309	45545655	39
940127	43323445	28	940310	34445556	36
940128	43233123	21	940311	34335545	32
940129	02333222	17	940312	43445555	35
940130	31112433	18	940313	54232325	26
940131	31111214	14	940314	44334455	32
940201	21231111	12	940315	44445654	36
940202	02334340	19	940316	43334544	30
940203	11224442	20	940317	34334554	31
940204	21213553	22	940318	44333324	26
940205	43344456	33	940319	43332133	22
940206	64356676	43	940320	33112344	21
940207	45466563	39	940321	33343544	29
940208	65545655	41	940322	53234334	27
940209	43334656	34	940323	44334432	27
940210	54345554	35	940324	32344323	24
940211	44355665	38	940325	41234554	28

Date	K	Sum	Date	K	Sum
940326	32131221	15	940507	53444343	30
940327	11122225	16	940508	44444444	32
940328	11233433	20	940509	43344443	29
940329	11211012	9	940510	44534444	32
940330	10133454	21	940511	43333533	27
940331	32122111	13	940512	33222202	16
940401	01112223	12	940513	22220112	12
940402	43245576	36	940514	23433334	25
940403	54655666	43	940515	33454454	32
940404	65444555	38	940516	43334543	29
940405	43335545	32	940517	33343322	23
940406	43344655	34	940518	43334324	26
940407	44444554	34	940519	23233211	17
940408	34444455	33	940520	12121301	11
940409	44354454	33	940521	00013111	7
940410	44344544	32	940522	11012232	12
940411	44444545	34	940523	01033313	14
940412	43333455	30	940524	34243333	25
940413	22334554	28	940525	43322324	23
940414	43343543	29	940526	12333213	18
940415	33133444	25	940527	21012311	11
940416	34223365	28	940528	00024765	24
940417	56654234	35	940529	55354543	34
940418	33334354	28	940530	44444555	35
940419	52331123	20	940531	34344354	30
940420	21222111	12	940601	33433344	27
940421	22221133	16	940602	32344544	29
940422	21132123	15	940603	33334453	28
940423	00133344	18	940604	33333334	25
940424	11122301	11	940605	22243434	24
940425	31231122	15	940606	32243233	22
940426	10121011	7	940607	32223224	20
940427	12212001	9	940608	23122322	17
940428	20011011	6	940609	12222211	13
940429	11210013	9	940610	11333534	23
940430	00000000	0	940611	22242323	20
940501	02223576	27	940612	33344433	27
940502	54333355	31	940613	32122443	21
940503	54444553	34	940614	32234323	22
940504	34344444	30	940615	21121211	11
940505	34434654	33	940616	21002111	8
940506	44333345	29	940617	12122421	15

Date	K	Sum	Date	K	Sum
940618	34322422	22	940730	33122125	19
940619	12243334	22	940731	22133324	20
940620	33324333	24	940801	32211221	14
940621	32133222	18	940802	21010111	7
940622	32212222	16	940803	10111111	7
940623	00000111	3	940804	11001101	5
940624	11011000	4	940805	22121120	11
940625	00112112	8	940806	01022011	7
940626	34344443	29	940807	00011221	7
940627	43333222	22	940808	00010001	2
940628	22122345	21	940809	11001232	10
940629	44343444	30	940810	30223333	19
940630	43334444	29	940811	33233323	22
940701	44443345	31	940812	43234353	27
940702	34333434	27	940813	34335554	32
940703	22332323	20	940814	43443444	30
940704	21123332	17	940815	32222234	20
940705	21211103	11	940816	22122133	16
940706	22222235	20	940817	11122311	12
940707	23334343	25	940818	11132212	13
940708	01002210	6	940819	20001120	6
940709	10013321	11	940820	12112133	14
940710	01222210	10	940821	21014311	13
940711	01003211	8	940822	30013325	17
940712	11000200	4	940823	22111221	12
940713	02201121	9	940824	11011322	11
940714	11244545	26	940825	22232320	16
940715	53323335	27	940826	01121223	12
940716	63243435	30	940827	33222233	20
940717	42233323	22	940828	23111121	12
940718	23323231	19	940829	10111103	8
940719	31223023	16	940830	00001112	5
940720	01011111	6	940831	00023223	12
940721	13133112	15	940901	33122042	17
940722	21112110	9	940902	21011001	6
940723	11222322	15	940903	22221101	11
940724	21233223	18	940904	20011101	6
940725	32233333	22	940905	12123211	13
940726	11012111	8	940906	13243343	23
940727	25122234	21	940907	13445565	33
940728	34233234	24	940908	33343444	28
940729	32222324	20	940909	33435554	32

Date	K	Sum	Date	K	Sum
940910	43334332	25	941022	00334446	24
940911	33223142	20	941023	54436453	34
940912	11133221	14	941024	44333654	32
940913	11212225	16	941025	23321030	14
940914	22213110	12	941026	22112032	13
940915	11012121	9	941027	11011001	5
940916	21122222	14	941028	10011103	7
940917	11221312	13	941029	43356733	34
940918	21112102	10	941030	34445465	35
940920	11121122	11	941031	43255453	31
940921	11012123	11	941101	33323423	23
940922	30210132	12	941102	32334324	24
940923	10000112	5	941103	12224342	20
940924	33010111	10	941104	34232353	25
940925	20101256	17	941105	42021354	21
940926	44333322	24	941106	45353561	32
940927	33231425	23	941107	11100141	9
940928	33230211	15	941108	00010113	6
940929	30000231	9	941109	01123445	20
940929	20101112	8	941110	24332243	23
940930	00111122	8	941111	12231112	13
941001	10110011	5	941112	10100120	5
941002	00112445	17	941113	11021322	12
941003	64647644	41	941114	21120134	14
941004	43435543	31	941115	31112123	14
941005	43355554	34	941116	21001210	7
941006	34345446	33	941117	02020042	10
941007	33334555	31	941118	00121222	10
941008	33242333	23	941119	23323433	23
941009	32212252	19	941120	23435323	25
941010	32232344	23	941121	22110102	9
941011	23233352	23	941122	01010232	9
941012	23211254	20	941123	00010102	4
941013	22232233	19	941124	01101311	8
941014	32121334	19	941125	01000012	4
941015	33132112	16	941126	02465652	30
941016	11120111	8	941127	32345543	29
941017	10121002	7	941128	21333421	19
941018	20010123	9	941129	01112332	13
941019	10002334	13	941130	32243334	24
941020	31112333	17	941201	14234325	24
941021	10010000	2	941202	23225555	29

Date	K	Sum
941203	42223123	19
941204	20001140	8
941205	01112222	11
941206	33333554	29
941207	43223434	25
941208	32333333	23
941209	31121233	16
941210	32221333	19
941211	21111344	17
941212	42232344	24
941213	33323421	21
941214	31021133	14
941215	22325444	26
941216	43234222	22
941217	11201231	11
941218	20001333	12
941219	03112101	9
941220	21222333	18
941221	22211111	11
941222	22000000	4
941223	21211224	15
941224	33343655	32
941225	42223434	24
941226	32233333	22
941227	12113255	20
941228	30022313	14
941229	43333300	19
941230	22111210	10
941231	00000123	6

Date	K	Sum	Date	K	Sum
950101	00000131	5	950212	43133565	30
950102	02232554	23	950213	53346545	35
950103	64433534	32	950214	43236552	30
950104	33334232	23	950215	32231445	24
950105	42343444	28	950216	11110323	12
950106	22234345	25	950217	00112211	8
950107	22233223	19	950218	22131341	17
950108	31112320	13	950219	12110013	9
950109	21210012	9	950220	01011110	5
950110	00112133	11	950221	20011013	8
950111	33235232	23	950222	00000000	0
950112	30000112	7	950223	10112011	7
950113	11222011	10	950224	10000011	3
950114	10100123	8	950225	00000000	0
950115	21011001	6	950226	22312333	19
950116	11234253	21	950227	14134354	25
950117	33242466	30	950228	43242475	31
950118	55433223	27	950301	44443555	34
950119	20012220	9	950302	53445533	32
950120	00011153	11	950303	41221013	14
950121	11110242	12	950304	31224347	26
950122	11113213	13	950305	41133343	22
950123	23111001	9	950306	03111100	7
950124	00010000	1	950307	01020100	4
950125	11110110	6	950308	11100021	6
950126	00001002	3	950309	11323265	23
950127	00021000	3	950310	63222233	23
950128	00000021	3	950311	43323566	32
950129	14234546	29	950312	64333555	34
950130	54334555	34	950313	42345644	32
950131	53324464	31	950314	33134443	25
950201	33133332	21	950315	22233044	20
950202	33335544	30	950316	33223233	21
950203	33234464	29	950317	22222333	19
950204	53224533	27	950318	11212021	10
950205	21101201	8	950319	20000022	6
950206	32022313	16	950320	10011110	5
950207	43110224	17	950321	00000000	0
950208	34234222	22	950322	00111001	4
950209	02100100	4	950323	00042231	12
950210	00000113	5	950324	30312212	14
950211	22434545	29	950325	11121012	9

Date	K	Sum	Date	K	Sum
950326	20234444	23	950507	22334344	25
950327	32334343	25	950508	43233332	23
950328	32233431	21	950509	12132143	17
950329	33333222	21	950510	21111121	10
950330	22113211	13	950511	22122021	12
950331	12021232	13	950512	21023221	13
950401	00001454	14	950513	12243312	18
950402	54233110	19	950514	12210110	8
950403	00000000	0	950515	01002122	8
950404	10001102	5	950516	33355555	34
950405	32233253	23	950517	44242342	25
950406	30001023	9	950518	31223234	20
950407	35445676	40	950519	12322232	17
950408	33344644	31	950520	31332343	22
950409	43333423	25	950521	21001011	6
950410	34334334	27	950522	11022113	11
950411	23333254	25	950523	31022455	22
950412	43221432	21	950524	35343423	27
950413	22221113	14	950525	23114331	18
950414	31011111	9	950526	21233444	23
950415	00001110	3	950527	00022230	9
950416	00010022	5	950528	11122102	10
950417	31110111	9	950529	11123232	15
950418	20122232	14	950530	14355454	31
950419	11110012	7	950531	43344553	31
950420	12122221	13	950601	33233543	26
950421	00000101	2	950602	32234432	23
950422	10032443	17	950603	33433333	25
950423	33233425	25	950604	21122321	14
950424	44322353	26	950605	22011313	13
950425	54123322	22	950606	31122121	13
950426	32332334	23	950607	30002122	10
950427	33644241	27	950608	22100001	6
950428	22244321	20	950609	10021221	9
950429	21113223	15	950610	32222211	15
950430	10011012	6	950611	21011011	7
950501	00000012	3	950612	01000100	2
950502	25335655	34	950613	10000101	3
950503	54454544	35	950614	00012223	10
950504	44325445	31	950615	11121211	10
950505	33354544	31	950616	32133341	20
950506	53453333	29	950617	21112211	11

Date	K	Sum	Date	K	Sum
950618	02323213	16	950730	20012223	12
950619	33345443	29	950731	21100313	11
950620	24423423	24	950801	22211000	8
950621	23133322	19	950802	11111220	9
950622	11014221	12	950803	22322221	16
950623	02222311	13	950804	01211121	9
950624	02100111	6	950805	12132322	16
950625	02014443	18	950806	11011112	8
950626	43322233	22	950807	00034333	16
950627	21220111	10	950808	44322253	25
950628	10212324	15	950809	43243445	29
950629	11112411	12	950810	43432232	23
950630	31145454	27	950811	11122223	14
950701	53222222	20	950812	40132123	16
950702	21021221	11	950813	22223324	20
950703	32122133	17	950814	53342444	29
950704	32002310	11	950815	33223244	23
950705	01001100	3	950816	22311200	11
950706	00001102	4	950817	20134222	16
950707	12121100	8	950818	21012232	13
950708	10012110	6	950819	31222343	20
950709	01013310	9	950820	11112211	10
950710	01000100	2	950821	10010000	2
950711	00000001	1	950822	01014255	18
950712	10012212	9	950823	43122111	15
950713	22121110	10	950824	10001123	8
950714	00021333	12	950825	33232223	20
950715	21123222	15	950826	12111003	9
950716	11225635	25	950827	31121131	13
950717	43233523	25	950828	01111211	8
950718	32124232	19	950829	21232232	17
950719	21221124	15	950830	21111011	8
950720	32243301	18	950831	00000202	4
950721	11132210	11	950901	30011030	8
950722	01112221	10	950902	11001122	8
950723	30112332	15	950903	21011122	10
950724	34444344	30	950904	01111113	9
950725	42121000	10	950905	32245555	31
950726	21112122	12	950906	53343323	26
950727	11211131	11	950907	32333542	25
950728	21121021	10	950908	34434542	29
950729	32021311	13	950909	44334313	25

Date	K	Sum	Date	K	Sum
950910	00121334	14	951022	32211153	18
950911	63333444	30	951023	34232243	23
950912	22232354	23	951024	30113532	18
950913	23243333	23	951025	22100000	5
950914	11011234	13	951026	00000212	5
950915	34324641	27	951027	10101113	8
950916	32233223	20	951028	11000011	4
950917	21012120	9	951029	00111002	5
950918	00010012	4	951030	10023522	15
950919	10010122	7	951031	54321344	26
950920	22122323	17	951101	43325254	28
950921	22112212	13	951102	34342530	24
950922	10011121	7	951103	01210130	8
950923	32123254	22	951104	01012521	12
950924	32010211	10	951105	41133425	23
950925	10110210	6	951106	42434352	27
950926	10120112	8	951107	22222132	16
950927	21234565	28	951108	22121321	14
950928	12433000	13	951109	10011011	5
950929	00021200	5	951110	22110131	11
950930	00020113	7	951111	10001014	7
951001	10000033	7	951112	13202150	14
951002	20134225	19	951113	00012211	7
951003	43123544	26	951114	10010012	5
951004	43347655	37	951115	11010000	3
951005	32345225	26	951116	10021003	7
951006	23354535	30	951117	31221103	13
951007	54334433	29	951118	01010113	7
951008	33234552	27	951119	22100114	11
951009	02334544	25	951120	20210001	6
951010	33321101	14	951121	00000101	2
951011	13223533	22	951122	21120413	14
951012	33333133	22	951123	30010000	4
951013	31222333	19	951124	00000110	2
951014	11121223	13	951125	10000012	4
951015	20111203	10	951126	22000000	4
951016	21112243	16	951127	00253444	22
951017	13211211	12	951128	12221343	18
951018	10143566	26	951129	42222511	19
951019	64332124	25	951130	33221101	13
951020	25454652	33	951201	22014555	24
951021	21224434	22	951202	41223232	19

Date	K	Sum
951203	10122253	16
951204	44331211	19
951205	20010022	7
951206	00011212	7
951207	10111210	7
951208	01000002	3
951209	24123211	16
951210	32110001	8
951211	11000120	5
951212	01102243	13
951213	10000011	3
951214	32112110	11
951215	11224543	22
951216	34324121	20
951217	11122543	19
951218	11010001	4
951219	31112210	11
951220	01113200	8
951221	11111234	14
951222	31112463	21
951223	32021131	13
951224	22545433	28
951225	12233432	20
951226	23223342	21
951227	32112232	16
951228	11100211	7
951229	10000122	6
951230	10010110	4
951231	11312231	14

Date	K	Sum	Date	K	Sum
960101	10111042	10	960212	32334134	23
960102	10111333	13	960213	23322453	24
960103	31122211	13	960214	42233322	21
960104	10122101	8	960215	31111152	15
960105	22122223	16	960216	23122413	18
960106	32112212	14	960217	32101132	13
960107	00010133	8	960218	22222435	22
960108	21010020	6	960219	31020033	12
960109	10012012	7	960220	21013224	15
960110	20001133	10	960221	21210011	8
960111	11001133	10	960222	23321131	16
960112	10120215	12	960223	31133523	21
960113	34434633	30	960224	44231352	24
960114	31444346	29	960225	21133554	24
960115	43134324	24	960226	52134144	24
960116	32111231	14	960227	23222354	23
960117	23111253	18	960228	23211212	14
960118	23222332	19	960229	10012255	16
960119	01121335	16	960301	11011131	9
960120	21323110	13	960302	10000002	3
960121	10221323	14	960303	21112223	14
960122	10102332	12	960304	22311332	17
960123	30011110	7	960305	12220032	12
960124	01000433	11	960306	00113200	7
960125	12121132	13	960307	00111020	5
960126	32121331	16	960308	12322001	11
960127	21022223	14	960309	11122332	15
960128	22110044	14	960310	11122144	16
960129	42433453	28	960311	44333344	28
960130	23111224	16	960312	23133445	25
960131	42222233	20	960313	43244433	27
960201	31001332	13	960314	31212033	15
960202	33123421	19	960315	20111130	9
960203	00112012	7	960316	23032211	14
960204	11112224	14	960317	24332343	24
960205	23010111	9	960318	32022132	15
960206	10010020	4	960319	22322444	23
960207	20101324	13	960320	33224355	27
960208	32212231	16	960321	43343556	33
960209	31122124	16	960322	22132443	21
960210	02002245	15	960323	31110032	11
960211	55252343	29	960324	41133335	23

Date	K	Sum	Date	K	Sum
960325	53323421	23	960506	10001112	6
960326	22113333	18	960507	20021102	8
960327	23132113	16	960508	22121110	10
960328	13121213	14	960509	21002212	10
960329	22111332	15	960510	02012121	9
960330	20112212	11	960511	11112211	10
960331	10110223	10	960512	00100023	6
960401	32112233	17	960513	32333324	23
960402	01021214	11	960514	32122134	18
960403	00021113	8	960515	01223240	14
960404	31225313	20	960516	11211243	15
960405	30110202	9	960517	21231011	11
960406	10111001	5	960518	00000000	0
960407	00010010	2	960519	10231232	14
960408	01002203	8	960520	41025333	21
960409	33231333	21	960521	21122331	15
960410	21220111	10	960522	01113133	13
960411	31212204	15	960523	12101202	9
960412	43343444	29	960524	22222232	17
960413	11012215	13	960525	12022312	13
960414	33234346	28	960526	33021201	12
960415	43422323	23	960527	01012434	15
960416	21211323	15	960528	10001101	4
960417	44223545	29	960529	11243322	18
960418	44334234	27	960530	32121222	15
960419	33334553	29	960531	21122123	14
960420	33244233	24	960601	11001101	5
960421	33323344	25	960602	11101211	8
960422	23012212	13	960603	00111102	6
960423	32111133	15	960604	21000211	7
960424	10011231	9	960605	12120123	12
960425	22111111	10	960606	24343421	23
960426	20012110	7	960607	12221210	11
960427	10012034	11	960608	11011132	10
960428	21010111	7	960609	10002321	9
960429	00121112	8	960610	11022111	9
960430	12122120	11	960611	01112221	10
960501	22222132	16	960612	10012110	6
960502	00123112	10	960613	00000001	1
960503	11012213	11	960614	01000101	3
960504	21123242	17	960615	01122222	12
960505	31122100	10	960616	22111121	11

Date	K	Sum	Date	K	Sum
960617	21123213	15	960729	01011000	3
960618	11110225	13	960730	22210032	12
960619	52132323	21	960731	41244413	23
960620	31022110	10	960801	43212325	22
960621	11013112	10	960802	21113101	10
960622	20002212	9	960803	22231213	16
960623	11011111	7	960804	01112221	10
960624	21010230	9	960805	21012121	10
960625	00010112	5	960806	10112331	12
960626	10011111	6	960807	00220231	10
960627	01131222	12	960808	01011111	6
960628	32002122	12	960809	20022322	13
960629	30122333	17	960810	11001100	4
960630	21111121	10	960811	20000122	7
960701	11003233	13	960812	10010013	6
960702	31011223	13	960813	32112111	12
960703	33132222	18	960814	11024242	16
960704	24221231	17	960815	11222211	12
960705	23122210	13	960816	21233442	21
960706	11111210	8	960817	43222103	17
960707	22112210	11	960818	10112211	9
960708	11232423	18	960819	11111102	8
960709	11020000	4	960820	11223231	15
960710	01010011	4	960821	01020021	6
960711	00001101	3	960822	01002211	7
960712	11111123	11	960823	23223022	16
960713	21022222	13	960824	22122213	15
960714	11222134	16	960825	42222442	22
960715	12113432	17	960826	33211224	18
960716	02011221	9	960827	32221433	20
960717	22112102	11	960828	40123343	20
960718	11111311	10	960829	54534435	33
960719	20012112	9	960830	52322233	22
960720	11132322	15	960831	23222130	15
960721	11122332	15	960901	21110031	9
960722	12101232	12	960902	01111112	8
960723	11111210	8	960903	00000011	2
960724	01000111	4	960904	00032324	14
960725	11122331	14	960905	11011102	7
960726	11001222	9	960906	21111201	9
960727	01112100	6	960907	11112012	9
960728	10003442	14	960908	22012010	8

Date	K	Sum	Date	K	Sum
960909	00121234	13	961021	12111312	12
960910	54444353	32	961022	43234656	33
960911	34233235	25	961023	65332433	29
960912	53425534	31	961024	42112321	16
960913	52232344	25	961025	10120131	9
960914	22221221	14	961026	30111110	8
960915	21223353	21	961027	00022012	7
960916	13432513	22	961028	44232244	25
960917	32111333	17	961029	32124244	22
960918	41334334	25	961030	12111553	19
960919	10133642	20	961031	22102122	12
960920	53354335	31	961101	20101001	5
960921	43444553	32	961102	00000000	0
960922	33435522	27	961103	00000022	4
960923	24343533	27	961104	20133223	16
960924	11212131	12	961105	20101122	9
960925	13222312	16	961106	22020224	14
960926	33222464	26	961107	01000211	5
960927	53132313	21	961108	01111110	6
960928	12223432	19	961109	02122252	16
960929	21212130	12	961110	41112220	13
960930	01021100	5	961111	00010220	5
961001	01100023	7	961112	31212102	12
961002	21113323	16	961113	11012355	18
961003	23313354	24	961114	62023454	26
961004	11012322	12	961115	31244431	22
961005	00010020	3	961116	10000122	6
961006	10010100	3	961117	21221155	19
961007	00001232	8	961118	33223341	21
961008	21222352	19	961119	33113223	18
961009	24223354	25	961120	20111344	16
961010	34223232	21	961121	31000112	8
961011	10013322	12	961122	10002200	5
961012	23134424	23	961123	00000021	3
961013	35231323	22	961124	00022315	13
961014	52233411	21	961125	12221111	11
961015	11100121	7	961126	21114211	13
961016	32224422	21	961127	43221001	13
961017	01020223	10	961128	33120210	12
961018	54432234	27	961129	01101222	9
961019	43355636	35	961130	00000001	1
961020	43323323	23	961201	00011202	6

Date	K	Sum
961202	02020542	15
961203	22021222	13
961204	12122454	21
961205	00000000	0
961206	00001001	2
961207	00121120	7
961208	00010211	5
961209	00000226	10
961210	52432442	26
961211	41232242	20
961212	41122221	15
961213	11111221	10
961214	00223033	13
961215	33022454	23
961216	31232333	20
961217	22221321	15
961218	11001221	8
961219	00000002	2
961220	00000100	1
961221	02112323	14
961222	10013234	14
961223	23112200	11
961224	11001301	7
961225	11111102	8
961226	00010011	3
961227	10000212	6
961228	00010011	3
961229	00000002	2
961230	31022203	13
961231	11110121	8

Date	K	Sum	Date	K	Sum
970101	10011111	6	970212	42210000	9
970102	10111121	8	970213	10111101	6
970103	10010122	7	970214	11220112	10
970104	10010001	3	970215	00122310	9
970105	11021200	7	970216	00123033	12
970106	00011001	3	970217	22332132	18
970107	23123422	19	970218	12111211	10
970108	34102122	15	970219	00001001	2
970109	31121021	11	970220	00012121	7
970110	34454443	31	970221	03233203	16
970111	54223023	21	970222	30011313	12
970112	11431232	17	970223	12223112	14
970113	22112221	13	970224	02232003	12
970114	00100122	6	970225	30111222	12
970115	00101210	5	970226	33234421	22
970116	00100002	3	970227	32214347	26
970117	00001011	3	970228	64334444	32
970118	21110111	8	970301	31223442	21
970119	10011320	8	970302	13232301	15
970120	11112323	14	970303	00132423	15
970121	31113321	15	970304	30102011	8
970122	11000122	7	970305	00002443	13
970123	20000010	3	970306	41223300	15
970124	02010213	9	970307	00223123	13
970125	21001033	10	970308	10012211	8
970126	22124465	26	970309	00000000	0
970127	33231455	26	970310	00000003	3
970128	34325554	31	970311	21000001	4
970129	21222142	16	970312	23334232	22
970130	21204443	20	970313	21200232	12
970131	12011133	12	970314	11110112	8
970201	20112211	10	970315	41110121	11
970202	12211344	18	970316	22221211	13
970203	41000123	11	970317	11111133	12
970204	00120111	6	970318	12111212	11
970205	00012221	8	970319	00011000	2
970206	13223112	15	970320	00000020	2
970207	11000034	9	970321	00011111	5
970208	31136642	26	970322	23232210	15
970209	22224455	26	970323	00012110	5
970210	33333344	26	970324	01132145	17
970211	33233345	26	970325	21223334	20

Date	K	Sum	Date	K	Sum
970326	22333445	26	970507	10100012	5
970327	40000231	10	970508	10000112	5
970328	00113554	19	970509	20011000	4
970329	33242345	26	970510	11011112	8
970330	22232232	18	970511	20222010	9
970331	01011232	10	970512	01000000	1
970401	34312101	15	970513	10011000	3
970402	12212231	14	970514	10011333	12
970403	33010031	11	970515	54655534	37
970404	43122313	19	970516	21224413	19
970405	33010334	17	970517	43031123	17
970406	20232403	16	970518	11212222	13
970407	32012223	15	970519	00010100	2
970408	00001022	5	970520	11221200	9
970409	20002113	9	970521	00022131	9
970410	20002335	15	970522	20000213	8
970411	45424345	31	970523	00011100	3
970412	30133100	11	970524	11233332	18
970413	13121211	12	970525	11102121	9
970414	20002001	5	970526	10023344	17
970415	20110000	4	970527	45322213	22
970416	00004456	19	970528	11023101	9
970417	44332344	27	970529	10000012	4
970418	32324133	21	970530	00002323	10
970419	22234223	20	970531	21022333	16
970420	01100022	6	970601	11122332	15
970421	00134433	18	970602	10012223	11
970422	53021032	16	970603	33311233	19
970423	20133133	16	970604	20011220	8
970424	53112232	19	970605	01000111	4
970425	23112233	17	970606	42132213	18
970426	11001011	5	970607	33123322	19
970427	10000123	7	970608	01132433	17
970428	00000110	2	970609	45444333	30
970429	00001131	6	970610	11110230	9
970430	33221143	19	970611	11010111	6
970501	41103546	24	970612	20122110	9
970502	42113323	19	970613	01012000	4
970503	21123332	17	970614	00000000	0
970504	21102242	14	970615	21111221	11
970505	32021122	13	970616	01123221	12
970506	20011200	6	970617	01111110	6

Date	K	Sum	Date	K	Sum
970618	01111101	6	970730	22010123	11
970619	22222324	19	970731	44333213	23
970620	00002201	5	970801	21112122	12
970621	00010010	2	970802	10001230	7
970622	14223321	18	970803	22144545	27
970623	11222223	15	970804	22220231	14
970624	01122120	9	970805	10110110	5
970625	11222133	15	970806	10000101	3
970626	31000023	9	970807	00123313	13
970627	12244333	22	970808	11021312	11
970628	22022221	13	970809	00223333	16
970629	21122112	12	970810	11211122	11
970630	21010211	8	970811	23222021	14
970701	00001110	3	970812	10121223	12
970702	21012121	10	970813	21232244	20
970703	22123201	13	970814	34421223	21
970704	21102321	12	970815	01021210	7
970705	11102200	7	970816	31121000	8
970706	13121021	11	970817	20113452	18
970707	13123444	22	970818	10112320	10
970708	10102202	8	970819	21010100	5
970709	31202443	19	970820	11111012	8
970710	01122211	10	970821	33122022	15
970711	11100112	7	970822	32212312	16
970712	10000201	4	970823	11000121	6
970713	00000100	1	970824	21122133	15
970714	01000110	3	970825	10110010	4
970715	12343322	20	970826	00000110	2
970716	10022220	9	970827	00111112	7
970717	01220223	12	970828	23321234	20
970718	23333112	18	970829	12343333	22
970719	13113222	15	970830	02123333	17
970720	21122000	8	970831	11021110	7
970721	10011221	8	970901	11011102	7
970722	20132111	11	970902	11001023	8
970723	11022123	12	970903	32233356	27
970724	21334233	21	970904	43232231	20
970725	31110121	10	970905	01012321	10
970726	10001101	4	970906	02323133	17
970727	11112221	11	970907	00002201	5
970728	10123211	11	970908	00124444	19
970729	11111011	7	970909	22233344	23

Date	K	Sum	Date	K	Sum
970910	32233445	26	971022	12020121	9
970911	32232223	19	971023	00232234	16
970912	43223342	23	971024	31245334	25
970913	40301224	16	971025	53233334	26
970914	33133232	20	971026	42103445	23
970915	32132302	16	971027	54321354	27
970916	21100112	8	971028	42232453	25
970917	10012235	14	971029	22110022	10
970918	54323322	24	971030	20121231	12
970919	00110021	5	971031	21101311	10
970920	21113001	9	971101	13332233	20
970921	11230356	21	971102	01000010	2
970922	54212110	16	971103	00010233	9
970923	10122113	11	971104	22212332	17
970924	21211102	10	971105	00123220	10
970925	01001210	5	971106	01243345	22
970926	00021122	8	971107	55323532	28
970927	31212443	20	971108	02011310	8
970928	43322321	20	971109	11021154	15
970929	31320112	13	971110	41212312	16
970930	03222332	17	971111	13022002	10
971001	42454752	33	971112	10000100	2
971002	21112103	11	971113	00011021	5
971003	12233320	16	971114	11122354	19
971004	20023001	8	971115	22011121	10
971005	10000110	3	971116	42122113	16
971006	00010222	7	971117	43020133	16
971007	11022435	18	971118	23225231	20
971008	01334424	21	971119	10010201	5
971009	22433252	23	971120	21010000	4
971010	33322456	28	971121	10000111	4
971011	55310100	15	971122	32355554	32
971012	12122102	11	971123	45344244	30
971013	21231120	12	971124	33213322	19
971014	01012100	5	971125	10000201	4
971015	00010201	4	971126	10012012	7
971016	00010013	5	971127	00002010	3
971017	10232333	17	971128	01000012	4
971018	21000101	5	971129	00000001	1
971019	00010000	1	971130	01231121	11
971020	22110030	9	971201	01001123	8
971021	10110000	3	971202	10010011	4

Date	K	Sum
971203	21112122	12
971204	20211224	14
971205	11122223	14
971206	11010112	7
971207	00012001	4
971208	00100000	1
971209	00000120	3
971210	03133445	23
971211	32123221	16
971212	11100000	3
971213	00000000	0
971214	00001112	5
971215	00010200	3
971216	00002123	8
971217	10011123	9
971218	34110023	14
971219	11001022	7
971220	10111023	9
971221	31000112	8
971222	00010021	4
971223	21111112	10
971224	22002120	9
971225	11000000	2
971226	10001001	3
971227	10000000	1
971228	00000010	1
971229	11011012	7
971230	33124651	25
971231	21110001	6

Date	K	Sum	Date	K	Sum
980101	00210101	5	980212	31111232	14
980102	03002102	8	980213	11122332	15
980103	00102011	5	980214	10131134	14
980104	00011112	6	980215	21110001	6
980105	00101220	6	980216	01111122	9
980106	34103554	25	980217	00024456	21
980107	45232210	19	980218	65333543	32
980108	00232244	17	980219	11120243	14
980109	31124410	16	980220	41120342	17
980110	22013311	13	980221	31111132	13
980111	22023210	12	980222	21222331	16
980112	01230030	9	980223	21113344	19
980113	00002210	5	980224	10111102	7
980114	10210011	6	980225	00010132	7
980115	10010002	4	980226	00000011	2
980116	20002543	16	980227	00212231	11
980117	22101343	16	980228	12234325	22
980118	20323210	13	980301	43223434	25
980119	01001222	8	980302	42333343	25
980120	13113556	25	980303	31000031	8
980121	13321001	11	980304	22002523	16
980122	00012023	8	980305	31331024	17
980123	12110012	8	980306	43313211	18
980124	03321022	13	980307	21021000	6
980125	23101541	17	980308	01001000	2
980126	00011220	6	980309	10220000	5
980127	22232221	16	980310	12353676	33
980128	00000221	5	980311	53444515	31
980129	11112324	15	980312	33333343	25
980130	53333432	26	980313	33222444	24
980131	31012354	19	980314	10122443	17
980201	22320013	13	980315	44321104	19
980202	01010000	2	980316	43323431	23
980203	00002213	8	980317	11031113	11
980204	42122200	13	980318	00010012	4
980205	02012212	10	980319	11010102	6
980206	10110210	6	980320	31123233	18
980207	00000012	3	980321	21345663	30
980208	00101245	13	980322	23333540	23
980209	33233231	20	980323	33011013	12
980210	43221133	19	980324	00222134	14
980211	33114545	26	980325	12125533	22

Date	K	Sum	Date	K	Sum
980326	01034432	17	980507	31132333	19
980327	32233343	23	980508	43244141	23
980328	33121224	18	980509	03301321	13
980329	54224554	31	980510	01122332	14
980330	11222234	17	980511	11121224	14
980331	33122002	13	980512	32111330	14
980401	20100020	5	980513	02101001	5
980402	00000113	5	980514	00011001	3
980403	20301211	10	980515	11004321	12
980404	33122201	14	980516	12221344	19
980405	11011100	5	980517	52112313	18
980406	10022121	9	980518	10113322	13
980407	21101433	15	980519	10120210	7
980408	33101231	14	980520	10012451	14
980409	12110231	11	980521	32333133	21
980410	12121555	22	980522	41012321	14
980411	31223244	21	980523	12212033	14
980412	43121111	14	980524	32213423	20
980413	01000142	8	980525	11221223	14
980414	11011211	8	980526	40012233	15
980415	01111002	6	980527	12221223	15
980416	20332014	15	980528	01001123	8
980417	33233241	21	980529	23124643	25
980418	11232010	10	980530	52433322	24
980419	00000243	9	980531	11010011	5
980420	11223113	14	980601	21100210	7
980421	22111213	13	980602	21122213	14
980422	02013223	13	980603	00134244	18
980423	02201065	16	980604	31121121	12
980424	45545225	32	980605	10033432	16
980425	44334452	29	980606	12134434	22
980426	54324335	29	980607	33332323	22
980427	44232121	19	980608	31112221	13
980428	22011233	14	980609	01233232	16
980429	21011003	8	980610	12234334	22
980430	00042533	17	980611	30021020	8
980501	22212115	16	980612	13221010	10
980502	42112131	15	980613	01001132	8
980503	54434566	37	980614	44222212	19
980504	68746523	41	980615	01123310	11
980505	36324530	26	980616	11011301	8
980506	10202103	9	980617	11000002	4

Date	K	Sum	Date	K	Sum
980618	12020124	12	980730	22132334	20
980619	31243312	19	980731	43345554	33
980620	03211234	16	980801	11225562	24
980621	34242143	23	980802	22230143	17
980622	32120332	16	980803	21142232	17
980623	22112224	16	980804	24211232	17
980624	33234434	26	980805	00122211	9
980625	34231444	25	980806	34665344	35
980626	54443452	31	980807	45334242	27
980627	12011101	7	980808	32123320	16
980628	01001001	3	980809	00012210	6
980629	00112110	6	980810	43323254	26
980630	11012211	9	980811	20011214	11
980701	10012332	12	980812	22212224	17
980702	42222232	19	980813	32122310	14
980703	41013334	19	980814	01223340	15
980704	22222242	18	980815	01012332	12
980705	44234452	28	980816	11010200	5
980706	34434321	24	980817	02100001	4
980707	22133210	14	980818	02301122	11
980708	12010120	7	980819	20013334	16
980709	01112554	19	980820	53334443	29
980710	31021222	13	980821	31011013	10
980711	33222433	22	980822	21233453	23
980712	22222112	14	980823	42334433	26
980713	12011123	11	980824	00122234	14
980714	11002110	6	980825	43233133	22
980715	00110102	5	980826	11454566	32
980716	35444543	32	980827	76755676	49
980717	32323321	19	980828	44433553	31
980718	21023313	15	980829	42322451	23
980719	12211112	11	980830	33343333	25
980720	32000111	8	980831	32433343	25
980721	14342222	20	980901	23233344	24
980722	22123424	20	980902	10143332	17
980723	35533544	32	980903	41112302	14
980724	33354543	30	980904	21111032	11
980725	12323321	17	980905	10020212	8
980726	32111212	13	980906	21012102	9
980727	02122111	10	980907	10112132	11
980728	02003334	15	980908	33100211	11
980729	23322323	20	980909	33101212	13

Date	K	Sum	Date	K	Sum
980910	32211122	14	981022	21444553	28
980911	10202213	11	981023	22134544	25
980912	21123433	19	981024	43212344	23
980913	32222221	16	981025	33212321	17
980914	10000113	6	981026	11210112	9
980915	12121130	11	981027	21122225	17
980916	10212112	10	981028	31223233	19
980917	22111123	13	981029	41232323	20
980918	32245664	32	981030	22221011	11
980919	31233133	19	981031	21011142	12
980920	31121211	12	981101	21110021	8
980921	33323111	17	981102	32000032	10
980922	01222242	15	981103	11110223	11
980923	32333234	23	981104	21210322	13
980924	34342347	30	981105	31022424	18
980925	77745613	40	981106	33323354	26
980926	21123454	22	981107	32334354	27
980927	32333222	20	981108	56544324	33
980928	22121132	14	981109	54656564	41
980929	02121242	14	981110	32210100	9
980930	22121134	16	981111	00021013	7
981001	52343443	28	981112	10200122	8
981002	52425465	33	981113	55554566	41
981003	42212011	13	981114	53365543	34
981004	21012013	10	981115	21133344	21
981005	21120022	10	981116	22112323	16
981006	10100322	9	981117	42210101	11
981007	32334654	30	981118	32332133	20
981008	42333234	24	981119	31223231	17
981009	34332344	26	981120	12222153	18
981010	22231133	17	981121	21122412	15
981011	32103043	16	981122	22310120	11
981012	42001121	11	981123	31123334	20
981013	22231103	14	981124	24243653	29
981014	11000010	3	981125	22232554	25
981015	00112320	9	981126	22232432	20
981016	10112022	9	981127	33222411	18
981017	12233233	19	981128	23000221	10
981018	11222343	18	981129	23222052	18
981019	56345554	37	981130	04441455	27
981020	23442365	29	981201	33224211	18
981021	54333452	29	981202	10211021	8

Date	K	Sum
981203	11112421	13
981204	12223432	19
981205	33334340	23
981206	01222333	16
981207	21121424	17
981208	10001201	5
981209	22132400	14
981210	10111233	12
981211	54434543	32
981212	21122033	14
981213	11110111	7
981214	21122102	11
981215	40011013	10
981216	21220400	11
981217	00000000	0
981218	00011001	3
981219	01022324	14
981220	33233341	22
981221	00111212	8
981222	10011040	7
981223	10111222	10
981224	11011112	8
981225	22132325	20
981226	23214034	19
981227	20010000	3
981228	01001264	14
981229	22223465	26
981230	22210112	11
981231	21111110	8

Special phenomena

SSC-s 1994–1998

Date	CET (UT+1h)	Ampl. in H(nT)	Hx	Hy	Hz	Remark
940221	0900	138	-	+	-	–
940528	1354	52	+	-	+	–
941012	1727	9	+	-	0	very weak storm
941019	1432	15	+	-	-	–
941022	0849	21	+	-	-	–
941029	0025	46	+	-	-	–
941205	2105	9	+	-	-	–
950226	0359	8	+	-	+	–
950323	1038	41	+	-	-	no storm
950724	0253	36	+	-	-	–
950817	0256	15	+	-	+	–
950822	1307	39	+	-	+	–
951018	1122	36	+	-	-	–
951224	0600	37	+	-	+	–
960408	1334	24	+	-	-	no storm
960618	2319	44	+	-	-	short storm
960709	0909	15	+	+	-	unusual event
960728	1306	22	+	-	+	–
961111	1527	11	+	-	-	no storm
961113	1300	19	+	-	-	–
970110	0104	21	+	-	+	–
970111	0116	44	+	-	+	–
970209	1321	27	+	-	-	–
970227	1809	9	+	-	-	–
970416	1319	17	+	-	+	–
970501	1243	25	+	-	+	–
970515	0159	52	+	-	-	–
970619	0033	15	+	-	+	–
970622	0312	14	+	-	-	–
970803	1140	30	+	-	+	–

Date	CET (UT+1h)	Ampl. in H(nT)	Hx	Hy	Hz	Remark
970902	2359	19	+	-	-	–
971001	0059	43	+	-	-	–
971010	1611	16	+	-	-	–
971106	2248	66	+	-	+	–
971210	0525	16	+	-	+	–
971230	0208	17	+	-	+	–
980106	1413	25	+	-	-	–
980106	1413	25	+	-	-	–
980108	0828	20	+	-	-	–
980124	0529	16	+	-	-	–
980228	2300	77	+	-	-	–
980304	1156	12	+	-	+	–
980407	1745	33	+	-	+	–
980423	1822	37	+	-	+	–
980430	0927	33	+	-	-	–
980501	2155	51	+	-	+	–
980503	1742	54	+	-	+	–
980515	1449	38	+	-	+	–
980613	1924	32	+	-	-	–
980625	1636	31	+	-	+	–
980810	0044	18	+	-	+	–
980826	0649	39	+	-	-	–
980902	1029	18	+	-	-	–
980924	2345	135	+	-	-	–
981002	0725	19	+	-	-	–
981006	1625	11	+	-	+	–
981018	1951	31	+	-	-	–
981107	0816	26	+	-	+	–
981130	0505	28	+	-	+	–
981201	0328	23	+	-	-	–

Special phenomena

sfe 1994–1998

Date	Beginning GMT	Maximum GMT	End GMT	Ampl. nT	Sign Hx	Hy	Hz
940304	1126	1132	1142	19	−	−	+
940825	0901	0904	0909	15	−	+	0
940829	0840	0846	0851	8	−	−	+
941201	0915	0925	0929	22	−	+	−
941203	0904	0911	0918	18	−	+	−
941221	0838	0843	0848	15	−	+	−
950118	0732	0737	0743	23	−	+	−
950129	0704	0709	0713	12	−	+	−
950401	1719	1723	1726	35	−	+	+
950418	1108	1114	1119	25	+	−	+
950513	1156	1203	1209	46	−	+	−
950917	1401	1409	1412	14	−	+	+
951205	0506	0509	0511	20	−	+	−
970421	1359	1403	1407	22	−	+	−
970907	1452	1458	1504	15	−	+	+
970908	1403	1411	1419	41	−	+	+
971106	1151	1158	1205	54	−	−	+
971107	1610	1617	1625	17	−	−	+
971127	1312	1318	1322	22	−	+	−
980116	2001	2006	2018	8	−	+	−
980324	1058	1110	1119	12	−	+	−
980524	1438	1441	1446	10	−	+	−
980602	1109	1117	1124	16	−	+	−
980818	0817	0827	0850	28	−	+	−
981010	1102	1108	1115	8	−	+	−

Annual mean values of geomagnetic elements

Year	D	H nT	Z nT	I	X nT	Y nT	F nT
1961	−0°23.6′	20816	42077	63°40.7′	20816	−143	46944
1962	−0°19.6′	20827	42093	63°40.5′	20827	−119	46964
1963	−0°14.3′	20839	42116	63°40.4′	20839	−87	46990
1964	−0°10.5′	20845	42126	63°40.4′	20845	−64	47001
1965	−0°08.1′	20877	42137	63°38.6′	20877	−49	47025
1966	−0°06.8′	20888	42156	63°38.5′	20888	−41	47047
1967	−0°06.0′	20903	42179	63°38.3′	20903	−36	47074
1968	−0°03.0′	20921	42196	63°37.7′	20921	−18	47098
1969	0°00.2′	20942	42214	63°36.9′	20942	1	47123
1970	0°02.8′	20964	42235	63°36.1′	20964	17	47152
1971	0°04.3′	20992	42262	63°35.2′	20992	26	47188
1972	0°06.5′	21011	42286	63°34.7′	21011	40	47218
1973	0°10.2′	21028	42317	63°34.6′	21028	62	47254
1974	0°13.6′	21046	42350	63°34.5′	21046	83	47291
1975	0°18.5′	21072	42380	63°33.8′	21072	113	47330
1976	0°23.8′	21084	42413	63°34.0′	21084	146	47365
1977	0°28.8′	21106	42443*	63°33.6′*	21105	177	47401*
1978	0°34.6′	21108	42473*	63°34.4′*	21107	212	47429*
1979	0°41.4′	21113*	42496*	63°34.8′*	21112*	254	47452*
1980	0°46.3′	21107*	42512*	63°35.8′*	21105*	284	47463*
1981	0°52.4′	21097*	42530*	63°37.0′*	21095*	322	47475*
1982	0°57.5′	21078	42549	63°38.8′	21075	353	47484
1983	1°02.7′	21078	42581	63°39.8′	21074	384	47512
1984	1°08.1′	21075	42601	63°40.7′	21071	417	47529
1985	1°12.7′	21073	42625	63°41.7′	21068	446	47550
1986	1°17.8′	21065	42660	63°43.1′	21060	477	47577
1987	1°21.9′	21067	42689	63°44.0′	21061	502	47604
1988	1°26.6′	21052	42723	63°46.0′	21045	530	47628
1989	1°31.3′	21041	42761	63°48.0′	21034	559	47657
1990	1°35.5′	21044	42782	63°48.3′	21036	584	47678
1991	1°36.3′	21027	42816	63°50.4′	21019	589	47701
1992	1°38.1′	21037	42834	63°50.4′	21028	600	47721
1993	1°43.2′	21039	42853	63°51.0′	21030	631	47739
1994	1°48.4′	21037	42877	63°52.0′	21026	663	47760
1995	1°56.6′	21052	42898	63°51.7′	21039	713	47785
1996	2°02.0′	21062	42920	63°51.7′	21048	747	47809
1997	2°07.5′	21060	42955	63°52.9′	21045	781	47839
1998	2°13.7′	21053	42997	63°54.7′	21037	819	47875

IV. ATMOSPHERIC ELECTRICITY AND THE IONOSPHERE

EXPERIMENTAL STUDY OF ATMOSPHERIC ELECTRICITY AND THE IONOSPHERE

P. BENCZE

As it has been indicated in the paper entitled "The beginnings and the IGY" in this volume, the study of atmospheric electricity became the part of the observation programme of the Observatory, because its relation to the electromagnetic field of the Earth. Considering the inclusion of ionospheric measurements, it arised, when the investigation of the geomagnetic variation field necessitated the knowledge of the simultaneous variations in the ionosphere.

Atmospheric electricity

The study of atmospheric electricity can be divided on the basis of its place in the frequency spectrum into two parts. One of them is the static electric field and the other the electromagnetic field. The source of both of them is the thunderstorm activity, more precisely the charge separation in thunder-clouds. The mechanism of charge separation is not quite understood, but it is widely accepted that conditions of charge separation are the intensive lifting of air and the presence of cloudparticles. It is assumed that charge separation occurs in cloud particles in the atmospheric electric field due to the influence phenomenon. Under normal conditions, the influence charge is positive in the bottom of a cloud particle. The lighter neutral particles transported upwards by the vertical airflow, touching the heavier cloud particles floating in the airflow get positive charge decreasing at the same time the positive charge of the cloud particle. Thus, the cloud particles in the lower part of the developing thunder-cloud become more and more negative, while the lighter neutral particles after gaining positive charge are transported to the upper part of the cloud. In this way the thunder-cloud becomes an electric dipole with a positive charge centre at the top and a negative one in the lower part of the cloud.

If the thunder-clouds all over the world are taken into account, they can be considered as a generator in an electric circuit maintaining a voltage between the

Earth's surface and the so called atmospheric electric equalizing layer in the ionosphere. The system works like a space bounded by two spherical surfaces and air of high resistivity between them, i.e. as a spherical layer condenser. This condenser is a leaky condenser and the global thunderstorm activity provides for the maintenance of the voltage between the "electrodes" of the condenser.

The leakage of the condenser is due to the fact that the resistivity of the air is finite. Thus, a weak vertical air-earth current is flowing from the equalizing layer to the Earth's surface in the so-called "fine weather" areas, that is in areas without thunderstorm activity. This vertical air-earth current produces a potential difference on a column of air of unit cross section and of unit height, which is called atmospheric electric potential gradient. As it has been mentioned, the resistivity of air is finite. Consequently, the resistance of the air column is changing according to the variation of local factors (ionization by radioactive gases and galactic cosmic rays, concentration of aerosol particles, humidity, wind) determining the conductivity of the air in the vicinity of the ground, where the measurements are carried out. Because of this circumstance, the global atmospheric electric circuit can be characterized by three parameters, by the vertical air-earth current, the atmospheric electric potential gradient and the conductivity of air. If at least two of this characteristics are recorded, then the third can be computed assuming that Ohm's law is valid. However, Ohm's law is valid only under "fine weather" conditions; that is in case of absence of fog, thunder-clouds and strong wind. Otherwise convective currents can falsify the results.

Measurement of the point discharge current

As it has been mentioned in the paper entitled "The beginnings and the IGY" in this volume, the first regularly recorded atmospheric electric quantity was the point discharge current. The phenomenon and its measurement were described in that paper. Here we report on some results of these measurements.

The electric charge transported by point discharge is one component of the charge exchange between the atmosphere and the ground. Positive charge is transported to the ground (or negative charge gets to the atmosphere) by negative lightning discharges, by the vertical air-earth current, by the precipitation and point discharge in case of clouds with a positive charge centre in the lower part of the cloud. Negative charge is transferred to the ground (or positive charge gets to the atmosphere) by positive lightning discharges and point discharge in case of clouds

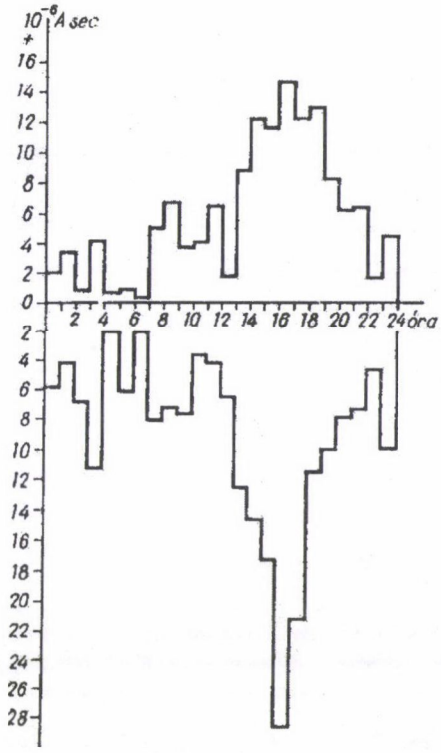


Fig. 1. Annual average daily variation of the charge transported by point discharge plotted for charges of both signs observed in the Geophysical Observatory Nagycenk

of a lower negative charge centre. According to the investigations, there is an equilibrium in the charge exchange between the atmosphere and the ground.

The charge transported by point discharge can be obtained by the determination of the area between the recorded curve and the straight line indicating zero current (Bencze and Märcz 1967a). This procedure gives the charge in As, since the vertical scale of the record is calibrated in Ampere (A), the horizontal scale is time fixed by the recording paper or film transport. The evaluation of the records can be made in the simplest case by means of a planimeter. However, the digital recording enables also the determination of the charge, if the sampling interval is small enough. The periods without point discharge can be eliminated by prescribing a threshold value. In this case only those periods are recorded, when point discharge occurred during the day.

Our results have shown that the charge transported by point discharge indicates

the dominance of the negative charge transport (Fig. 1) (Bencze and Märcz 1963). The daily variations of the charges of both signs show a minimum in the morning hours and a broad maximum in the afternoon and evening hours. This type of the daily variation is similar to that of the thunderstorm activity confirming the connection of the point discharge with the thunderstorm activity. Accordingly, the occurrence of point discharge is limited mainly to the summer months.

The recordings of the point discharge currents enable also the recognition of the electrical structure of thunder-clouds (Bencze 1966). As it is known, the thunder-clouds can be approximated by a vertical electrical dipole. Thus, if a thunder-cloud is approaching the site of observation, first the effect of the upper pole is dominant. In course of the further advance of the cloud the effect of the lower pole becomes determinant. After the cloud passed the place of observation, the effects appear in the opposite order. In this way a thunder-cloud, the upper pole of which is positive, appears on a point discharge current recording in the form of positive current followed by negative current and then repeatedly positive current due to the change of the increased positive potential gradient to a negative one and then again to the original positive potential gradient (Fig.2). In case of a thunder-cloud of opposite polarity, the order of the changes of the current direction is the opposite according to the sign of the charge centers.

It is interesting to note that the sensitivity of the equipment can be increased and already fleecy clouds can be registered in case of passing through its surroundings. This experience was obtained in connection with the restoration of the liberty statue at the top of mountain Gellért in Budapest. The provision for the safety of the people working on the platform surrounding the monumental statue necessitated the thunderstorm forecast. This task was solved by us mounting to the top of the platform a point made of rust-proof steel and connecting it with a sensitive recording galvanometer. The sensitivity of the equipment could be increased by changing the resistances in the circuit of the galvanometer until it registered also isolated fleecy clouds.

Measurement of the atmospheric electric potential gradient

After starting the registration of the point discharge currents, the next step was the realization of the measurement of the electric potential gradient. In the study of atmospheric electricity the expression potential gradient is generally used, because of the variation of the potential difference within the space ranging from the ground

Fig. 2. Change of the point discharge current coresponding to the electrical structure of the thunder-cloud and due to the increased potential gradient, which is caused by the approach of the charge centers of different signs measured in the Geophysical Observatory Nagycenk

to the height of 1 m. The expression field strength could be used in case of the linear increase of the potential moving off the ground under fine weather conditions.

As it has been described in the previous paper, the radioactive collector method has been applied for the measurement of the atmospheric electric potential gradient. The study of the literature has shown, namely that this method is mostly used at atmospheric electric stations because of its reliability. The disadvantage of the radioactive collector, however is its relatively great time constant (the careful choosing of the activity of the radioactive material has already been mentioned before). The sensitivity of the recording was set to 10 mm/100 Vm^{-1} following international recommendations and a recording speed of 20 mm/hour was chosen as in case of other measurements carried out in the Observatory. The measurement of the atmospheric electric potential gradient was aimed first of all at the investigation of

the global atmospheric electric circuit. Thus, the measurements could be confined to the range ± 250 V/m. If the potential gradient exceeds this limits, the recorded grid current of the valve working as an electrometer gets to saturation. In course of the evaluation of the recordings hourly averages are computed.

The results of the measurement of the atmospheric electric potential gradient indicate that the recordings correspond to that of undisturbed continental area. The diurnal variation of the potential gradient in summer months shows the increase of the potential gradient already in the morning hours differing from the diurnal variation of the global thunderstorm activity (Carnegie curve). This circumstance indicates that the radioactive collector is already located at that time in the exchange layer characterized by turbulence dispersing the ionizing radioactive decay products (radon, thoron) in a thicker layer. Hereby, the conductivity of the air is decreased and the potential gradient increased. In the winter months the effect of the exchange layer is considerably reduced and the diurnal variation of the potential gradient is much more similar to that corresponding to the global thunderstorm activity. In Fig. 3 the diurnal variation of the potential gradient recorded in the Geophysical Observatory Nagycenk is presented constructed on the basis of data measured in the period from 1964 to 1976 (Märcz and Bencze 1981). The analysis of the data shows that the potential gradient displays also a seasonal variation with a minimum in summer and a maximum in winter.

The recordings of the potential gradient indicate also short period fluctuations, which are called atmospheric electric agitation. These short period fluctuations are due to local effects influencing the conductivity of the air. The conductivity of the air can be affected by the changing concentration of aerosol particles transported by the wind from various directions. The concentration of aerosol particles changes the conductivity by modifying the ion composition and hereby the resultant mobility of the ions. According to various investigations, the parameters of the atmospheric electric agitation depend not only on the speed and direction of the wind but also on the sky cover and on the type of the airmass related to the change of the weather (Bencze 1965). Concerning the sky cover, its effect might be connected with its influence on the illumination intensity and thus, also on the turbulent intensity. The types of airmasses can have qualities advantageous or disadvantageous in the point of the development of the atmospheric electric agitation. Advantageous can be the Atlantic cold airmasses in summer, the continental cold and polar cold airmasses both in summer and in winter showing large vertical temperature gradient

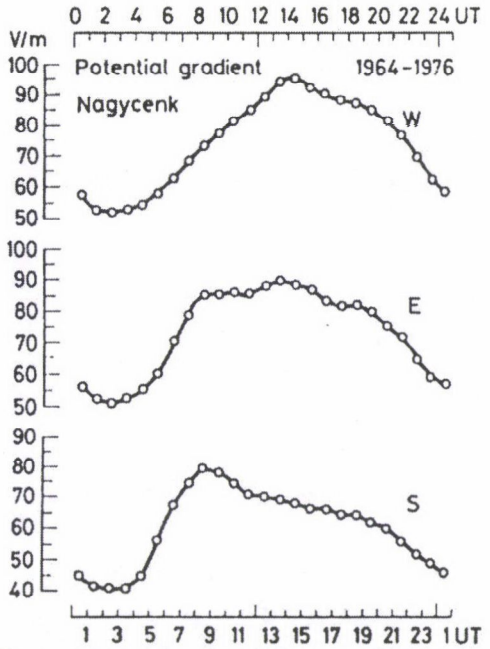


Fig. 3. Diurnal variation of the atmospheric electric potential gradient in different seasons (W=winter, E=equinoctial month, S=summer) recorded in the Geophysical Observatory Nagycenk

favourable for the development of the agitation. Disadvantageous can be subtropic, continental warm, Mediterranean mild and Atlantic mild airmasses indicating only small vertical temperature gradient, which is not favourable for the production of agitation.

The diurnal variations of the fluctuations of different period (0–6, 6–12, 12–24 and 24–60 min) show a maximum about midday in case of the first two period ranges in the summer months, but variations in the winter months more similar to that of the potential gradient (Bencze 1964). Considering the third and fourth period ranges, the diurnal variations are more similar to that of the potential gradient. These daily trends prove the above mentioned role of turbulence in the development of the atmospheric electric potential gradient and that of the atmospheric electric agitation indicating a maximum about midday in case of the shorter period fluctuations in summer, but a variation more resembling that of the potential gradient in case of the longer fluctuations in both summer and winter months. These conditions

determine also the seasonal variation of the atmospheric electric agitation. In Fig. 4 the seasonal variations of the four period ranges and that of the potential gradient are shown. It can be seen that the seasonal variation of the fourth period range is the most similar to that of the potential gradient displaying increased values in winter as compared with the summer months. Generally, it has been found that the amplitude of the atmospheric electric agitation is proportional to the magnitude of the potential gradient.

Study of the ionosphere

It has been mentioned in the introduction that ionospheric measurements were initiated for the support of the investigation of the geomagnetic variations. As it is known, the diurnal variation of the geomagnetic variation field is due to an equivalent ionospheric current system located in the lower part of the E region of the ionosphere, where the electrical conductivity of the atmosphere is greatest. This part of the lower ionosphere can also be observed in a simple way by the determination of the ionospheric absorption of LF, MF radio waves, that is by oblique incidence called A3 method. However, it is to be noted that the study of the lower ionosphere was also motivated by the circumstance that at that time the upper ionosphere (F region) was observed by the vertical sounding of the ionosphere in the meteorological station Békéscsaba of the Meteorological Institute. The data of these measurements were mainly used for the preparation of the forecasting of radio wave propagation. This ionosonde was transferred to the Geophysical Observatory Nagycenk in 1991.

Variations of the ionospheric absorption of radio waves

The determination of the ionospheric absorption of radio waves was carried out in the beginning by recording the sky (reflected) waves of two transmitters, as it has been mentioned in the paper entitled "The beginnings and the IGY". However, it shortly turned out that the power of the transmitter Budapest (539 kHz) is changing and hereby the field strength of the sky wave is also subject to artificial variations. Thus, the determination of the ionospheric absorption was continued using only the transmitter Ceskoslovensko (272 kHz); though, meanwhile the recording of the sky waves of other transmitters being in operation in the LF and MF ranges and located in proper distance from the Observatory was also attempted.

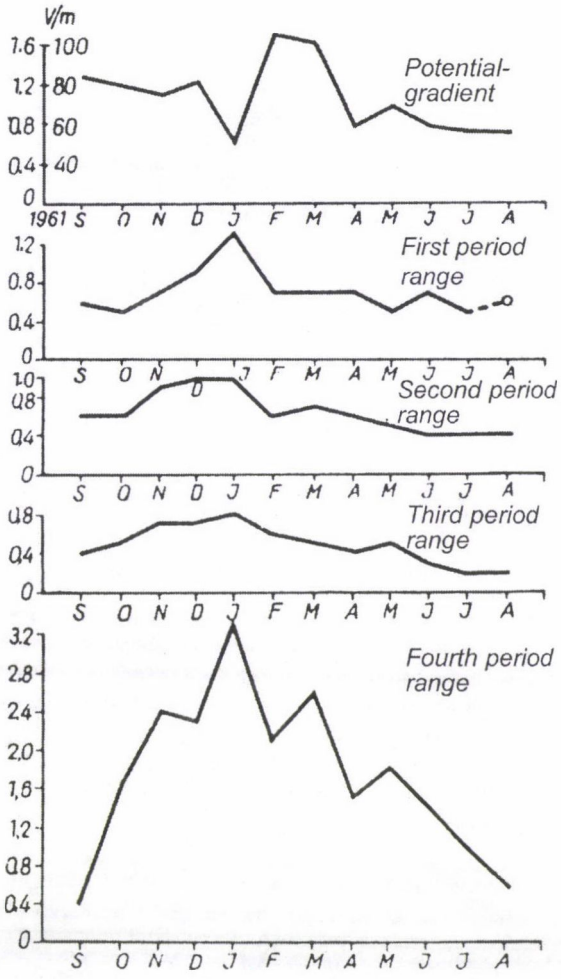


Fig. 4. Seasonal variation of the atmospheric electric agitation referring to the four period ranges and that of the potential gradient observed in the Geophysical Observatory Nagycenk

The absorption of radio waves in the lower ionosphere is determined partly by the absorption taking place in the medium traversed by the waves in course of their path to the point of reflection and back to the receiver, partly by the absorption directly in the vicinity of the reflection point. The first type of absorption is called non-deviative, the latter type is called deviative absorption. It is the non-deviative absorption, which decreases the field strength of the sky wave by day due to the

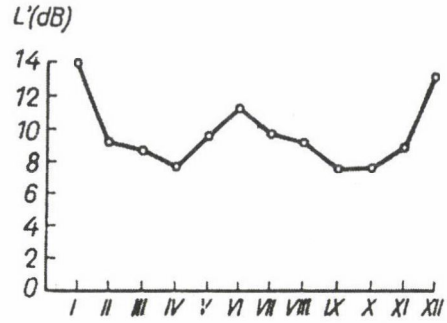


Fig. 5. Seasonal variation of the ionospheric absorption of radio waves in case of the transmitter Budapest (539 kHz) measured in the Geophysical Observatory Nagycenk

presence of the D layer and the non-deviative absorption determines the observed field strength by night after the almost complete disappearance of the D layer. Thus, the daily variation of the ionospheric absorption of LF and MF waves shows increased values by day as compared with the night values, since the effect of the non-deviative absorption is greater than that of the deviative absorption. The electron density in the D region is due to the extreme ultraviolet (EUV) radiation of the Sun, consequently the absorption of these radio waves can be expressed in day-time by the solar zenith angle.

It has been mentioned before that the variation of the ionospheric absorption of LF and MF waves depends on the solar zenith angle. If it is so, then one would expect that the seasonal variation of the absorption shows large values in summer and small values in winter. However, the data show besides large values in summer, after a minimum in autumn large values in winter, too (Fig. 5) (Bencze and Märcz 1967b). This phenomenon is called winter anomaly and it is due to the seasonal variation of the vertical component of the wind in the lower thermosphere (corresponding to the lower ionosphere) indicating downward flow in winter. This means that the downward wind transports additional easily ionizable nitrogen-oxide (NO) from the source region above to the vicinity of the reflection height, hereby increasing the ion production and the absorption of the radio waves. This is the reason why the seasonal variation of the ionospheric absorption of LF, MF radio waves does not follow the zenith angle rule at mid-latitudes.

Another anomaly of the ionospheric absorption of LF and MF waves is the so

called geomagnetic after effect, or post-storm effect. This phenomenon is related to geomagnetically disturbed periods and it appears as increased absorption 3-4 days after the end of the geomagnetic disturbance. It has been found using data of the level of atmospheric radio noise measured at 27 kHz in high mid-latitudes that the appearance of the effect indicated by the enhancement of the level of atmospheric radio noise, is delayed in case of a station located at a lower latitude as compared with the time of the appearance of the effect observed by a station of higher latitude (Fig. 6) (Bencze and Szemerédy 1973). The increased level is due to the improvement of the reflection conditions of the VLF waves in the vicinity of the reflection height (70–90 km) because of the increased electron density there. This phenomenon leads to the conclusion that the post storm effect is also related to the transport of easily ionizable nitrogenoxide from high to low latitudes. This conclusion is also supported by the increase of the post storm effect in winter as compared with the post-storm effect in summer, in accordance with the latitudinal variation of the concentration of the nitrogen-oxide and its change with season showing winter maximum at high latitudes.

Vertical incidence sounding of the ionosphere

After ceasing the ionospheric investigations in the Central Institute for Atmospheric Physics of the Meteorological Service because of the reduction of the staff in 1990, the ionosonde operated at the meteorological station in Békéscsaba was offered to the Geodetic and Geophysical Research Institute of the Hungarian Academy of Sciences. The Institute could assure place for the instrument in its Geophysical Observatory Nagycenk. However, not every condition could be fulfilled at that time for the installation of the ionosonde. Though, the building and the infrastructure was available, it was necessary to set up a tower made of steel for the placing of the transmitting and receiving antennas. For the preservation of the undisturbed conditions, it was necessary to locate the tower in a given distance from the site, where the absolute values of the components of the geomagnetic field are measured; thus, the area of the Observatory had to be increased. The area by which the area of the Observatory had to be increased was determined by the dimensions of the antenna.

It was also necessary to make up-to-date the recording of the ionograms. The ionosonde was operated in Békéscsaba with analog recording unsuited to the processing of the obtained ionograms by a computer. The problem was solved by

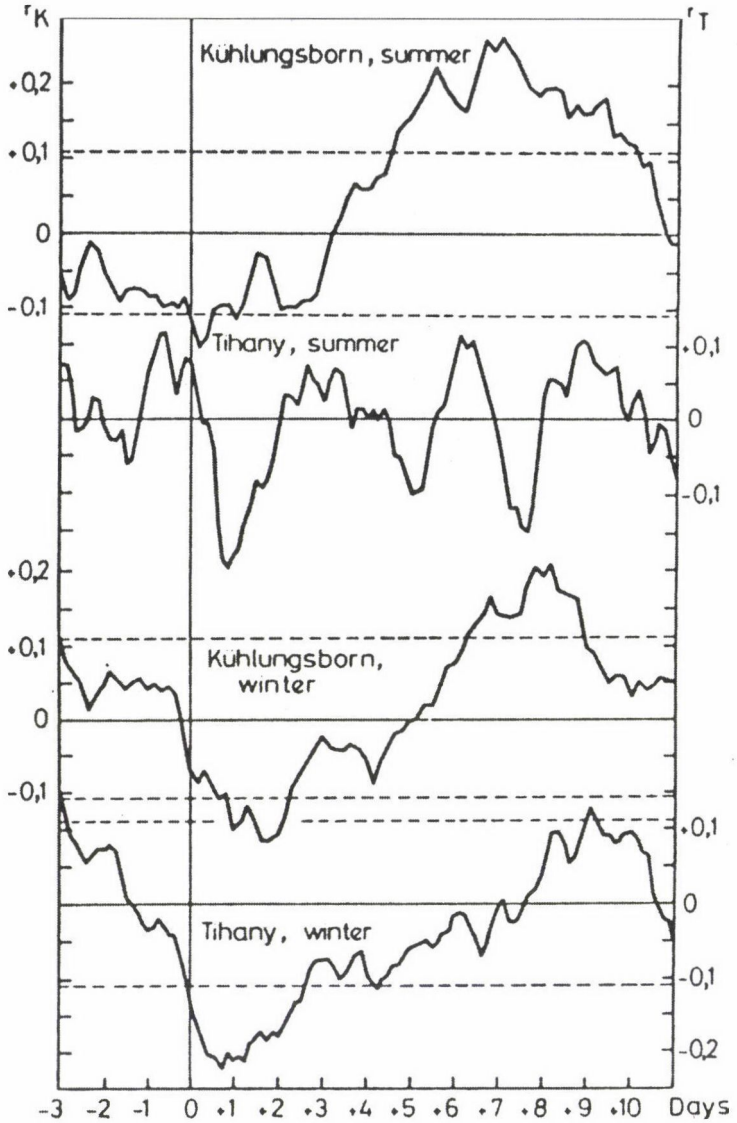


Fig. 6. Cross correlation function of the three hour (in case of Kühlungsborn four hour) averages of differences between hourly values and the corresponding monthly medians of atmospheric noise level and Kp referring to the stations Kühlungsborn (54°07′N, 11°46′E) and Tihany 46°54′N, 17°54′E). Positive shift means that Kp is delayed as compared to the level of atmospheric noise. Dashed line indicates the 99 % level of significance

mounting the proper interface in the ionosonde insuring the safe passing of the ionogram in digital form to the computer and by using the proper software. The ionosonde is operated by K. Kovács.

The temporal and spatial variations of the six frequency and three height parameters usually read from the ionograms are already known, furthermore the electron density profiles for the subpeak region of the ionosphere can also be determined, since the computation of them is enabled by computers. However, the ionosphere indicates also anomalies, that is a variation of the ionospheric regions departing from their usual behaviour. The anomalies are partly regularly returning phenomena, partly changes related to geomagnetically disturbed periods. These offer further possibilities for the research. Special phenomena are also the solar eclipses, like the last one observed as a total solar eclipse the 11th August 1999 in Hungary. The vertical incidence sounding of the ionosphere was carried out every minute during this eclipse in the Geophysical Observatory Nagycenk starting the measurement with this frequency before the day of the eclipse and continuing them also the day after the eclipse. In Fig. 7 the variation of the critical frequency foE of the E layer proportional to the maximum electron density in the E layer is plotted showing the considerable decrease of the electron density at a height of about 110 km in the period from 11^h26^m to 14^h08^m LT . The totality of the eclipse occurred at 12^h28^m LT. The change of foE in the same period of the following day is also indicated enabling the demonstration of the effect of the eclipse. In Fig. 8 the variation of the critical frequency foF1 of the F1 layer proportional to the maximum electron density in the F1 layer is presented indicating the significant decrease of the electron density at a height about 180 km in the period about the eclipse. For comparison the change of foF1 in the same period of the following day is also shown making possible the illustration of the effect of the eclipse. The decrease of the electron density could be expected, if it is taken into account that the ionization is produced in the E and F1 regions of the ionosphere by the solar extreme ultraviolet radiation. Thus, the source of the ionizing radiation was eclipsed by the Moon causing night conditions and an eclipse also in the ionosphere.

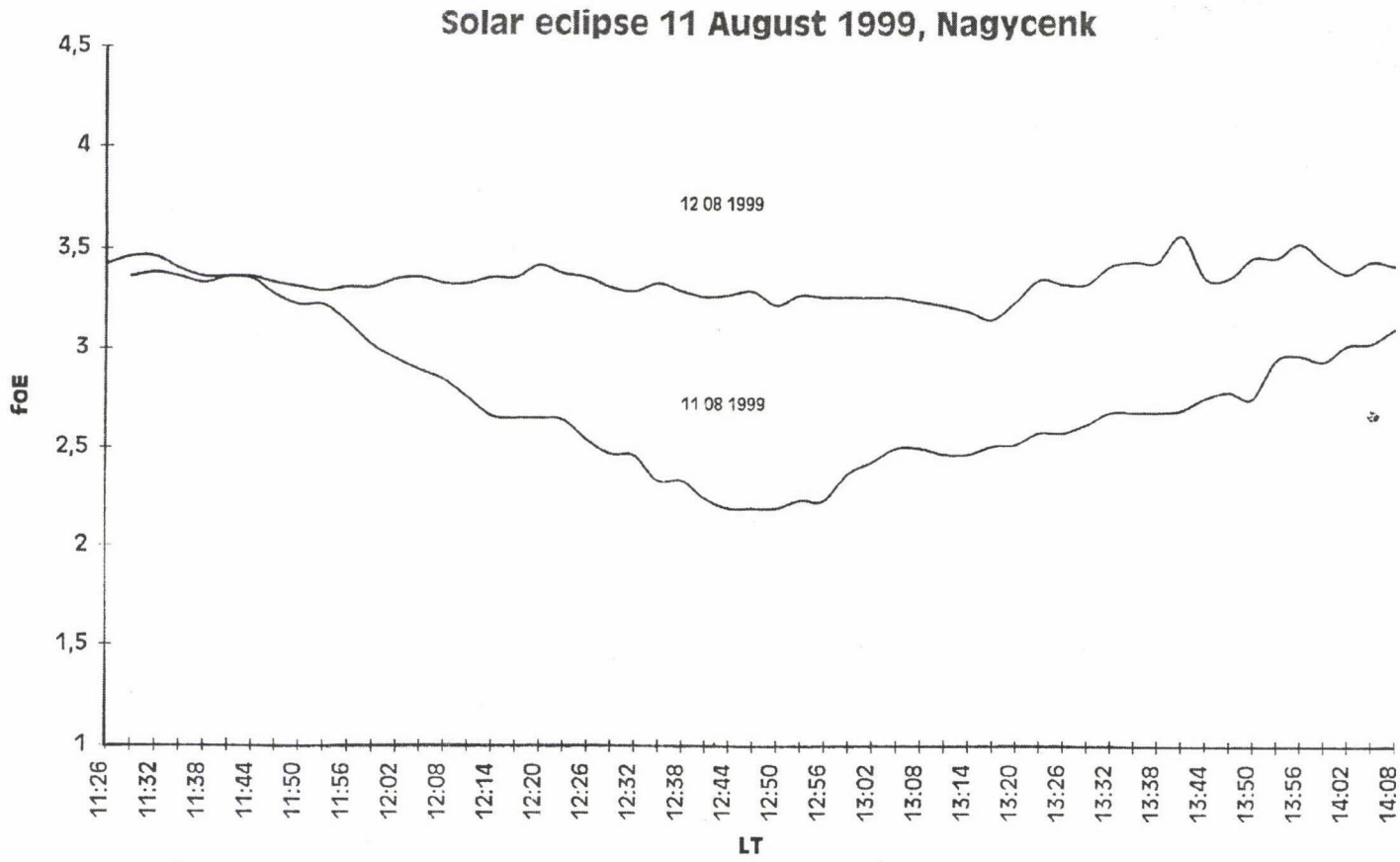


Fig. 7. Variation of the critical frequency foE of the E layer on the 11th and 12th August 1999

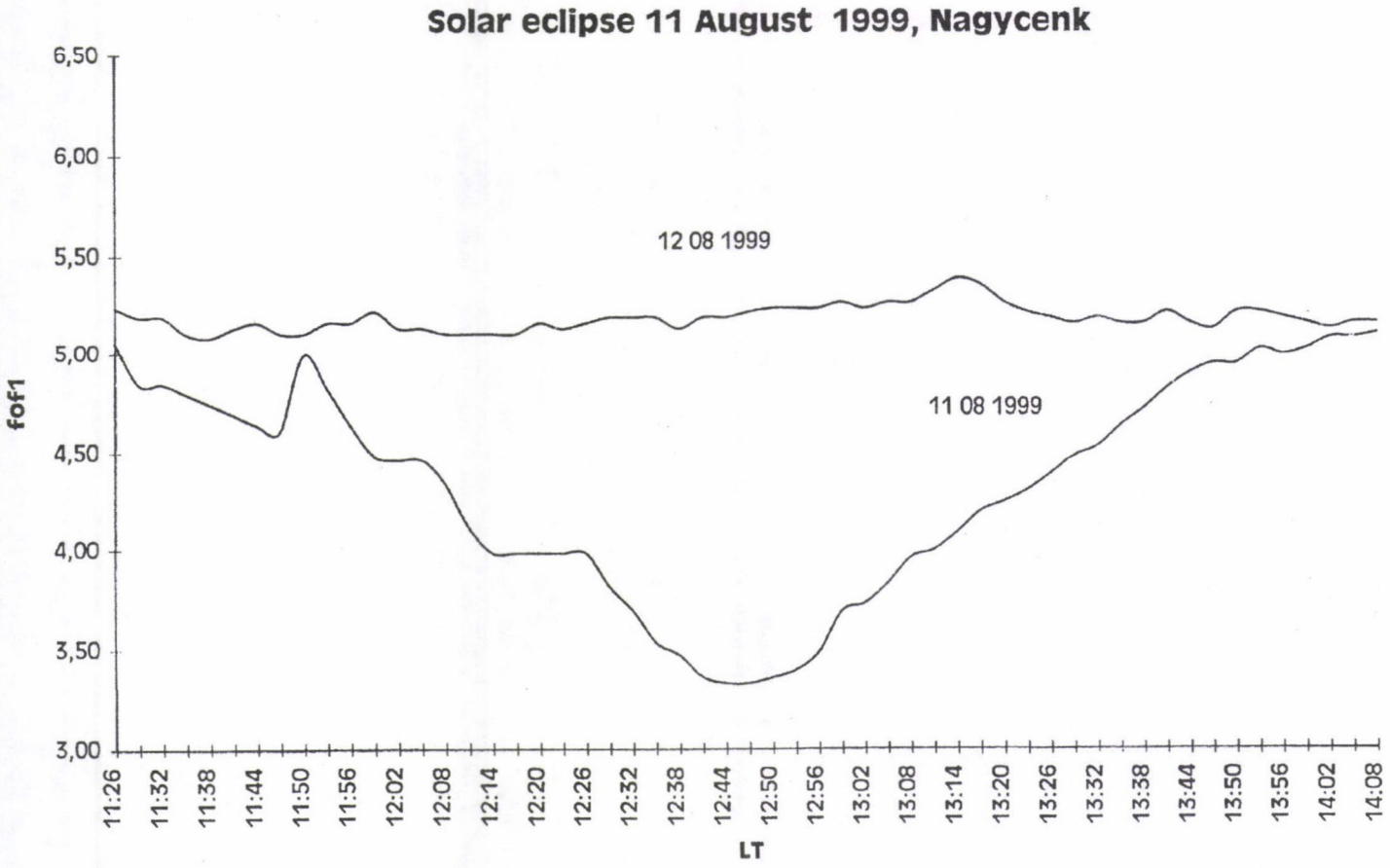


Fig. 8. Variation of the critical frequency foF1 of the F1 layer on the 11th and 12th August 1999

References

Bencze P 1964: Über den täglichen und jährlichen Gang der luftelektrischen Unruhe. *Acta Techn. Hung.*, 47, 87–95.

Bencze P 1965: Zur Frage der Entstehung der luftelektrischen Unruhe. *Pageoph.*, 61, 173–182.

Bencze P 1966: The annual variation of the ratio of the quantities of negative to positive charge transported by point discharge. *Acta Geod. Geoph. Mont. Hung.*, 1, 93–105.

Bencze P, Märcz F 1963: On the study of the point discharge currents (in Hungarian). *MTA Műsz. Tud. Oszt. Közl.*, 32, 137–144.

Bencze P, Märcz F 1967a: Atmosphärisch-elektrische Messungen im Observatorium bei Nagycenk. Bericht des Observatoriums bei Nagycenk, 143–152.

Bencze P, Märcz F 1967b: Über die Messungen der ionosphärischen Absorption im Lang und Mittelwellenbereich. *Acta Geod. Geoph. Mont. Hung.*, 2, 409–414.

Bencze P, Szemerédy P 1973: Variation of the level of atmospheric radio noise after geomagnetic disturbances, I. *Acta Geod. Geoph. Mont. Hung.*, 8, 251–257.

Märcz F, Bencze P 1981: Variations of the atmospheric electric potential gradient at Nagycenk Observatory. *Acta Geod. Geoph. Mont. Hung.*, 16, 415–422.

SOME RESULTS OF ANALYSES BASED ON ATMOSPHERIC ELECTRIC AND IONOSPHERIC DATA OF PREVIOUS OBSERVATORY REPORTS

F. MÄRCZ

Atmospheric electric potential gradient and the 11-year solar cycle

Earlier investigations described by Märcz and Bencze (1981) have not found a regular potential gradient variation with the 11-year solar cycle. An additional analysis using means of early morning values determined for late winters (January-February) over two solar cycles (from 1964 to 1986) has detected a connection between the potential gradient and solar activity regarding the 11-year period (Märcz 1990). Nevertheless, this connection could only be revealed when the potential gradient data were separated according to the two phases of the Quasi-Biennial Oscillation (QBO), similarly to that done by Labitzke (1987) in the case of investigating north polar winter temperature data at 30 mb. The Nagycenk potential gradient showed a positive and significant correlation with the 11-year solar cycle in the QBO west phase, while a negative and less significant correlation was found between the two parameters in the QBO east phase. The basic results are presented in Fig. 1.

Variations in the point-discharge current

Based on data of the point-discharge current measurements carried out at the Nagycenk observatory between 1961 and 1996, variations on different time scales have been analysed. The results have been published in the paper by Märcz and Bencze (1998). In Figure 2, the diurnal variation of this atmospheric electric parameter is displayed by the hourly means of positive and negative charges transferred to the ground by a metal point elevated to a height of about 8 m. There is a morning minimum and an afternoon maximum in the diurnal variation of the point-discharge current (Fig. 2 top), whereby a surplus of negative charge flow appears over almost the whole day as shown in Fig. 2 bottom. The annual variation of this atmospheric electric parameter is characterized by a summer maximum and a winter minimum in Fig. 3, where a predominance of negative charge flow can also be seen. The lat-

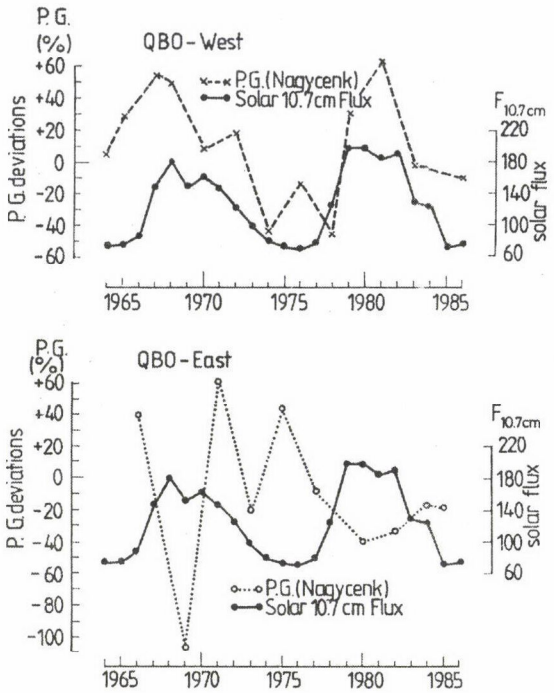


Fig. 1.

ter behaviour appears on an even longer time scale as demonstrated by the yearly averaged ratio of negative to positive charge for the years between 1961 and 1996 in Fig. 4. Additionally, this ratio seemed to increase over the investigated period.

Enhanced ionospheric absorption of radio waves following geomagnetic disturbances

Ionospheric absorption of radio waves might be enhanced following certain geomagnetic storms as shown by different analyses based on data published in earlier reports of the Nagycenk observatory. Using data of the interval from 1967 to 1973, a previous work has found an absorption increase around and after selected geomagnetic disturbances both for sunset and night-time (Märcz 1980). Latter results are presented in Fig. 5. Ionospheric absorption is enhanced by the increase of ionization in the lower ionosphere due to particles (mostly to energetic electrons) precipitating from the magnetosphere into the ionosphere after certain geomagnetic storms (Lauter and Knuth 1967).

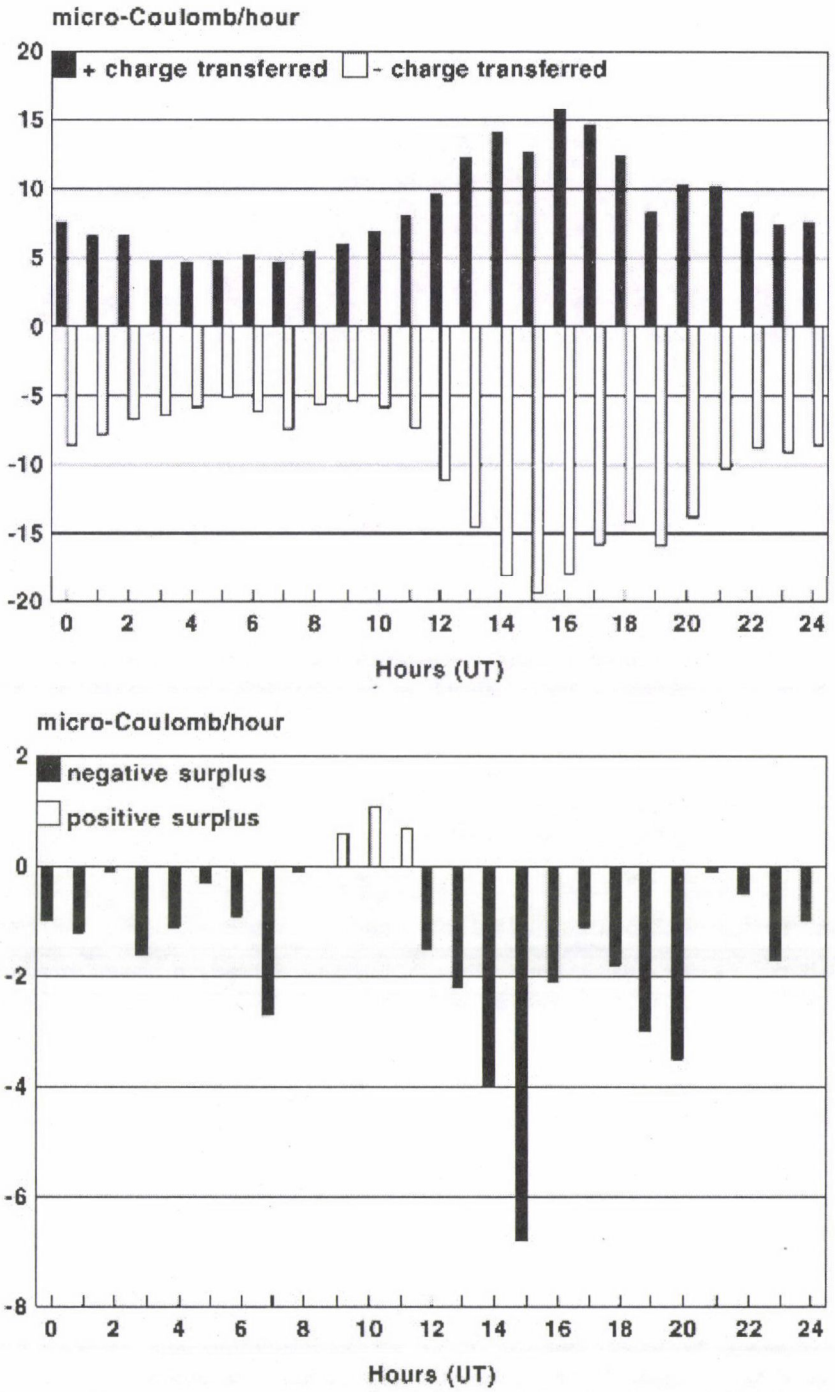

micro-Coulomb/hour
+ charge transferred
- charge transferred
20
15
10
5
0
-5
-10
-15
-20
0 2 4 6 8 10 12 14 16 18 20 22 24
Hours (UT)
micro-Coulomb/hour
negative surplus
positive surplus
2
0
-2
-4
-6
-8
0 2 4 6 8 10 12 14 16 18 20 22 24
Hours (UT)

Fig. 2.

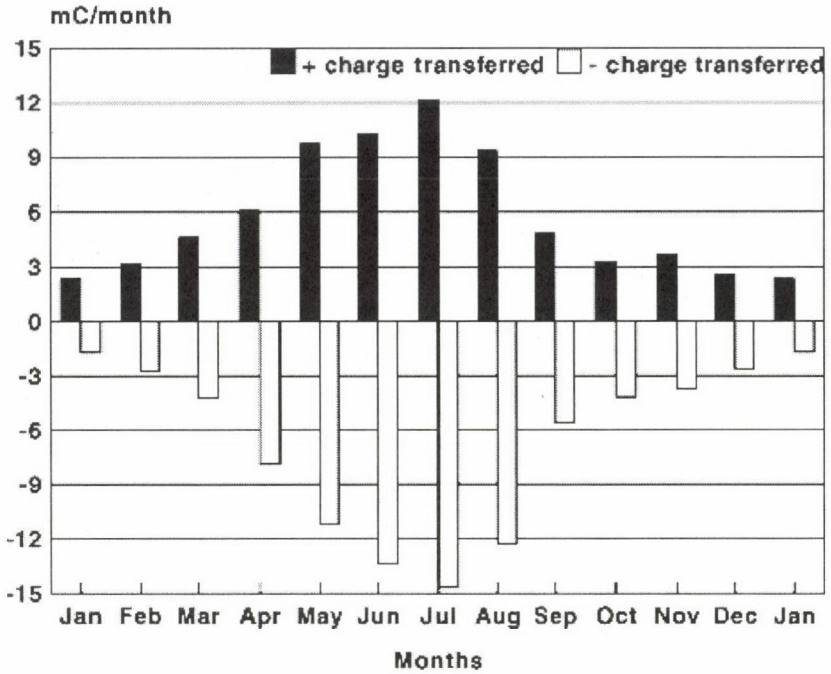

mC/month
+ charge transferred
- charge transferred
15
12
9
6
3
0
-3
-6
-9
-12
-15
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
Months

Fig. 3.

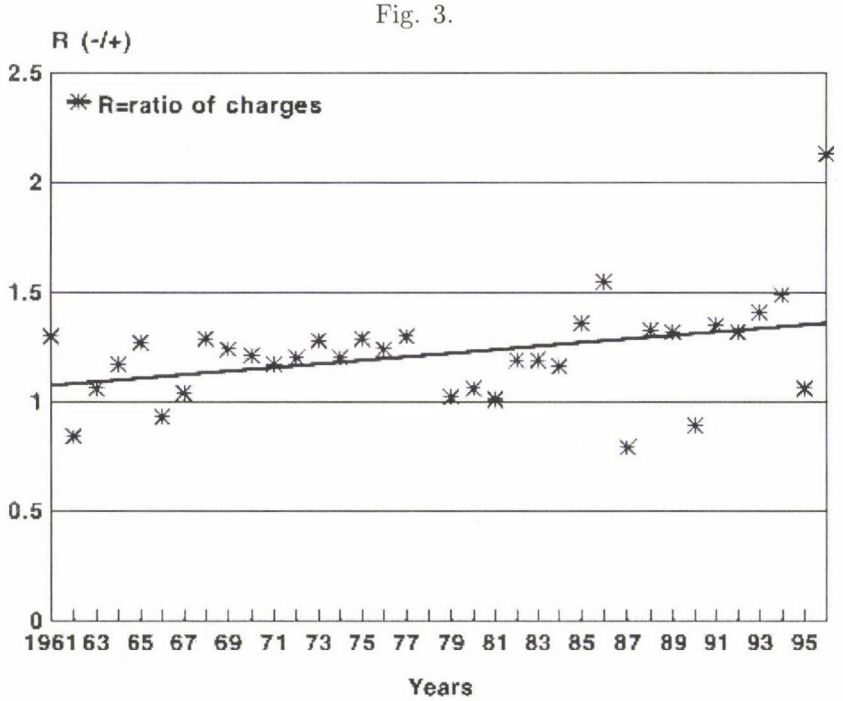

R (-/+)
R=ratio of charges
2.5
2
1.5
1
0.5
0
1961 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95
Years

Fig. 4.

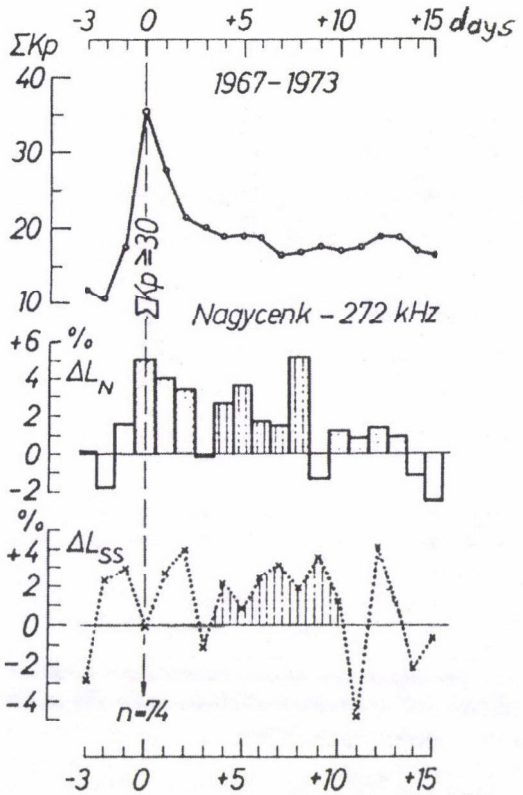


Fig. 5.

Changes in atmospheric electricity associated with events in ionospheric absorption

Simultaneous measurements of atmospheric electric and ionospheric parameters yielded the opportunity for detecting relations between them on the basis of corresponding data series. For 1967 (which was a year around solar activity maximum), seven cases were selected when the ionospheric night absorption determined at Nagycenk was anomalously high. Appropriate potential gradient data have been analysed around the selected absorption events by the superposed epoch method. (Earlier, it was proved that potential gradient values determined for night or morning are more favourable for using them in comparative analyses. During night and early morning hours, the local environmental conditions are less disturbed than in other intervals of the day; this is especially true regarding the vertical and horizontal air motions). The results presented in Fig. 6 show a distinct increase of

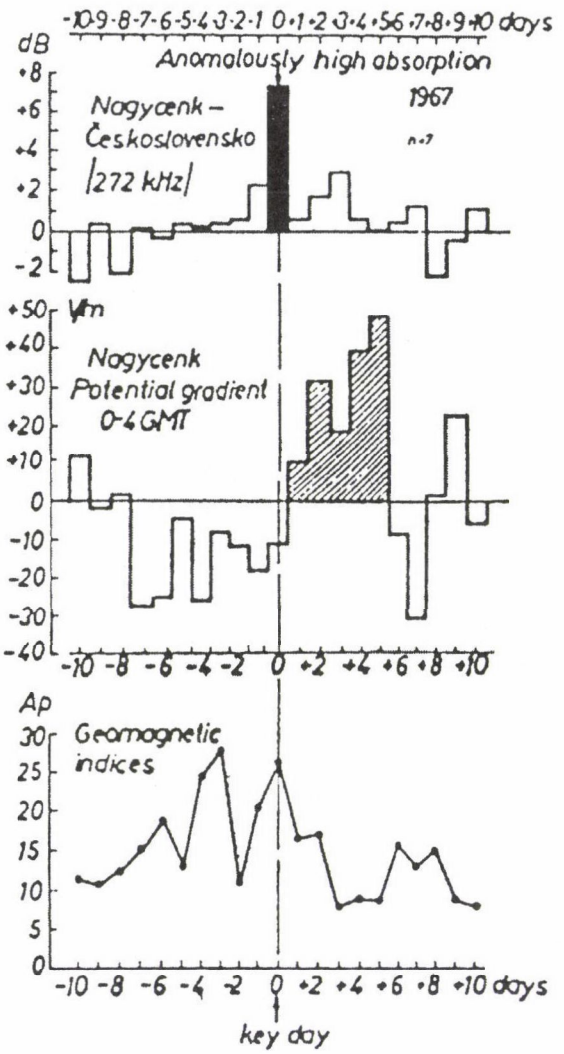


Fig. 6.

the potential gradient (as related to the corresponding monthly mean) for five days after the absorption event. As the geomagnetic activity (represented by Ap-indices) is enhanced before the key day, the increased absorption can be regarded as a sign of after-effect which is due to particle precipitation. All these hint at the fact that a chain of processes (solar, magnetospheric and ionospheric ones) can really lead to changes in the atmospheric electric field measured at the ground. Further results on this topic are included in the paper by Märcz (1976).

References

Labitzke K 1987: Sunspots, the QBO, and stratospheric temperature in the north polar region. *Geophys. Res. Lett.*, 14, 535-537.

Lauter E A, Knuth R 1967: Precipitation of high energy particles into the upper atmosphere at medium latitudes after magnetic storms. *J. Atmos. Terr. Phys.*, 29, 411-417.

Märcz F 1976: Links between atmospheric electricity and ionospheric absorption due to extraterrestrial influences. *J. Geophys. Res.*, 81, 4566-4570.

Märcz F 1980: Geomagnetic after-effect in ionospheric absorption of radio waves. Atmospheric and extraterrestrial relations. Ph.D. dissertation (in Hungarian), 1- 185.

Märcz F 1990: Atmospheric electricity and the 11-year solar cycle associated with QBO. *Ann. Geophysicae*, 8, 525-530.

Märcz F, Bencze P 1981: Variations of the atmospheric electric potential gradient at Nagycenk observatory. *Acta Geod. Geoph. Mont. Hung.*, 16, 415-422.

Märcz F, Bencze P 1998: Surplus of negative charge flow in point-discharge current as shown by variations on different time scales at Nagycenk station. *J. Atmos. Solar-Terr. Phys.*, 60, 1435-1443.

ATMOSPHERIC ELECTRICITY DATA

Hourly means of the potential gradient

Atmospheric electricity data have been published since 1962. This table contains the hourly average values of the potential gradient expressed in V/m. The date column gives year, month, day. Hourly averages have been taken only from hours having a recording period of 30 minutes or more. If values were available only for part of an hour the average is entered in square brackets [ ]. These data have been used in the determination of the daily means. Values uncertain for some reason are entered in round brackets ( ) and have not been used in calculating daily means. Daily means of each day with 24 hours of recording are entered. However, loss of a maximum of one hour's data out of twelve (for example, on account of instrument maintenance or calibration) has not precluded entering this mean value. In hours marked by S the value of the potential gradient exceeded permanently or several times the measuring limits of the equipment making the determination of an hourly average impossible. The direction of the deviations is marked by signs. OBS indicates that the potential gradient exceeded the measuring limits of the equipment both in positive and negative directions. Gaps of some days are generally due to missing records. Data are presented in universal time (GMT).

Hourly means of quantities of positive and negative charges transported by point-discharge for each month

In this table the values are expressed in 10^{-6} Asec/hour. Data are presented in universal time (GMT).

Both the equipments and methods of measurements of potential gradient and point discharge have been described in the paper by BENCZE P and MÄRCZ F: "Atmosphärisch-elektrische und ionosphärische Messungen im Observatorium bei Nagycenk". Observatoriumsberichte des Geophysikalischen Forschungslaboratoriums der Ungarischen Akademie der Wissenschaften vom Jahre 1966, Sopron, 1967. Further information is given by BENCZE P and MÄRCZ F: "The Geophysical Observatory near Nagycenk. II. Atmospheric electricity and ionospheric measurements" (*Acta Geod. Geoph. Mont. Hung.*, 16, 1981, 353-357).

See CD (program Seenck.exe, menu item AtmElectr).

Date	00	01	02	03	04	05	06	07	08	09	10	11
940101	−40	0	40	40	10	−S	+S	+S	+S	−S	OBS	−S
940102	40	40	40	40	50	40	40	60	[90]	70	90	90
940103	70	60	50	50	40	40	50	[70]	–	50	70	70
940104	80	50	−70	−30	10	40	70	80	[100]	[100]	70	50
940105	OBS	−100	60	30	30	40	40	30	40	[50]	70	70
940106	50	40	40	40	40	40	40	40	50	[50]	[40]	40
940107	–	–	–	–	–	30	30	20	30	[30]	40	40
940108	30	20	30	30	10	40	40	40	[50]	60	70	60
940109	70	50	40	70	60	70	70	100	[100]	70	70	90
940110	30	50	70	60	60	40	70	90	–	40	10	0
940111	−50	−40	−40	−30	−20	−30	−10	[−10]	−30	0	−10	(20)
940112	0	10	0	−10	(10)	–	–	–	(20)	[60]	50	50
940113	40	40	30	20	30	20	30	30	[30]	40	40	50
940114	50	50	40	30	30	30	40	[50]	[70]	80	70	40
940115	50	50	50	40	50	50	40	[60]	70	70	50	50
940116	0	0	0	0	−10	−10	−10	−10	0	[−10]	0	−10
940117	0	10	10	10	10	10	10	[10]	–	90	70	70
940118	30	30	40	40	60	80	90	[90]	[100]	90	100	100
940119	30	30	40	70	70	80	80	[90]	[100]	120	100	100
940120	−40	−10	0	20	40	40	–	40	[70]	60	80	70
940121	20	10	10	10	0	0	0	10	[20]	30	60	30
940122	70	70	70	70	70	90	70	[90]	140	130	90	90
940123	–	–	–	–	–	–	–	–	–	–	–	–
940124	–	–	–	–	–	–	–	–	–	–	–	–
940125	–	–	–	–	–	–	–	–	–	–	–	–
940126	–	–	–	–	–	–		–	–	–	–	–
940127	30	40	40	40	40	30	40	[40]	–	40	50	50
940128	50	50	40	40	30	40	60	[OBS]	20	20	40	30
940129	30	30	30	30	40	30	30	[30]	30	30	40	40
940130	50	40	30	10	10	0	10	[30]	OBS	20	20	60
940131	30	20	20	20	0	30	40	[50]	–	40	50	40

potential gradient

12	13	14	15	16	17	18	19	20	21	22	23	Means
–S	–S	10	40	40	60	80	70	60	50	40	50	–
100	80	80	70	60	80	80	50	40	70	20	40	61
70	80	70	140	130	120	110	110	120	110	90	30	81
60	50	40	40	40	50	50	50	70	60	–50	OBS	44
70	70	70	70	80	70	70	80	90	60	50	50	52
30	40	30	50	50	50	50	50	50	40	40	–	43
40	40	20	20	30	30	20	40	50	50	40	40	–
50	50	40	40	40	50	70	60	50	50	60	50	45
70	50	50	50	50	40	40	40	40	40	50	50	60
–20	–10	–20	–40	–10	–20	–20	–30	–40	–20	–30	–30	10
–10	–10	0	–10	–10	0	10	10	0	0	0	0	–13
50	50	50	60	50	20	50	40	40	40	30	40	–
50	40	30	40	50	50	70	70	60	60	50	40	42
30	50	40	60	30	30	50	50	40	30	70	50	46
40	30	50	40	30	40	30	30	10	10	10	10	40
–10	–10	0	–10	–10	–10	–10	0	0	0	10	10	–4
70	60	60	70	80	70	60	40	30	30	30	30	40
100	90	80	40	30	30	40	30	20	30	30	30	58
110	110	90	90	90	90	160	90	–20	–40	–60	–10	69
90	90	100	90	90	100	90	110	100	90	80	30	62
90	90	110	120	110	130	110	120	120	100	80	90	60
100	110	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–		–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	70	60	50	+S	40	50	50	40	–
40	50	60	60	70	70	90	100	80	80	60	60	55
50	50	40	50	40	60	OBS	OBS	–S	40	40	30	–
20	30	40	50	50	50	50	60	50	50	50	50	39
70	70	60	90	100	80	80	70	60	60	40	40	48
40	40	50	60	60	60	70	60	50	50	40	40	42

Date	00	01	02	03	04	05	06	07	08	09	10	11
940201	30	30	30	40	50	40	40	[50]	(80)	(40)	50	(60)
940202	40	40	30	30	40	40	30	[40]	50	(30)	(30)	60
940203	10	40	60	40	80	70	90	90	[80]	80	60	60
940204	70	80	60	80	70	60	70	80	[70]	50	50	40
940205	20	0	30	40	80	120	80	80	90	70	[40]	50
940206	20	30	20	10	10	30	50	[20]	50	20	30	30
940207	50	50	30	40	30	40	40	[50]	–	[60]	40	60
940208	–10	0	–10	–20	–30	–30	–20	30	[50]	50	40	50
940209	10	10	0	20	20	20	20	[40]	[60]	80	80	80
940210	60	60	50	40	40	50	40	40	[60]	120	80	60
940211	20	30	20	30	30	30	40	[50]	40	40	40	50
940212	30	0	–10	–10	–10	10	20	[10]	30	30	40	20
940213	–60	–20	–30	–20	–S	–40	–20	[30]	–20	–	–	–30
940214	30	30	20	20	20	40	40	40	–	70	60	60
940215	40	40	40	50	50	50	70	80	[80]	50	50	50
940216	30	30	20	–	–	–	–	–	–	100	110	120
940217	40	40	20	30	50	40	10	–10	[–20]	–10	30	40
940218	30	40	40	50	40	50	30	([0])	60	70	80	80
940219	–60	–60	–10	0	–20	–30	–10	[10]	30	70	80	90
940220	30	40	50	70	80	60	70	[60]	80	70	70	70
940221	–	–	–	–	–	–	–	–	–	–	–	–
940222	–	–	–	–	–	–	–	–	–	–	–	–
940223	–	–	–	–	–	–	–	–	–	–	–	–
940224	–	–	–	–	–	–	–	–	–	–	–	–
940225	–	–	–	–	–	–	–	–	–	–	–	–
940226	–	–	–	–	–	–	–	–	–	–	–	–
940227	–	–	–	–	–	–	–	–	–	–	–	–
940228	–	–	–	–	–	–	–	–	–	[80]	80	70

12	13	14	15	16	17	18	19	20	21	22	23	Means
(70)	50	50	40	40	50	80	70	80	80	40	30	–
70	80	80	30	40	40	40	40	30	30	10	10	–
90	100	80	70	60	70	50	50	40	60	50	70	65
40	20	30	10	20	10	10	20	10	0	10	10	40
50	60	50	50	50	10	–10	20	10	40	30	40	46
40	40	60	40	40	50	40	60	50	70	110	60	41
60	60	60	60	70	50	50	10	30	10	–10	–20	40
60	60	30	10	10	–10	0	–10	–10	10	10	20	12
50	40	40	50	50	70	80	60	80	60	70	60	48
50	40	40	40	90	80	50	70	70	60	50	30	57
40	40	30	10	10	10	0	–10	10	–10	–10	10	23
30	30	30	10	20	20	40	0	–20	–20	–10	–40	10
–40	–80	–90	40	60	80	70	120	160	110	80	70	–
80	90	90	90	90	90	90	90	80	70	50	40	60
40	40	40	40	50	70	40	50	40	20	20	30	47
130	130	120	120	120	120	80	50	60	70	10	30	–
40	40	40	40	30	20	30	20	20	0	30	20	25
80	90	100	90	90	90	100	130	110	100	70	0	70
100	120	120	120	120	120	110	100	90	90	90	50	55
90	90	90	90	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
80	90	90	80	80	80	90	80	40	90	80	70	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
940301	80	90	90	90	80	110	90	(110)	70	30	60	90
940302	70	120	110	80	90	30	0	[20]	[20]	20	30	40
940303	20	10	30	30	20	20	[(20)]	–	40	40	40	40
940304	40	40	20	30	OBS	40	40	20	[20]	20	+S	OBS
940305	40	40	30	20	30	30	30	[70]	[90]	90	90	90
940306	10	10	20	40	40	70	70	[70]	[70]	60	40	40
940307	20	30	40	20	20	10	10	([10])	–	30	40	50
940308	40	40	30	30	40	40	50	40	[50]	30	20	20
940309	60	60	(50)	–	–	–	–	–	–	–	–	–
940310	–	–	–	–	–	–	–	–	–	–	100	110
940311	60	60	40	40	40	50	50	80	[90]	90	80	70
940312	–10	–40	–20	–10	0	–20	20	[30]	[10]	20	30	50
940313	40	40	10	20	10	30	40	80	[50]	[30]	10	20
940314	OBS	–50	OBS	20	30	50	50	60	[60]	30	–	50
940315	40	30	30	20	20	20	30	[30]	40	40	40	50
940316	40	40	+S	20	30	OBS	30	[60]	+S	70	70	60
940317	30	20	20	20	40	30	–40	20	[30]	–S	OBS	30
940318	40	30	30	20	20	30	40	50	[40]	40	20	30
940319	50	10	20	20	0	0	0	10	[30]	40	40	30
940320	30	40	40	50	40	40	[30]	OBS	OBS	OBS	80	90
940321	70	50	40	30	30	+S	+S	+S	–	10	30	40
940322	0	–60	–50	–80	–60	–50	–20	20	–	30	20	30
940323	20	0	–10	–110	–20	0	–20	[–10]	[10]	10	30	30
940324	40	40	40	40	30	–S	40	[60]	40	60	90	80
940325	–S	30	30	–30	–30	0	–140	[–120]	20	–20	20	80
940326	20	30	40	20	30	40	30	[10]	–10	10	40	30
940327	30	40	40	40	40	30	[+S]	40	60	30	OBS	OBS
940328	30	20	40	30	30	40	70	–	[60]	60	60	50
940329	20	40	30	20	30	40	50	[60]	50	40	50	50
940330	20	20	10	20	40	40	[70]	[50]	40	50	60	50
940331	30	30	20	30	10	30	[40]	[40]	40	50	60	70

12	13	14	15	16	17	18	19	20	21	22	23	Means
90	90	80	80	90	80	80	70	40	0	−10	10	69
50	40	40	40	60	80	70	80	60	60	30	20	53
40	60	60	60	90	100	140	90	80	40	40	40	–
OBS	OBS	−S	OBS	0	−10	10	10	20	30	30	40	–
100	110	120	80	20	30	40	20	30	0	0	10	50
40	40	10	−20	0	40	40	60	70	60	70	40	41
50	40	90	140	30	80	70	20	−10	70	50	30	–
10	40	60	70	80	70	60	50	40	40	30	50	43
–	–	–	–	–	–	–	–	–	–	–	–	–
110	110	100	80	20	0	20	30	30	40	60	50	–
60	50	60	40	30	10	30	30	0	−20	−20	−40	41
80	70	70	60	50	50	40	30	50	40	30	30	28
20	20	30	40	40	40	40	40	40	10	30	OBS	32
60	70	70	60	70	80	100	80	80	80	40	40	–
50	60	50	60	50	60	50	40	30	30	40	40	40
50	60	60	60	60	70	70	OBS	40	+S	30	30	–
40	30	30	40	40	−S	50	60	50	40	30	40	–
30	40	40	30	20	−S	OBS	−S	10	10	0	20	–
20	30	30	20	20	30	40	30	30	30	30	20	24
70	60	60	70	80	100	90	70	60	50	50	50	–
40	60	60	60	40	40	40	50	30	40	40	30	–
30	30	40	40	40	30	40	20	30	20	20	10	6
30	30	40	60	70	70	60	40	40	40	40	40	20
70	80	80	60	70	90	80	OBS	0	30	+S	0	–
70	70	70	60	60	40	40	40	60	60	30	20	20
−10	OBS	40	40	60	60	60	70	70	70	70	OBS	–
60	60	70	30	30	30	40	40	40	40	40	40	–
40	40	40	40	50	40	40	40	20	20	10	20	39
40	40	40	50	50	70	80	50	70	40	40	30	45
70	70	60	60	50	40	40	40	40	40	30	40	44
70	80	70	60	50	60	60	60	70	40	30	10	47

Date	00	01	02	03	04	05	06	07	08	09	10	11
940401	0	10	20	20	20	20	30	[30]	40	40	50	40
940402	–S	10	20	10	20	20	0	[–10]	–10	10	10	30
940403	40	30	30	40	30	30	[40]	[40]	50	40	50	40
940404	40	30	30	40	30	30	40	[40]	50	60	50	60
940405	30	20	20	20	30	40	[30]	–	50	50	60	60
940406	50	50	50	40	40	30	40	[20]	–10	30	–10	(30)
940407	40	40	40	40	40	40	[50]	[50]	50	50	50	40
940408	40	30	40	40	40	50	50	50	[50]	50	50	60
940409	30	30	30	20	10	10	30	[20]	20	20	30	30
940410	20	20	10	–20	–10	0	0	[0]	10	20	30	40
940411	60	30	–10	0	–20	–20	–	[10]	20	30	60	40
940412	OBS	OBS	OBS	OBS	OBS	OBS	OBS	[30]	20	20	10	30
940413	10	–20	0	10	20	20	40	–	40	30	20	20
940414	30	30	40	40	40	40	80	[60]	40	50	70	60
940415	50	40	30	30	10	10	[20]	–	20	40	40	40
940416	30	40	30	30	40	40	60	[70]	60	50	50	60
940417	20	30	30	40	40	40	[80]	50	60	60	40	30
940418	–20	–10	0	10	10	0	–30	–	[–120]	20	50	60
940419	60	50	50	60	60	80	80	[70]	70	60	40	40
940420	40	40	40	30	30	20	20	[40]	40	40	40	50
940421	30	40	30	30	40	40	60	[60]	50	50	50	50
940422	40	40	50	40	50	50	[60]	80	70	70	60	70
940423	40	30	30	20	30	40	[50]	50	60	80	80	80
940424	10	10	10	0	0	20	[30]	40	40	40	50	50
940425	10	0	–	–	–	–	–	–	–	60	60	70
940426	30	20	10	30	10	[10]	10	10	30	30	30	30
940427	0	–20	10	10	10	[0]	10	30	50	80	70	70
940428	–20	–30	–40	–20	–10	[–10]	30	50	70	80	80	80
940429	30	30	30	30	40	[40]	40	60	80	80	80	80
940430	10	10	10	10	10	20	[30]	40	40	70	70	70

12	13	14	15	16	17	18	19	20	21	22	23	Means
30	30	30	0	40	40	50	30	0	0	0	80	27
30	30	30	40	40	40	40	30	40	40	30	30	23
50	50	40	60	60	60	60	60	60	50	40	40	45
50	50	40	40	40	40	50	40	40	40	40	40	42
70	70	70	80	80	90	80	70	50	50	50	50	53
(20)	30	40	50	20	−20	10	20	40	40	40	40	29
40	50	60	70	60	50	50	50	50	40	30	40	47
70	70	70	60	50	30	0	10	30	10	0	10	40
40	40	30	40	30	30	20	−10	+S	−10	−10	10	21
40	40	50	50	50	50	60	50	60	70	70	70	33
50	60	70	70	70	70	70	80	70	50	−S	OBS	–
20	0	0	−20	0	30	0	30	40	30	20	20	–
20	20	−20	40	+S	OBS	OBS	10	50	70	60	40	–
70	70	70	60	60	OBS	OBS	OBS	30	60	50	40	–
50	50	50	50	50	50	60	60	50	60	40	20	40
70	40	40	60	60	50	+S	OBS	20	30	OBS	20	–
20	−20	−30	−10	70	20	30	(40)	(30)	30	−20	0	–
30	0	40	60	70	60	50	50	60	60	60	60	24
40	40	40	40	60	40	40	70	40	50	40	40	53
50	50	50	50	50	50	50	50	50	40	40	30	41
60	60	70	70	60	60	60	70	60	60	40	40	52
70	80	90	80	70	70	60	60	40	40	30	40	59
90	80	80	80	60	40	30	40	40	30	20	20	50
50	50	50	50	70	+S	OBS	OBS	OBS	OBS	10	10	–
70	60	60	50	60	30	30	40	30	30	40	40	–
40	30	20	10	10	20	10	10	0	−10	0	10	17
70	60	60	40	40	40	40	40	−10	−30	−20	−30	26
90	80	60	60	70	70	70	60	60	60	50	40	43
70	80	70	80	70	60	50	40	20	10	10	10	50
80	80	80	70	60	30	20	10	0	0	0	0	34

Date	00	01	02	03	04	05	06	07	08	09	10	11
940501	0	0	0	0	0	10	[30]	OBS	OBS	20	–10	20
940502	10	10	10	30	40	40	[50]	–	60	50	40	30
940503	40	40	30	20	20	[30]	40	40	40	50	60	70
940504	30	10	10	10	20	[20]	20	30	30	40	40	40
940505	OBS	OBS	OBS	10	40	[20]	30	30	0	20	40	30
940506	20	20	30	30	30	40	[40]	30	30	20	20	30
940507	–10	0	10	10	20	30	[30]	40	50	60	60	40
940508	30	10	30	40	50	50	50	[50]	60	50	50	40
940509	10	20	20	10	20	30	–	–	40	40	50	50
940510	10	10	10	20	30	30	OBS	OBS	10	70	–S	70
940511	30	20	20	20	30	[30]	30	40	60	80	80	70
940512	20	20	20	20	30	[30]	30	30	30	40	40	50
940513	30	20	30	30	20	30	30	[40]	40	40	50	60
940514	30	40	40	40	30	30	20	30	40	30	40	20
940515	10	20	10	30	40	40	[40]	30	50	60	60	70
940516	20	10	10	20	30	50	–	–	[70]	90	90	90
940517	20	20	20	20	20	[40]	+S	30	+S	80	70	80
940518	40	30	30	20	40	[60]	70	70	80	90	90	90
940519	40	30	40	30	40	0	OBS	OBS	–S	–S	–10	30
940520	0	30	30	20	30	[30]	40	40	40	60	40	OBS
940521	30	30	20	20	10	[20]	40	40	40	60	70	40
940522	30	40	70	70	40	[80]	60	40	40	40	60	70
940523	10	0	0	10	30	[0]	0	30	30	40	60	60
940524	OBS	–S	10	20	40	40	–	–	[110]	80	70	60
940525	–10	0	10	10	20	–S	–S	–100	–20	10	120	30
940526	30	10	10	30	30	[40]	50	50	40	40	50	40
940527	–	–	–	–	–	–	–	–	70	60	80	50
940528	30	30	10	40	30	40	[40]	40	60	60	40	40
940529	OBS	10	20	20	40	40	70	[70]	50	50	30	–10
940530	10	10	10	20	20	40	–	–	80	OBS	OBS	OBS
940531	40	40	40	40	70	[80]	80	80	80	80	80	80

12	13	14	15	16	17	18	19	20	21	22	23	Means
OBS	30	40	50	50	50	50	40	40	40	40	20	–
40	40	40	50	40	50	50	50	50	50	50	40	40
80	90	90	80	70	50	40	30	20	20	20	30	46
40	50	50	50	40	40	40	30	30	20	10	–20	28
30	10	–S	–S	20	30	30	30	20	20	20	20	–
20	10	30	30	20	30	30	30	20	20	10	10	25
50	40	50	50	50	60	60	40	60	40	30	30	38
40	40	60	50	50	40	20	20	20	20	10	10	37
40	50	50	60	40	40	40	30	30	20	20	10	–
50	–S	30	40	40	40	40	40	40	20	10	30	–
70	80	80	80	+S	OBS	30	–S	40	40	40	30	–
OBS	OBS	–S	OBS	OBS	80	60	30	20	20	20	20	–
60	60	80	70	60	40	30	–40	40	50	40	30	39
20	20	30	OBS	20	30	40	40	30	20	10	10	29
80	80	70	80	–S	OBS	OS	OBS	OBS	10	10	20	–
90	90	90	90	80	40	30	30	30	30	30	20	–
40	40	60	60	60	60	40	40	60	60	60	40	–
90	100	90	80	80	80	80	70	30	30	40	40	64
30	20	10	10	–10	–10	–S	–S	–40	–10	10	10	–
OBS	+S	–20	OBS	OBS	OBS	–S	OBS	–S	OBS	10	30	–
40	40	40	40	40	40	40	30	40	30	30	30	36
80	70	90	90	80	70	40	30	10	10	0	10	51
70	80	OBS	OBS	20	30	–S	OBS	OBS	+S	20	20	–
50	60	70	70	60	60	30	OBS	OBS	20	–20	–30	–
10	30	30	30	20	30	40	30	40	30	20	10	–
40	50	40	40	30	20	0	–10	–	–	–	–	–
40	OBS	+S	30	30	20	–S	0	20	20	30	30	–
40	40	40	50	40	40	50	40	30	OBS	OBS	OBS	–
–20	OBS	OBS	–70	60	70	70	60	40	40	30	20	–
30	80	60	40	30	30	30	10	10	20	30	40	–
80	70	70	60	60	60	50	40	30	20	10	10	56

Date	00	01	02	03	04	05	06	07	08	09	10	11
940601	10	20	20	30	40	[50]	60	60	70	80	80	80
940602	10	20	20	30	40	[50]	50	40	50	60	60	60
940603	50	40	20	20	30	[30]	20	40	50	70	60	60
940604	10	20	OBS	OBS	OBS	30	40	80	60	40	40	20
940605	–S	–60	–10	30	30	[30]	10	0	–S	30	50	20
940606	40	40	40	40	40	40	–	–	40	40	+S	40
940607	30	20	30	30	40	[40]	40	40	40	30	30	40
940608	30	20	20	20	20	40	40	[40]	50	70	80	80
940609	0	0	0	10	20	[10]	20	20	30	40	50	–10
940610	10	10	10	10	10	[20]	20	30	30	40	40	40
940611	20	10	0	0	0	10	30	[50]	50	40	40	50
940612	30	10	0	–10	10	20	[20]	30	10	30	40	40
940613	OBS	+S	–S	–60	–80	–10	30	–	70	60	70	50
940614	20	20	20	20	10	[10]	10	10	10	10	10	10
940615	0	10	20	20	20	[20]	[20]	30	60	60	50	50
940616	20	10	10	20	20	30	30	[30]	30	30	20	20
940617	OBS	OBS	OBS	30	20	20	30	[0]	OBS	OBS	OBS	OBS
940618	20	0	–30	0	20	20	20	[30]	40	40	40	40
940619	20	10	10	10	10	10	10	[30]	30	50	60	50
940620	20	20	–10	–S	OBS	20	–	–	40	50	30	30
940621	40	30	40	30	30	40	50	[60]	60	70	60	50
940622	20	10	10	10	20	30	30	[40]	40	70	70	60
940623	0	0	20	30	30	40	[40]	50	40	40	40	60
940624	20	10	0	20	30	40	40	[40]	30	40	40	50
940625	10	10	10	20	30	20	20	30	[40]	50	50	60
940626	30	40	30	40	40	60	40	–	60	80	110	120
940627	30	40	30	40	40	60	40	–	60	80	110	120
940628	40	50	(40)	60	70	[70]	[50]	60	70	90	110	110
940629	10	20	10	20	20	40	[40]	30	60	80	90	110
940630	30	30	40	30	30	[40]	30	30	40	40	50	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
70	70	80	80	70	40	40	30	30	20	20	20	49
60	70	80	70	60	50	50	40	30	40	50	50	48
70	60	70	70	50	40	20	20	30	10	10	10	40
30	50	40	20	30	20	20	10	10	–60	–90	–S	–
30	20	10	10	10	20	20	–	–	–	30	40	–
40	30	40	–	–	30	30	40	30	40	30	30	–
40	40	30	40	40	30	40	40	40	40	30	30	35
70	80	80	80	70	60	40	40	40	20	10	10	46
–S	–40	10	20	30	20	–S	–S	–S	–10	10	0	–
40	40	40	30	10	–10	–110	–60	–70	–20	–20	–10	5
50	40	30	30	20	20	20	30	30	40	30	20	28
40	30	–S	OBS	OBS	OBS	–50	20	–90	–130	–60	OBS	–
40	40	30	30	20	40	40	40	30	30	30	20	–
20	30	20	20	10	0	10	10	20	30	20	10	15
60	60	70	60	50	50	30	40	30	20	10	20	36
20	60	70	20	30	20	–S	30	20	20	OBS	40	–
–S	60	50	50	40	40	40	60	50	40	40	20	–
40	50	50	50	40	40	30	20	20	20	20	10	26
20	60	OBS	OBS	70	40	OBS	OBS	OBS	10	20	0	–
40	20	40	40	40	50	40	40	40	40	40	40	–
50	50	50	60	50	50	50	40	40	40	30	20	45
70	80	80	90	60	40	40	30	30	30	10	10	41
60	60	80	80	50	60	50	40	40	40	60	40	44
50	50	60	60	40	40	40	30	20	20	10	10	33
60	70	80	80	90	80	70	50	50	40	40	40	46
120	110	110	110	110	70	60	50	40	40	30	30	67
120	110	110	110	110	70	60	50S	40S	40	30	30	67
110	120	+S	+S	OBS	OBS	OBS	OBS	OBS	+S	0	0	
120	130	120	120	80	70	50	40	30	30	30	40	58
60	70	60	50	50	40	50	60	50	40	30	20	43

Date	00	01	02	03	04	05	06	07	08	09	10	11
940701	30	0	10	10	10	20	[40]	40	60	70	70	80
940702	30	30	40	40	40	50	[40]	50	70	80	90	110
940703	10	0	0	10	10	30	[40]	50	60	80	80	90
940704	20	0	0	0	20	30	–	–	70	90	100	120
940705	10	20	20	30	20	30	[40]	30	30	30	40	30
940706	30	20	30	40	40	[40]	40	70	90	110	100	110
940707	30	10	40	40	80	OBS	OBS	OBS	OBS	OBS	40	80
940708	40	60	40	40	30	–S	OBS	–30	20	20	40	30
940709	10	20	20	20	30	40	[40]	60	70	60	70	70
940710	10	20	30	30	20	30	[40]	30	40	80	OBS	OBS
940711	30	20	30	30	20	30	–	–	70	80	70	80
940712	50	40	40	40	40	[60]	60]	70	80	80	80	80
940713	30	30	30	30	10	[30]	60	70	80	80	80	80
940714	30	30	20	10	20	[40]	60	40	50	70	80	90
940715	0	0	0	0	10	[30]	[40]	40	60	80	80	80
940716	20	20	20	20	20	50	[50]	40	50	80	80	80
940717	0	–10	–10	–10	0	30	[40]	40	50	80	80	90
940718	20	30	20	20	30	40	[40]	–	10	[90]	80	90
940719	10	20	0	10	0	20	[30]	[40]	60	70	70	90
940720	30	20	OBS	OBS	20	[40]	(30)	–	–	–	–	–
940721	40	40	40	30	30	60	70	[60]	80	90	90	90
940722	40	30	30	30	30	[40]	40	40	70	80	80	90
940723	20	10	20	20	10	30	(40)	[40]	60	80	80	90
940724	(10)	20	10	0	20	40	[40]	40	60	90	90	90
940725	0	–10	–10	–10	–10	10	–	–	40	60	60	50
940726	0	–10	0	10	10	[30]	30	40	40	60	60	60
940727	20	20	0	10	0	[10]	40	40	50	80	80	80
940728	30	20	10	20	20	[30]	40	40	50	70	80	80
940729	10	10	10	10	30	30	[40]	30	40	80	80	80
940730	–10	–10	0	–10	–10	10	[30]	30	40	60	50	50
940731	10	10	0	10	[20]	30	40	40	40	70	70	80

12	13	14	15	16	17	18	19	20	21	22	23	Means
70	80	80	80	80	80	70	60	40	40	30	20	49
120	120	140	140	130	70	50	40	20	10	10	20	64
110	120	110	120	90	50	30	20	10	0	0	0	47
130	140	140	110	80	70	40	30	20	10	0	10	–
30	30	+S	30	40	30	60	30	OBS	40	30	30	–
+S	OBS	110	130	90	60	70	80	40	40	60	60	–
120	80	70	70	70	60	70	60	60	40	40	40	–
20	30	60	70	60	40	30	20	20	20	20	10	–
40	30	OBS	OBS	OBS	30	30	20	20	20	20	20	–
OBS	OBS	40	90	40	40	40	30	30	30	30	30	–
80	80	80	70	70	60	80	70	60	60	50	50	–
90	80	90	80	OBS	OBS	OBS	10	OBS	OBS	0	10	–
90	90	100	80	0	OBS	OBS	OBS	30	30	50	30	–
80	80	80	80	60	40	30	10	20	20	10	0	44
80	80	60	+S	140	70	30	40	50	40	30	20	46
90	90	80	50	40	30	10	10	10	10	0	0	40
90	80	80	90	80	40	40	30	30	20	10	20	41
+S	OBS	OBS	OBS	OBS	10	+S	OBS	+S	10	10	10	–
90	–S	OBS	OBS	20	110	40	60	60	60	20	20	–
–	(200)	130	100	90	80	70	70	70	60	60	60	–
90	100	110	100	60	40	30	40	30	40	40	40	60
90	90	100	100	70	40	30	20	20	30	20	30	52
90	100	120	120	90	60	40	40	20	0	(10)	(20)	–
90	90	110	110	80	30	20	10	10	0	10	0	46
70	70	60	70	60	50	40	30	20	20	10	0	–
70	80	80	80	50	20	20	10	10	10	0	0	32
80	81	90	100	70	40	OBS	40	40	40	30	30	47
100	100	120	+S	40	30	30	30	30	10	20	10	44
90	90	100	100	60	40	30	20	10	0	0	–10	41
50	60	60	50	40	40	40	40	30	30	20	10	29
70	80	80	80	60	50	30	20	10	0	0	0	38

Date	00	01	02	03	04	05	06	07	08	09	10	11
940801	20	20	10	0	10	30	–	–	40	80	70	80
940802	10	20	30	30	30	[30]	30	20	40	70	80	80
940803	30	20	30	30	30	[30]	30	40	60	80	90	100
940804	30	20	20	20	30	[30]	30	30	30	60	70	70
940805	0	10	10	10	10	[30]	–	–	–	–	–	–
940806	–	–	–	–	–	–	–	–	–	–	–	–
940807	–	–	–	–	–	–	–	–	–	–	–	–
940808	–	–	–	–	–	–	–	–	–	–	–	–
940809	–	–	–	–	–	–	–	–	–	–	–	–
940810	–	–	–	–	–	–	–	–	–	–	–	–
940811	–	–	–	–	–	–	–	–	–	–	–	–
940812	–	–	–	–	–	–	–	–	–	–	–	–
940813	–	–	–	–	–	–	–	–	–	–	–	–
940814	–	–	–	–	–	–	–	–	–	–	–	–
940815	–	–	–	–	–	–	–	[40]	40	50	50	50
940816	10	10	10	10	20	[30]	30	30	40	50	60	60
940817	20	10	10	20	20	[20]	30	20	30	30	40	40
940818	30	+S	OBS	0	–S	–S	OBS	OBS	OBS	50	70	90
940819	10	10	20	10	30	[40]	50	[40]	–	40	40	60
940820	60	30	+S	OBS	OBS	0	40	[60]	40	60	30	10
940821	30	30	20	10	10	10	[10]	[40]	30	40	40	60
940822	60	60	60	60	40	80	–	–	[50]	60	60	80
940823	40	10	0	0	20	[30]	[60]	70	50	40	50	40
940824	40	50	40	30	30	[50]	110	70	80	60	60	90
940825	40	40	40	40	30	[30]	80	80	80	50	50	40
940826	10	20	10	20	20	20	20	–	–	–	–	–
940827	40	40	30	30	20	30	[40]	50	90	110	120	120
940828	30	30	20	20	(120)	40	60	50	50	60	70	80
940829	40	OBS	–S	20	30	[40]	–	–	OBS	OBS	–30	60
940830	10	20	30	30	30	40	[40]	[40]	40	40	40	50
940831	20	20	30	40	40	[40]	50	40	50	50	50	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
80	80	70	80	60	50	40	30	20	20	10	10	–
90	100	100	110	90	50	40	40	30	30	30	30	50
110	110	100	100	80	50	50	60	50	40	30	30	58
70	80	80	90	80	80	50	40	40	30	10	10	46
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
50	50	(40)	(40)	40	40	30	30	40	20	20	10	–
50	70	80	70	60	40	30	30	20	10	10	20	35
40	+S	OBS	OBS	OBS	OBS	OBS	10	OBS	OBS	30	30	–
40	30	40	40	40	30	30	30	30	40	30	10	–
40	30	40	40	–10	–10	30	60	60	60	40	60	34
30	40	40	40	40	40	20	30	30	30	10	20	–
60	70	70	70	60	70	80	60	40	40	40	40	43
+S	–S	OBS	OBS	OBS	OBS	–20	10	30	40	40	40	–
40	+S	OBS	OBS	30	30	20	30	40	30	30	40	–
OBS	OBS	+S	OBS	20	40	50	50	60	60	30	30	–
50	50	50	50	20	10	20	10	10	20	30	20	39
–	–	–	–	–	–	60	60	60	60	50	40	–
120	120	90	80	70	70	50	50	50	50	40	30	64
80	80	80	70	60	50	40	+S	30	20	OBS	–S	–
70	60	50	30	20	20	20	20	30	30	30	20	–
50	50	50	50	50	50	40	30	20	20	20	20	36
50	60	60	50	50	50	40	40	40	40	40	30	43

Date	00	01	02	03	04	05	06	07	08	09	10	11
940901	40	OBS	–S	OBS	30	30	70	[40]	40	40	60	60
940902	40	40	50	50	50	50	–	[+S]	40	50	50	50
940903	OBS	OBS	+S	OBS	OBS	OBS	OBS	OBS	OBS	OBS	+S	110
940904	20	20	40	30	[40]	50	50	50	50	50	60	60
940905	30	30	30	30	30	30	–	–	40	50	50	50
940906	20	20	40	40	30	[40]	40	40	40	40	50	50
940907	20	20	40	40	30	[40]	40	40	40	40	50	50
940908	0	10	10	10	10	[30]	50	50	60	60	70	80
940909	40	40	50	30	30	50	50	[50]	50	50	50	50
940910	30	20	30	10	20	20	+S	OBS	+S	20	40	60
940911	20	10	20	10	30	30	[40]	50	40	40	40	40
940912	–10	0	0	0	10	10	[40]	40	40	50	50	60
940913	10	10	20	20	20	20	–	–	–	–	–	–
940914	60	40	40	30	20	[30]	70	(50)	40	40	60	70
940915	30	40	50	40	30	[40]	40	–	–	–	–	[50]
940916	40	50	50	50	50	50	70	70	80	80	70	50
940917	30	20	30	10	10	20	30	[40]	40	40	30	40
940918	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	–S	50	40	10
940919	30	20	30	40	40	40	–	–	50	50	50	60
940920	20	20	20	20	20	30	[30]	40	40	30	40	40
940921	10	10	10	20	20	20	30	[40]	40	40	40	40
940922	10	10	10	10	10	20	[30]	30	30	50	60	60
940923	10	20	30	20	10	20	40	–	40	60	70	60
940924	10	10	20	10	(20)	20	10	–10	–10	–10	–10	–10
940925	30	40	30	20	20	40	60	40	50	40	40	50
940926	60	80	80	70	70	60	80	–	–	70	80	80
940927	–10	+S	0	–40	–60	0	[30]	110	80	30	20	10
940928	–10	–10	–10	–10	–10	0	10	20	[30]	30	30	30
940929	–10	–10	0	10	10	20	30	40	30	30	40	40
940930	20	20	20	20	10	30	30	40	20	30	40	30

12	13	14	15	16	17	18	19	20	21	22	23	Means
70	70	70	50	70	60	50	50	50	50	50	50	–
50	70	60	50	50	50	40	30	50	50	40	40	–
110	40	60	50	20	30	20	30	30	20	20	20	–
70	70	60	60	50	50	50	50	40	40	40	40	48
60	70	60	50	40	40	50	40	30	30	20	30	–
50	50	50	40	40	30	30	30	20	10	10	0	34
50	50	50	40	40	30	30	30	20	10	10	0	34
70	70	60	50	50	50	50	40	30	30	40	40	43
50	50	50	40	40	40	50	50	50	40	40	40	45
50	10	20	40	30	40	40	40	30	20	30	40	–
50	50	50	40	70	40	20	20	10	0	0	0	30
60	70	70	60	50	30	20	30	30	30	20	10	32
50	60	50	40	40	40	40	40	40	40	50	60	–
80	80	60	60	40	40	50	50	50	60	50	40	50
50	70	71	60	60	OBS	OBS	OBS	OBS	OBS	60	–S	–
60	70	50	40	40	40	40	40	30	30	20	20	50
40	–S	30	30	30	40	40	40	30	40	40	30	32
10	20	30	30	40	40	40	40	40	30	30	30	–
50	50	50	50	40	40	50	60	60	50	30	30	–
40	40	30	30	40	50	40	40	30	20	20	10	31
40	50	40	40	30	20	30	20	20	30	10	10	28
50	50	50	40	40	30	20	10	30	20	20	20	30
70	60	50	60	40	30	10	10	10	10	10	10	33
0	20	20	20	40	40	40	40	40	30	30	20	16
60	80	80	50	50	40	50	60	60	50	50	40	47
80	70	60	60	40	30	20	20	30	10	0	–10	–
20	20	30	20	30	30	10	10	20	10	0	–10	16
30	20	40	40	10	–10	–10	10	–10	0	0	10	10
40	40	30	40	30	20	20	30	20	20	10	10	23
30	30	20	20	20	10	10	30	30	30	20	20	24

Date	00	01	02	03	04	05	06	07	08	09	10	11
941001	20	50	70	30	90	70	50	50	50	60	40	60
941002	20	20	30	30	20	20	30	20	30	20	40	40
941003	50	40	40	40	50	50	70	–	–	–	50	50
941004	–10	10	–20	10	–20	–10	–S	20	70	40	30	70
941005	0	0	0	10	20	40	[50]	40	30	30	30	30
941006	0	10	20	30	30	40	50	30	30	30	OBS	OBS
941007	20	20	20	30	20	20	20	30	0	–S	OBS	–S
941008	40	20	20	40	30	10	30	[30]	40	20	20	10
941009	20	30	10	20	10	10	10	[20]	20	30	40	40
941010	30	20	30	10	30	30	10	[30]	–	40	60	50
941011	10	10	20	10	20	20	[30]	40	30	40	50	60
941012	50	30	40	20	0	90	[90]	140	140	90	40	40
941013	190	180	80	140	140	140	140	130	[130]	30	40	40
941014	30	30	40	40	30	20	30	[40]	[50]	60	70	80
941015	10	10	10	10	0	30	20	[30]	30	20	10	40
941016	70	60	80	120	120	120	140	140	[140]	120	120	80
941017	0	10	10	0	–10	0	40	–	–	40	50	50
941018	60	60	60	60	60	70	[80]	80	90	80	90	90
941019	30	20	10	20	10	20	[10]	10	20	30	30	30
941020	20	30	20	10	10	30	40	20	[30]	30	40	50
941021	30	30	40	30	40	40	40	30	[–10]	–10	10	–10
941022	30	20	20	10	10	10	0	[0]	0	10	0	0
941023	–10	–20	–10	10	–10	10	–20	[–10]	10	10	10	10
941024	0	20	40	40	50	50	60	[60]	–	40	30	–S
941025	30	20	20	30	30	40	40	60	[70]	50	40	40
941026	40	40	50	110	70	70	80	[80]	50	40	40	50
941027	+S	OBS	OBS	–S	10	30	30	30	[40]	30	30	40
941028	10	20	10	10	20	30	40	50	[60]	60	50	40
941029	0	10	30	–10	–60	10	30	30	[40]	40	40	40
941030	40	30	40	40	50	60	80	[70]	[60]	50	40	40
941031	50	50	60	70	70	80	80	[80]	–	–	90	80

12	13	14	15	16	17	18	19	20	21	22	23	Means
60	40	20	20	40	30	30	50	40	30	40	30	45
40	30	40	50	50	20	30	40	60	60	60	50	34
20	30	30	40	40	50	50	OBS	OBS	OBS	OBS	OBS	–
60	60	70	80	80	30	20	130	+S	10	10	0	34
30	40	40	40	40	50	50	50	40	30	20	30	31
(+S)	OBS	30	40	50	60	60	50	50	40	30	30	–
–S	OBS	–S	–S	–S	–10	30	–30	30	50	50	30	–
20	30	40	40	40	40	40	50	50	40	20	10	30
50	40	50	40	40	50	50	40	40	40	40	30	32
50	50	40	40	40	40	30	20	10	10	10	10	30
70	60	60	60	50	60	50	50	60	60	60	60	43
50	50	50	50	40	30	20	20	30	60	110	+S	56
60	60	60	60	70	70	60	40	40	40	40	30	80
80	110	80	70	60	50	40	30	30	20	20	20	47
80	80	80	60	30	0	0	20	20	30	50	60	30
60	80	80	60	80	140	130	70	110	130	80	10	98
70	80	80	80	70	80	90	80	90	80	60	60	–
90	70	70	70	50	70	50	50	40	40	30	30	64
30	30	30	30	30	30	30	30	20	10	10	20	23
50	50	50	50	40	40	40	40	30	40	40	40	35
20	20	30	30	10	10	20	30	40	40	30	30	23
–10	–10	–10	–10	–10	–20	–10	–10	–10	10	–10	–10	0
10	10	20	10	–10	0	10	0	0	–10	–20	–20	–2
–S	–S	–S	–S	–S	–S	–S	–S	–160	–20	20	40	–
50	40	40	30	50	70	50	40	40	40	30	40	41
40	30	20	OBS	OBS	OBS	OBS	OBS	50	40	OBS	OBS	–
40	40	40	40	50	40	40	30	30	0	20	–10	–
40	30	20	0	30	30	20	0	OBS	–20	–S	OBS	–
40	50	850	50	80	60	70	60	50	60	40	40	35
50	50	60	40	30	30	40	40	70	50	50	50	48
60	70	50	40	40	50	40	60	90	30	20	70	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
941101	80	110	+S	130	80	120	90	100	[130]	30	70	60
941102	30	20	20	20	20	30	10	50	[40]	30	30	40
941103	20	10	10	20	20	10	10	10	[20]	10	10	10
941104	0	10	10	10	20	40	30	30	[30]	40	40	60
941105	20	20	0	−10	−10	−10	−20	−10	−10	−30	−40	−20
941106	−40	−30	−10	−10	−20	−10	−20	0	20	30	50	60
941107	20	30	30	40	0	30	−10	–	–	−10	−40	−50
941108	−50	−40	−30	−20	−10	30	40	30	20	30	30	30
941109	0	0	10	0	10	10	0	20	[20]	0	10	20
941110	0	0	10	20	30	30	30	30	[10]	10	20	40
941111	−10	10	10	10	0	10	−10	−20	[−20]	0	−10	−40
941112	10	10	10	30	30	40	30	30	[30]	40	40	40
941113	60	40	60	60	40	40	40	40	[40]	40	40	40
941114	−10	−10	−10	−10	0	−10	0	–	–	10	0	10
941115	30	30	10	30	30	40	40	60	[80]	70	70	60
941116	30	30	30	10	10	-30	−30	[20]	–	–	–	–
941117	–	–	–	–	–	–	–	–	–	–	–	–
941118	–	–	–	–	–	–	–	–	–	–	–	–
941119	–	–	–	–	–	–	–	–	–	–	–	–
941120	–	–	–	–	–	–	–	–	–	–	–	–
941121	–	–	–	–	–	–	–	–	–	–	–	–
941122	–	–	–	–	–	–	–	–	–	–	–	–
941123	–	–	–	–	–	–	–	–	–	–	–	–
941124	–	–	–	–	–	–	–	–	–	0	0	20
941125	20	10	10	10	10	10	30	[20]	(20)	20	10	10
941126	20	30	10	0	−20	−20	0	[10]	[10]	10	−80	−60
941127	30	30	30	20	30	20	−70	0	[10]	−10	0	40
941128	30	30	40	60	30	30	30	–	–	–	–	–
941129	40	40	40	40	60	70	90	[90]	–	(90)	(70)	60
941130	40	40	40	40	40	40	[60]	70	–	–	–	–

12	13	14	15	16	17	18	19	20	21	22	23	Means
60	40	30	30	20	20	10	20	10	30	30	30	60
40	50	40	40	20	10	0	0	0	10	20	20	25
10	30	30	30	30	20	10	0	10	10	0	−10	14
60	40	40	30	10	−10	10	20	20	0	10	20	24
−10	−20	−30	−10	−10	−10	−10	−40	−20	−40	−60	−40	−18
30	30	40	30	40	30	10	30	10	30	20	30	10
−20	−10	−10	−40	−20	−20	−20	−50	−30	−10	−20	−50	–
30	40	50	30	30	20	30	40	40	30	0	10	17
20	0	10	10	−10	−10	10	0	0	−10	−10	−10	4
40	30	40	40	40	40	30	10	20	30	0	−10	23
−50	−60	−60	−50	−60	−50	−20	0	−50	−11−00	−90	−10	−28
60	50	60	60	70	90	80	100	110	90	80	80	53
40	40	20	10	0	−10	−10	0	−10	−10	−10	−10	25
30	30	10	30	40	50	70	40	40	40	50	40	–
50	40	30	10	20	10	30	40	30	40	40	30	38
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
20	[30]	30	30	30	0	0	0	20	20	0	10	–
30	30	30	30	30	40	30	30	10	−10	10	10	19
−50	10	10	20	10	30	70	−80	−90	−70	−20	10	−10
20	20	30	40	60	30	30	40	60	30	20	30	23
–	–	–	70	70	90	80	80	80	80	70	40	–
70	70	60	70	40	40	40	40	30	10	30	40	–
–	–	60	40	OBS	60	70	90	100	90	70	80	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
941201	80	80	80	80	90	90	90	110	(100)	90	90	90
941202	20	0	−10	−10	−10	−10	−10	−10	[−10]	−10	0	10
941203	−40	−20	(−10)	10	60	(70)	30	[60]	120	80	80	70
941204	90	70	80	70	40	90	90	[90]	30	10	0	30
941205	60	80	110	90	140	140	140	[40]	–	60	30	40
941206	+S	210	210	+S	+S	190	170	110	[50]	40	70	70
941207	40	30	30	30	20	10	20	30	[50]	50	50	40
941208	40	40	70	70	30	0	30	60	[60]	50	50	20
941209	−10	−10	10	30	10	30	20	[−30]	[−10]	−10	30	50
941210	70	60	50	10	20	20	10	0	[10]	0	30	60
941211	50	60	50	10	−30	−10	−10	10	[0]	−10	0	20
941212	50	50	50	40	50	50	50	–	[40]	50	50	50
941213	30	30	30	30	30	30	30	[40]	[30]	40	40	30
941214	40	30	30	30	30	30	OBS	[30]	[10]	30	50	30
941215	40	30	40	30	40	40	50	[40]	[40]	50	50	50
941216	30	20	20	20	20	30	40	60	[80]	130	70	50
941217	10	20	20	30	40	40	50	50	([40])	30	30	30
941218	20	30	20	20	30	30	50	50	[50]	50	40	40
941219	20	10	10	20	20	20	0	–	–	−40	−30	−10
941220	−30	0	−10	−10	10	0	30	0	[0]	0	−10	0
941221	20	20	20	10	−30	70	80	[70]	30	40	30	70
941222	40	50	50	40	60	50	40	50	[30]	20	[20]	30
941223	−10	−10	0	10	10	10	0	[0]	[−10]	−10	−10	−20
941224	−60	−70	−80	−120	−120	−110	−120	−110	[−110]	−140	−120	−90
941225	30	30	30	40	50	40	40	[40]	[30]	30	40	40
941226	40	40	40	50	40	40	30	30	10	[10]	0	10
941227	30	0	10	20	10	0	50	80	[0]	−60	−40	−40
941228	−20	0	70	20	20	20	[10]	40	30	20	30	10
941229	30	30	30	20	50	70	30	–	50	30	70	60
941230	40	40	60	80	80	100	90	[130]	90	60	0	20
941230	OBS	+S	−S	OBS	10	20	20	(30)	[50]	70	60	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
90	110	90	90	80	80	80	60	70	70	60	30	82
−10	−10	−10	−40	−50	−30	−10	−30	−50	−50	−60	−60	−19
70	30	40	80	80	60	80	80	40	10	10	60	–
40	30	20	0	10	20	30	30	10	−40	−10	−70	32
40	50	50	30	−30	20	70	120	70	60	+S	+S	–
50	30	40	50	50	50	50	50	50	+S	60	40	–
50	50	50	40	50	40	20	20	0	−10	0	50	32
40	30	230	50	30	30	20	10	30	−10	−10	−20	31
30	−10	10	30	10	30	−60	0	80	60	70	70	18
60	40	30	50	50	50	50	30	30	40	30	40	34
40	50	50	60	80	90	80	110	70	50	50	50	38
50	70	50	40	40	50	50	40	40	40	30	30	46
30	30	20	40	50	50	50	50	50	40	40	40	37
40	50	50	50	50	30	40	40	40	40	40	30	37
50	50	50	50	50	60	60	50	50	50	40	40	46
50	50	60	50	60	120	120	70	80	50	30	20	55
20	30	30	40	60	50	50	40	40	40	40	30	36
40	40	40	50	40	30	30	20	20	10	30	30	34
−10	10	10	0	−10	−20	−20	−10	−10	0	20	−10	–
10	0	20	20	30	30	20	20	30	40	30	30	11
60	80	70	70	90	100	70	80	100	130	130	100	63
40	30	20	20	0	0	0	−10	10	10	30	20	27
−20	−30	−40	−20	(−10)	−20	−10	(−10)	−50	−80	−70	−40	–
−80	−70	−20	10	−10	−60	−60	−10	30	40	30	20	−60
60	50	50	70	40	40	40	30	120	80	40	50	46
20	20	10	0	10	30	30	20	0	10	20	30	23
−40	−40	−20	−10	−30	−50	−40	20	−40	−40	−10	0	−10
30	80	120	80	70	130	100	120	80	120	130	30	56
40	50	40	−10	10	30	30	10	20	40	30	10	34
30	20	20	10	30	10	20	30	30	40	10	20	44
50	40	40	40	40	60	50	50	40	50	30	10	–

Hourly means of the
1995

Date	00	01	02	03	04	05	06	07	08	09	10	11
950101	20	20	–10	0	60	70	70	[70]	70	50	30	40
950102	40	30	30	30	30	30	40	–	–	40	40	40
950103	20	20	20	30	30	40	40	40	[40]	60	70	60
950104	40	40	40	40	40	30	40	[80]	100	90	80	70
950105	40	30	30	30	20	10	–40	[–40]	–60	–110	–60	–80
950106	40	30	10	30	30	60	30	30	[40]	40	30	10
950107	20	30	40	40	60	40	[40]	100	100	70	60	70
950108	20	10	20	0	20	10	10	[10]	20	30	30	20
950109	40	40	30	30	40	40	60	[60]	–	70	40	70
950110	50	20	–10	20	30	20	20	–10	[30]	30	0	20
950111	OBS	OBS	–10	0	60	30	30	30	[90]	80	80	150
950112	40	40	40	40	40	40	40	[60]	60	50	40	40
950113	–10	–110	–100	–S	–50	–S	–S	20	P[40]	30	20	20
950114	40	40	40	60	60	50	40	[30]	50	60	70	80
950115	60	70	70	60	70	60	60	70	[70]	70	80	80
950116	70	71	80	80	90	120	110	–	–	90	120	100
950117	–80	–70	–110	–110	–70	–90	–120	–90	[–90]	–80	–110	–10
950118	–60	–70	–50	–40	–40	–60	–50	–50	[–50]	–40	–50	(–70)
950119	–20	–20	–20	–10	0	10	30	40	[0]	OBS	+S	170
950120	40	–10	–20	–40	–50	–130	–70	–50	[–30]	–90	–70	–80
950121	0	0	0	0	–10	[–10]	–10	–10	10	20	30	30
950122	–10	–20	–20	–20	–10	–20	–20	[–10]	[–10]	–20	–20	–50
950123	–	–	–	–	–	–	–	–	[100]	70	70	50
950124	–60	0	–10	20	–10	0	–10	0	10	10	10	30
950125	40	40	30	30	30	40	30	40	–	70	60	70
950126	40	20	30	30	40	30	40	80	[70]	60	60	60
950127	–10	OBS	OBS	OBS	0	–10	20	30	[30]	40	40	40
950128	30	40	40	40	60	[60]	40	30	40	40	20	30
950129	40	30	+S	30	40	40	40	60	[60]	70	80	80
950130	40	40	30	10	30	30	40	–	–	40	40	70
950131	30	20	40	70	70	70	70	[80]	[90]	90	80	80

potential gradient

12	13	14	15	16	17	18	19	20	21	22	23	Means
30	20	40	30	50	30	40	40	40	40	40	40	39
40	40	40	30	40	80	60	40	30	20	30	30	–
40	60	40	40	40	10	0	30	70	60	60	60	41
60	60	70	60	70	70	80	90	70	60	60	60	63
–90	–90	–80	–70	–40	–50	–10	10	10	–10	30	30	–25
30	20	–10	20	40	40	60	60	60	40	30	20	33
70	60	60	40	40	40	40	30	30	30	30	20	48
30	30	40	40	40	60	40	40	60	40	40	40	29
70	60	60	70	60	80	50	30	40	40	40	40	50
30	40	40	OBS	OBS	0	40	40	30	OBS	OBS	OBS	–
100	40	60	60	60	70	60	60	60	50	40	40	–
30	OBS	OBS	OBS	OBS	OBS	30	30	40	30	10	–40	–
60	50	40	40	60	50	50	50	40	30	30	30	–
80	90	90	90	100	90	110	100	100	80	70	60	70
90	80	70	80	130	100	80	60	40	50	70	80	73
100	120	70	30	–20	–10	–30	–50	–50	–30	–70	–90	–
10	20	–10	–40	–40	–110	–80	–80	–70	–80	–90	–70	–70
–60	–60	–80	–40	–60	–60	–60	–70	–70	–60	–60	–60	–57
120	120	100	70	60	50	40	50	40	40	50	40	–
–70	–60	–20	–10	–10	–20	–50	–10	–10	0	–10	–10	–39
50	50	50	50	60	50	70	80	50	20	–20	–40	22
–10	10	–10	–20	10	–	–	–	–	–	–	–	–
60	50	70	80	70	50	–10	–10	–10	10	–10	–20	–
40	50	40	50	50	50	40	60	50	50	50	40	23
80	90	80	80	70	90	70	80	70	60	40	40	58
60	60	60	60	40	20	–10	10	20	20	20	30	40
40	30	40	60	60	60	60	70	70	60	40	40	–
60	60	90	80	90	80	70	90	60	70	70	60	56
80	120	120	80	70	70	60	60	70	70	60	30	64
90	80	90	90	90	70	110	90	70	0	10	10	–
90	80	70	70	70	80	80	90	90	70	60	60	71

Date	00	01	02	03	04	05	06	07	08	09	10	11
950201	40	40	40	40	40	40	60	70	[80]	90	80	90
950202	70	70	70	60	60	70	60	70	[70]	90	100	100
950203	60	40	40	40	60	60	70	90	[100]	110	100	110
950204	40	60	40	60	60	[40]	60	40	40	80	70	80
950205	90	80	70	10	20	-S	20	[40]	120	120	80	OBS
950206	40	40	40	40	20	20	30	–	–	70	80	60
950207	60	60	40	40	40	40	40	40	[80]	80	80	100
950208	60	50	50	50	50	60	60	[60]	50	70	80	60
950209	20	20	30	40	40	50	60	60	[80]	70	70	70
950210	30	20	40	40	30	20	20	40	[30]	40	30	30
950211	-10	-20	20	40	50	[70]	70	70	70	80	80	90
950212	70	30	30	40	30	20	70	[60]	80	70	80	60
950213	10	20	10	10	10	20	20	–	[70]	50	40	40
950214	10	10	-10	0	0	0	-20	-10	[-10]	-30	-30	-40
950215	50	40	40	40	40	60	50	80	[60]	[40]	40	30
950216	30	30	40	40	40	50	70	50	[-10]	-70	-110	-50
950217	40	30	20	30	30	30	40	40	[40]	60	60	50
950218	OBS	OBS	[OBS]	OBS	-30	-30	30	-50	-60	-50	-70	-40
950219	50	40	40	40	40	30	40	[50]	50	40	50	40
950220	40	40	30	20	30	40	40	(40)	–	80	60	70
950221	50	40	40	40	40	40	50	60	[70]	70	70	60
950222	60	70	60	70	50	40	40	20	[20]	10	0	20
950223	10	10	10	10	20	20	20	30	[40]	30	40	40
950224	40	40	40	40	40	40	50	60	[50]	30	30	10
950225	60	70	50	40	50	[40]	40	70	50	50	40	30
950226	40	30	30	40	30	40	40	[40]	70	50	50	50
950227	-20	0	0	0	10	10	10	–	[40]	40	40	40
950228	40	40	30	30	30	30	40	40	–	60	50	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
100	100	90	90	100	90	80	90	100	100	90	70	75
100	110	90	90	80	80	30	10	30	30	10	30	66
100	100	100	100	80	90	40	40	40	40	40	30	70
70	80	70	70	60	70	80	90	90	80	70	70	65
OBS	+S	80	80	80	80	90	100	110	110	60	40	74
40	80	90	70	60	50	60	50	40	40	40	50	–
80	110	110	100	80	80	80	90	80	80	70	60	72
50	30	40	30	30	40	20	30	40	40	20	30	46
40	20	30	30	20	50	30	40	40	30	30	30	42
40	40	30	30	20	20	20	0	–10	0	–10	–20	22
80	90	90	90	90	80	80	80	40	40	60	60	62
80	90	80	80	80	70	80	90	70	40	40	20	61
40	50	50	50	40	40	40	30	40	20	20	20	32
–40	–30	–10	0	0	10	30	60	60	60	60	60	5
40	40	50	40	30	–50	–20	0	0	20	30	30	33
–70	–130	–70	–50	30	50	60	50	40	40	30	30	5
50	70	70	60	70	60	70	70	50	50	40	–10	47
20	40	30	30	40	50	60	60	50	60	50	60	13
50	60	50	50	60	110	90	60	80	70	50	40	53
50	60	80	80	70	40	70	80	80	60	70	60	–
80	80	90	80	70	80	80	70	80	70	70	60	64
40	30	30	30	30	20	30	30	20	30	20	20	33
40	30	–60	–10	40	OBS	OBS	OBS	40	+S	40	40	–
–30	–10	10	40	60	50	50	60	50	60	50	60	38
30	40	40	40	30	30	40	40	50	50	50	40	45
40	20	–40	OBS	30	–30	0	–10	–60	–30	0	–60	16
40	30	30	+S	30	40	50	60	70	60	50	40	30
50	60	60	60	70	80	90	90	90	80	90	90	59

Date	00	01	02	03	04	05	06	07	08	09	10	11
950301	80	70	70	80	80	80	90	80	[80]	80	80	70
950302	60	60	40	50	40	50	70	30	[10]	0	–70	–20
950303	30	30	40	40	30	30	50	[60]	[50]	30	40	40
950304	30	30	20	20	30	40	40	[70]	40	20	30	30
950305	10	10	10	20	20	40	50	[60]	70	70	70	80
950306	–10	0	30	30	30	30	50	(70)	(80)	100	90	100
950307	40	40	40	60	60	70	70	80	[80]	70	70	70
950308	30	30	30	30	40	40	70	70	[60]	40	40	70
950309	30	40	70	60	60	40	70	80	[70]	80	70	60
950310	30	30	10	10	10	10	20	30	[30]	40	40	70
950311	20	20	20	30	30	20	30	30	[40]	30	20	40
950312	20	20	20	0	0	–10	–20	20	[30]	60	60	70
950313	–20	–20	–10	10	10	10	10	[20]	–	30	30	40
950314	–10	–10	OBS	90	30	30	10	10	[10]	20	40	30
950315	20	0	10	10	0	0	10	20	[30]	40	40	30
950316	30	30	40	–	–	–	–	–	–	10	30	40
950317	20	60	140	140	160	140	140	150	[110]	90	40	40
950318	20	30	30	20	0	[20]	30	80	80	80	60	40
950319	10	10	0	0	0	0	0	[10]	20	30	60	60
950320	–	–	–	–	–	–	–	–	–	10	10	30
950321	30	30	40	40	30	30	40	40	(40)	OBS	0	20
950322	0	0	0	0	0	0	0	10	40	90	100	100
950323	30	30	30	20	30	30	20	10	[20]	10	10	30
950324	0	0	0	0	20	30	60	80	100	110	100	80
950325	10	0	0	0	0	0	0	20	100	130	130	70
950326	0	0	0	0	0	0	0	10	30	10	0	0
950327	0	0	0	0	0	0	(0)	10	50	70	110	170
950328	10	10	20	40	40	40	[50]	–	60	50	60	50
950329	40	20	20	20	20	20	[20]	[10]	40	50	50	70
950330	0	0	0	0	0	0	20	[50]	70	70	60	80
950331	0	–10	–10	–10	–10	–10	10	[40]	80	90	60	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
70	70	70	70	60	70	60	60	60	60	60	60	7
20	+S	80	−10	−60	−80	−S	0	20	30	30	30	–
40	60	40	30	40	40	40	60	60	40	40	40	42
30	20	−10	−20	−10	−30	0	−40	−10	−10	10	0	14
80	80	80	80	50	60	50	30	30	30	0	−10	45
90	70	70	80	80	70	80	70	70	70	60	40	–
70	60	70	70	40	60	60	60	60	60	40	40	60
70	80	80	80	70	80	60	60	10	30	40	40	52
70	70	60	70	60	60	40	40	60	60	40	40	58
70	70	70	70	70	80	80	70	40	30	20	20	43
40	30	30	30	20	10	20	40	30	30	40	30	28
80	80	80	70	60	60	70	60	40	10	−10	−10	36
30	30	(30)	30	30	0	−10	−20	−20	−30	−20	−30	45
40	30	40	70	60	40	40	20	20	30	30	30	30
30	20	20	20	20	10	20	20	30	20	30	30	20
10	OBS	40	60	70	90	90	120	110	30	30	30	–
40	30	40	40	40	40	60	60	60	40	0	−10	70
70	70	40	40	40	30	30	20	10	10	0	10	36
60	40	60	–	–	–	–	–	–	–	–	–	–
40	40	40	40	30	30	30	30	30	20	20	30	–
0	0	0	0	0	0	0	0	0	0	0	0	–
130	100	90	70	90	60	60	70	40	40	30	30	48
60	40	20	0	10	0	0	0	10	0	10	0	18
90	80	80	80	60	30	20	30	20	20	30	10	47
70	60	60	70	70	80	30	20	40	20	0	0	41
0	10	20	0	0	0	0	0	0	0	0	0	3
200	+S	OBS	−10	0	0	0	−10	−10	−10	0	0	–
50	60	50	50	50	50	50	50	40	40	40	40	43
−S	40	50	−30	20	20	20	0	0	0	−10	−10	21
80	(120)	(80)	60	80	80	40	10	0	0	0	0	–
20	60	OBS	10	0	20	40	50	40	40	40	20	27

Date	00	01	02	03	04	05	06	07	08	09	10	11
950401	0	0	0	0	0	0	0	0	0	0	0	0
950402	0	0	40	40	10	[40]	70	50	80	90	120	50
950403	50	50	40	40	40	50	–	[50]	40	20	10	10
950404	10	10	20	20	40	40	50	[60]	50	50	40	40
950405	0	0	0	0	0	0	20	[40]	40	40	40	50
950406	0	0	0	0	–10	–10	–10	[20]	60	70	70	60
950407	10	10	20	20	10	0	[10]	40	50	50	20	20
950408	–10	–10	–10	–10	–10	–10	–10	–10	10	20	20	40
950409	0	0	0	0	0	20	[40]	[50]	70	70	70	90
950410	20	0	0	–30	0	0	[0]	–	–	–	–	–
950411	–	–	–	–	–	–	–	–	–	–	–	–
950412	–	–	–	–	–	–	10	50	110	60	40	10
950413	50	50	40	40	20	–40	0	(40)	50	40	40	50
950414	0	30	30	30	30	40	40	[40]	50	50	50	50
950415	–130	90	30	10	0	0	[100]	10	40	10	30	30
950416	80	50	60	50	60	[90]	100	90	90	50	40	50
950417	30	40	50	40	50	50	[50]	60	50	50	50	50
950418	–40	–40	0	–40	0	50	[30]	–	50	40	50	50
950419	40	50	50	50	40	50	60	[50]	40	40	40	40
950420	–20	–20	–20	–10	0	20	[40]	40	50	50	50	40
950421	30	40	40	30	30	40	40	[30]	30	30	20	40
950422	30	30	30	20	[20]	30	40	40	40	40	40	40
950423	20	10	10	10	10	30	[30]	40	30	40	50	50
950424	10	10	10	10	10	20	30	(40)	[40]	40	(20)	–
950425	0	0	–10	–10	–20	–60	OBS	OBS	10	10	–10	OBS
950426	–20	0	20	20	20	20	30	[10]	–80	–140	–50	–130
950427	30	0	0	10	0	0	20	[30]	10	10	10	0
950428	10	20	10	20	30	40	40	[40]	40	–S	OBS	30
950429	30	30	30	30	30	30	[70]	60	60	60	70	60
950430	40	40	40	30	–10	20	[80]	30	40	40	60	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
0	0	0	20	40	10	0	0	0	0	−10	0	3
90	130	120	110	90	70	60	70	60	60	60	50	65
10	10	10	20	20	40	40	40	20	10	10	10	28
40	40	50	20	50	50	60	60	50	50	40	10	40
50	50	40	40	20	10	0	0	0	0	0	0	18
50	40	10	10	0	−10	−10	−10	0	0	0	0	14
20	40	40	50	40	10	10	20	10	0	0	0	21
10	−S	OBS	OBS	OBS	+S	0	0	0	0	0	0	–
70	OBS	+S	+S	OBS	40	10	10	20	50	20	10	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
20	20	20	40	40	+S	40	40	40	50	40	50	–
40	50	60	40	OBS	40	40	40	40	+S	10	10	–
40	40	+S	OBS	OBS	OBS	OBS	−10	10	10	−40	−30	
10	30	30	40	30	40	40	50	60	80	90	110	35
60	80	50	50	50	50	50	50	50	50	40	30	59
50	50	50	50	50	60	50	80	90	50	40	10	50
60	40	40	40	40	40	60	50	60	50	40	50	33
40	30	40	30	30	30	20	30	40	30	−10	−10	35
40	50	60	60	60	50	50	50	40	40	40	30	33
40	40	40	40	50	40	40	40	40	40	40	30	37
50	50	50	40	40	20	20	20	20	10	20	30	32
40	30	30	10	0	−20	−20	−10	−10	−10	−10	−10	15
(20)	20	30	20	−10	−*50	−60	OBS	−S	10	10	10	–
30	40	20	30	40	40	30	30	30	30	20	10	–
−230	−210	−30	−20	−20	−50	−10	−50	−60	0	−10	−10	−42
10	30	40	40	40	30	40	30	30	30	20	10	20
0	OBS	+S	30	OBS	10	40	40	40	40	40	40	–
60	60	50	50	50	40	40	40	40	40	40	40	46
80	70	30	40	40	20	20	30	40	40	30	30	39

Date	00	01	02	03	04	05	06	07	08	09	10	11
950501	30	40	30	20	30	30	20	[30]	30	30	50	60
950502	10	0	−10	−20	10	(20)	–	(40)	60	50	50	40
950503	30	30	30	20	30	50	40	[50]	50	60	70	80
950504	–	–	–	–	–	–	–	–	–	–	–	–
950505	10	10	0	10	10	[20]	30	50	60	40	50	60
950506	20	20	20	10	[10]	20	30	40	40	60	70	70
950507	10	10	10	10	10	20	[20]	30	40	50	50	50
950508	10	10	20	20	20	20	(30)	–	(30)	20	20	30
950509	−60	10	20	20	10	10	10	[+S]	+S	20	−10	+S
950510	20	20	20	20	10	20	30	[30]	30	30	230	30
950511	10	10	10	10	20	20	[20]	20	20	20	10	10
950512	10	20	20	10	10	20	20	[20]	10	30	10	−10
950513	20	20	−20	−20	0	−10	[OBS]	30	30	30	10	20
950514	0	20	20	30	20	10	[10]	[30]	20	10	0	0
950515	20	10	10	20	20	30	[30]	–	40	40	40	40
950516	0	0	0	0	10	20	20	[30]	30	40	40	40
950517	0	−10	−10	−10	−10	−20	[−10]	[−40]	−50	−40	−10	−20
950518	20	0	10	30	40	40	40	[40]	40	70	70	70
950519	30	−S	−60	−10	−40	−80	[0]	[40]	30	30	30	20
950520	30	30	20	20	[20]	30	20	10	30	40	40	30
950521	−30	−50	−10	−10	[0]	10	30	40	30	30	30	40
950522	30	30	30	30	30	30	(30)	–	50	50	60	60
950523	10	10	20	20	30	40	50	[60]	70	70	70	70
950524	20	20	20	20	10	30	40	[40]	50	80	70	70
950525	20	20	20	10	10	30	40	[40]	60	70	80	80
950526	10	20	20	20	30	30	30	[30]	40	50	50	50
950527	20	20	10	10	20	[20]	20	10	30	40	40	30
950528	10	10	10	10	0	[10]	20	20	30	40	50	60
950529	10	10	10	0	10	30	30	–	30	50	60	50
950530	0	0	0	10	10	30	30	[40]	40	60	+S	+S
950531	OBS	OBS	30	40	20	50	80	[110]	130	80	80	80

12	13	14	15	16	17	18	19	20	21	22	23	Means
60	60	60	50	30	40	30	20	20	10	10	0	33
40	40	40	40	50	40	60	80	80	70	40	40	–
80	80	40	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	50	30	20	20	20	10	20	–
60	60	60	60	50	50	60	50	40	40	40	30	40
80	+S	OBS	OBS	+S	40	20	0	20	10	10	10	–
60	+S	OBS	OBS	30	30	40	30	30	30	20	10	–
40	–S	OBS	+S	OBS	OBS	–S	–10	10	20	0	–30	–
60	10	20	20	0	10	30	30	20	30	20	20	–
20	10	10	10	20	10	10	0	10	10	10	10	18
20	20	30	30	20	30	30	40	30	30	20	10	18
–10	10	20	20	30	30	20	10	+S	+S	–90	20	–
20	10	20	20	–10	–60	OBS	–40	–60	–30	–10	10	–1
10	20	30	30	30	30	30	40	40	30	30	20	21
40	40	40	30	30	30	30	20	20	10	10	0	26
30	30	40	40	30	30	20	10	10	10	0	10	20
30	40	30	40	(40)	40	40	40	40	30	20	7	
60	40	60	60	40	40	40	40	30	30	30	30	40
10	10	30	30	30	40	40	30	30	20	10	20	13
40	60	60	60	60	70	30	–10	–40	–80	–130	–60	16
40	40	40	40	40	30	30	30	30	40	30	30	22
60	50	60	60	50	40	40	60	40	40	40	20	–
70	80	80	70	60	50	50	40	20	20	20	20	46
70	70	80	80	50	40	50	40	40	40	20	20	45
80	70	70	60	40	30	30	30	20	20	20	10	40
50	50	50	50	40	40	30	30	20	10	10	10	32
40	50	40	60	40	30	20	20	10	10	10	10	25
60	60	70	60	50	40	30	30	20	20	20	10	31
50	70	50	40	40	40	30	30	20	20	10	10	30
OBS	OBS	+S	80	30	30	+S	OBS	OBS	OBS	30	+S	–
70	70	–S	OBS	OBS	OBS	OBS	OBS	–10	10	0	20	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
950601	30	30	30	30	40	40	20	[40]	80	30	20	30
950602	40	30	30	40	70	50	70	[60]	(60)	50	60	60
950603	40	30	20	30	40	40	[40]	50	50	50	50	60
950604	10	10	10	10	20	30	[30]	[30]	40	50	50	40
950605	50	40	30	50	40	80	80	[70]	[80]	50	40	40
950606	60	50	40	+S	+S	(50)	30	–	OBS	OBS	90	140
950607	10	10	OBS	OBS	40	20	10	[60]	60	50	90	50
950608	20	20	20	20	20	40	40	[40]	60	80	90	90
950609	10	10	20	10	40	60	40	[40]	40	50	50	50
950610	–10	–10	10	40	[50]	60	70	80	70	90	80	80
950611	40	50	40	OBS	40	40	[20]	10	OBS	OBS	OBS	OBS
950612	20	20	40	20	40	20	(40)	–	40	40	40	40
950613	10	10	20	20	20	[40]	40	40	40	50	60	50
950614	0	0	10	10	40	[50]	71	70	60	–S	OBS	50
950615	OBS	OBS	OBS	20	40	[50]	40	50	50	60	50	50
950616	20	10	20	20	40	[40]	40	40	40	40	40	10
950617	20	20	20	40	40	[40]	80	90	80	90	70	–10
950618	40	10	10	20	40	40	50	[70]	60	50	50	60
950619	40	20	20	20	20	40	(40)	(40)	40	60	60	60
950620	10	0	0	10	10	20	20	[10]	30	40	40	50
950621	10	20	20	10	20	30	20	[30]	30	60	70	80
950622	10	0	OBS	OBS	OBS	–	–	60	80	90	50	OBS
950623	40	40	30	20	20	20	30	[40]	50	40	40	40
950624	50	40	40	40	40	40	[40]	40	30	10	20	20
950625	0	0	–10	10	0	[10]	[10]	10	30	30	20	0
950626	0	10	20	10	0	50	(70)	–	60	70	30	OBS
950627	20	0	10	20	40	60	70	[40]	30	–	–	40
950628	30	30	20	20	10	10	20	[30]	40	70	60	60
950629	20	20	10	10	20	30	[30]	30	40	60	60	70
950630	10	0	0	0	10	30	[10]	[20]	30	70	70	70

12	13	14	15	16	17	18	19	20	21	22	23	Means
20	20	20	30	30	30	30	40	50	40	40	40	34
70	40	20	10	10	30	40	50	40	40	40	50	43
60	60	60	60	60	30	20	20	20	20	30	20	40
30	OBS	OBS	OBS	OBS	OBS	+S	−130	−60	20	40	50	–
30	30	10	−80	OBS	−110	OBS	OBS	30	60	50	60	–
80	70	70	50	50	40	20	OBS	OBS	OBS	OBS	−20	–
50	50	20	20	10	20	20	20	40	40	40	20	–
90	80	80	90	80	60	50	50	40	20	20	40	52
50	60	50	20	OBS	60	0	0	10	20	10	−20	30
70	70	70	70	50	60	50	50	40	40	40	50	53
OBS	OBS	40	20	40	50	40	20	40	40	20	20	–
10	20	40	20	20	50	40	20	20	20	10	10	–
50	OBS	OBS	−50	OBS	+S	10	0	−10	−10	−10	0	–
−S	OBS	OBS	OBS	20	40	50	40	20	10	20	10	–
50	50	60	80	60	40	40	40	20	20	20	20	–
50	OBS	OBS	50	80	40	40	40	20	20	10	20	–
80	OBS	OBS	40	60	50	50	50	50	50	50	40	–
50	50	50	60	60	50	40	40	50	50	40	40	45
50	50	60	70	60	40	30	20	10	10	10	10	–
50	50	60	60	50	30	30	30	30	10	10	10	28
80	80	50	+S	OBS	OBS	OBS	OBS	OBS	20	20	30	–
30	30	30	20	20	40	30	20	30	40	30	40	–
40	40	40	40	50	60	70	50	60	40	40	40	41
40	40	40	20	30	30	20	10	30	20	20	20	30
40	20	OBS	−10	10	OBS	OBS	10	OBS	20	10	20	–
OBS	30	20	OBS	20	20	10	10	10	OBS	OBS	20	–
40	40	30	30	30	40	40	40	40	30	30	20	–
40	40	40	40	60	60	90	90	80	70	40	30	45
70	80	80	90	80	60	30	30	20	10	0	10	40
70	80	80	80	70	70	40	10	10	10	10	10	36

Date	00	01	02	03	04	05	06	07	08	09	10	11
950701	−10	−10	−10	−10	10	30	30	[30]	40	70	80	80
950702	−10	−10	−20	−10	10	20	[30]	30	+S	−20	30	30
950703	0	0	10	0	−10	20	(30)	–	30	40	70	70
950704	30	OBS	10	20	30	30	[30]	[30]	30	−10	20	40
950705	20	20	20	20	30	30	[30]	40	40	30	40	60
950706	30	30	20	20	10	0	20	[20]	30	40	40	60
950707	20	10	10	10	20	30	30	[40]	60	70	70	80
950708	10	0	0	0	10	30	40	[40]	60	80	80	80
950709	0	0	−10	−10	0	10	20	[30]	40	70	80	80
950710	10	10	10	10	10	30	–	40	50	70	70	60
950711	0	10	0	10	10	10	[20]	20	20	50	50	50
950712	10	20	10	20	40	40	[50]	60	60	80	80	90
950713	0	0	0	0	0	[20]	40	40	50	70	60	60
950714	0	10	0	10	10	20	10	[20]	40	60	70	140
950715	10	20	10	10	10	20	[20]	20	20	40	OBS	20
950716	10	10	0	10	10	20	20	[20]	40	60	70	70
950717	20	20	20	10	20	20	20	–	70	70	70	80
950718	0	−10	0	0	0	20	20	[30]	30	40	40	60
950719	20	10	10	10	20	30	10	[20]	30	30	20	30
950720	10	0	−10	0	10	20	30	[40]	40	60	60	70
950721	0	0	10	10	10	30	30	[30]	30	60	70	60
950722	30	20	20	20	10	10	[10]	10	30	40	40	60
950723	20	30	30	30	20	20	[20]	20	30	30	40	30
950724	30	30	20	20	20	30	–	–	–	–	60	50
950725	20	10	10	10	10	20	30	[40]	50	60	60	70
950726	10	10	10	10	20	30	40	[30]	30	30	40	50
950727	10	0	0	0	10	10	10	[10]	10	30	20	20
950728	10	10	10	−20	0	20	[10]	−S	40	40	40	40
950729	20	20	20	30	30	30	[30]	0	OBS	OBS	20	30
950730	0	10	10	10	[10]	30	40	40	40	50	40	60
950731	10	10	10	20	20	30	–	–	60	80	90	90

12	13	14	15	16	17	18	19	20	21	22	23	Means
80	90	70	60	30	30	30	20	0	0	0	−10	30
30	40	70	70	OBS	OBS	−S	OBS	+S	10	10	20	–
80	40	30	40	40	40	20	20	20	20	10	20	–
60	+S	60	70	60	40	30	30	40	60	40	30	35
70	70	70	60	60	30	20	10	10	10	10	10	34
60	60	60	60	60	60	60	60	40	30	30	20	38
90	90	90	90	80	70	40	40	30	20	20	10	47
90	90	100	90	70	40	40	30	10	10	10	10	43
80	80	90	80	60	40	30	30	20	20	10	10	36
80	80	80	90	50	40	20	20	10	10	0	0	37
50	60	60	70	50	50	40	20	20	10	10	10	29
80	80	70	60	20	10	0	0	0	0	0	0	37
50	40	40	50	50	40	20	10	10	0	0	−10	27
OBS	OBS	OBS	OBS	−10	20	20	10	10	10	0	0	–
50	40	40	40	40	40	20	20	20	10	10	10	23
80	90	90	70	50	40	20	40	20	20	10	10	37
80	80	70	70	40	30	20	20	10	10	10	10	38
70	70	80	80	60	40	30	30	20	30	30	10	33
30	30	30	30	20	30	20	20	30	20	20	10	22
80	90	90	90	80	70	30	20	10	10	10	0	38
70	80	70	80	40	40	60	30	20	20	20	30	38
70	70	70	70	40	40	40	40	40	40	40	30	37
20	30	30	30	30	30	40	40	40	30	40	30	30
60	60	60	60	60	50	60	60	50	30	20	20	–
70	80	80	90	70	70	50	40	40	20	10	10	43
50	60	60	60	40	30	20	10	10	0	0	0	27
20	30	40	40	30	30	20	10	10	10	10	10	16
50	OBS	OBS	20	40	40	40	40	30	20	20	20	–
40	20	30	30	20	10	0	0	10	10	10	10	–
60	70	70	80	60	40	30	20	10	10	10	20	34
80	90	110	110	70	50	50	40	40	40	20	10	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
950801	10	10	20	40	40	50	[50]	[40]	50	70	80	80
950802	10	40	20	20	10	20	[50]	10	10	40	50	50
950803	40	20	10	20	40	[40]	40	40	50	60	60	50
950804	20	10	0	10	10	20	40	[20]	40	70	70	OBS
950805	−10	−10	0	0	0	20	40	[20]	50	60	60	70
950806	10	10	10	10	20	40	50	[50]	60	70	70	70
950807	20	20	40	20	20	40	–	–	40	70	70	OBS
950808	0	0	0	0	−10	−20	10	[60]	40	40	40	70
950809	40	30	30	20	30	30	[30]	20	90	60	40	70
950810	10	20	20	20	20	60	90	[90]	80	70	80	80
950811	20	20	20	10	10	30	30	[40]	80	90	90	90
950812	20	20	20	20	20	30	[40]	60	70	80	100	110
950813	10	10	0	10	10	0	[20]	30	20	30	40	40
950814	10	10	10	10	10	20	–	–	30	40	70	60
950815	10	10	0	0	10	10	10	[30]	30	20	20	10
950816	20	20	30	30	40	40	[40]	70	40	60	40	60
950817	10	10	0	10	0	[10]	–	–	–	–	70	70
950818	20	20	10	10	10	[10]	30	30	30	30	40	40
950819	10	20	20	10	10	10	20	OBS	80	40	120	90
950820	OBS	OBS	20	+S	30	40	30	[40]	110	90	40	30
950821	10	20	20	20	30	40	–	–	30	30	30	30
950822	20	20	10	10	10	30	70	[40]	50	60	70	60
950823	20	10	10	30	80	60	60	[40]	30	30	40	40
950824	10	20	20	30	10	40	50	[50]	50	40	50	50
950825	10	10	10	10	10	30	20	[20]	30	40	50	60
950826	20	20	20	20	20	[30]	20	20	30	30	10	10
950827	10	10	0	10	10	[20]	30	20	20	10	20	10
950828	10	–S	10	OBS	OBS	OBS	–	OBS	+S	OBS	OBS	OBS
950829	30	20	20	10	20	30	[30]	–	–40	OBS	OBS	OBS
950830	10	10	10	20	20	30	[30]	20	0	10	0	−10
950831	10	10	10	10	10	20	20	[20]	20	20	40	40

12	13	14	15	16	17	18	19	20	21	22	23	Means
90	90	110	90	80	70	50	60	–S	OBS	0	0	–
60	50	50	60	50	50	50	40	20	20	20	20	34
50	60	70	50	60	40	10	20	10	20	20	10	37
90	–S	OBS	20	40	60	50	20	0	–10	–10	0	–
80	80	80	40	50	50	50	40	20	40	20	20	36
80	90	90	90	60	50	40	40	20	10	20	40	46
OBS	OBS	OBS	OBS	OBS	+S	0	0	0	0	–10	–10	–
+S	OBS	OBS	OBS	OBS	10	10	0	20	20	30	40	–
40	30	10	20	10	10	10	0	–10	0	30	30	28
70	70	70	80	80	70	30	20	20	20	30	30	51
90	90	100	100	90	70	60	60	40	30	20	20	54
120	110	120	110	80	60	40	30	–10	10	10	10	54
40	40	60	60	30	30	30	30	30	30	20	10	26
70	70	70	30	20	20	10	20	10	10	10	20	–
OBS	30	30	40	30	30	30	30	30	30	30	30	22
60	30	30	30	10	10	10	10	10	10	10	10	30
70	70	70	70	60	60	40	30	30	20	20	10	–
40	40	40	70	40	20	20	20	30	30	30	10	28
60	40	40	OBS	OBS	–10	10	OBS	OBS	90	OBS	OBS	–
30	40	40	40	40	40	30	30	10	10	10	10	–
30	30	40	40	40	30	20	30	20	20	20	20	–
70	80	70	–40	40	40	30	30	20	20	10	20	35
40	40	40	30	40	40	30	20	20	20	20	10	33
60	60	50	30	40	30	10	10	10	10	20	20	32
70	70	60	30	30	20	30	30	20	30	20	31	
20	10	10	10	20	40	20	20	30	10	10	10	19
10	10	20	20	10	10	10	0	0	0	10	10	12
OBS	OBS	OBS	30	40	40	40	40	40	30	30	30	–
OBS	–10	–10	–S	30	30	20	30	30	20	20	20	–
–10	50	30	30	30	30	30	30	30	20	20	20	19
30	30	30	20	30	20	10	10	10	30	20	20	20

Date	00	01	02	03	04	05	06	07	08	09	10	11
950901	10	10	10	10	30	30	[40]	–30	–40	–20	–30	OBS
950902	10	10	10	10	20	20	[10]	30	40	40	30	30
950903	0	10	10	20	20	20	[30]	20	30	40	40	30
950904	30	30	–20	0	10	–	–S	–S	–30	30	0	80
950905	20	20	20	20	20	30	30	–	40	30	40	40
950906	20	20	20	10	20	30	[40]	30	40	40	50	50
950907	20	20	20	20	20	40	70	[40]	30	40	40	30
950908	20	20	20	20	10	–20	[20]	[20]	0	0	0	20
950909	40	40	40	30	30	30	20	[20]	30	20	30	30
950910	20	10	10	10	10	10	[20]	[30]	30	30	40	50
950911	20	10	10	20	20	[20]	[30]	–	30	40	50	60
950912	30	30	20	20	20	20	[40]	(40)	(60)	70	80	90
950913	10	20	10	20	20	20	20	[30]	30	30	30	40
950914	10	10	30	10	10	0	10	[30]	–20	10	80	60
950915	–10	–10	20	20	20	+S	[–20]	20	–20	70	90	60
950916	10	10	0	10	0	10	[10]	[40]	40	60	60	60
950917	20	30	30	70	70	70	[80]	70	70	30	50	70
950918	10	10	20	10	10	20	[40]	–	60	40	60	40
950919	20	40	60	40	30	30	40	[20]	10	30	30	30
950920	20	30	OBS	–S	OBS	OBS	[10]	[20]	20	30	30	60
950921	30	20	20	10	+S	OBS	OBS	[20]	30	10	20	30
950922	20	20	20	20	40	40	30	[30]	40	60	30	30
950923	40	40	30	20	20	20	[30]	40	60	70	80	70
950924	20	30	20	20	20	10	20	30	[30]	30	40	30
950925	20	10	20	20	20	20	[30]	–	–	30	30	20
950926	–	–	–	–	–	–	–[30]	20	20	30	20	10
950927	–	–	–	–	–	–	–	–	–	–	–	–
950928	–	–	–	–	–	–	–	–	–	–	–	–
950929	–	–	–	–	–	–	–	–	–	–	–	–
950930	–	–	–	–	–	–	–	–	–	–	–	–

12	13	14	15	16	17	18	19	20	21	22	23	Means
OBS	OBS	−70	OBS	0	OBS	0	10	20	40	+S	−60	–
30	20	10	10	10	20	10	10	0	0	10	0	16
−S	30	+S	10	30	OBS	OBS	80	50	−S	OBS	+S	–
120	60	40	40	30	30	30	30	30	30	30	20	–
50	40	40	40	40	30	40	30	30	30	30	20	32
70	60	60	40	30	30	30	30	30	30	20	20	34
30	30	30	20	10	10	10	10	10	10	10	10	24
40	40	40	40	40	40	50	40	40	40	30	30	25
30	30	20	20	30	30	30	30	20	20	10	20	27
40	40	30	30	30	30	30	30	30	30	30	30	28
50	40	30	40	30	30	30	30	40	40	30	30	32
80	60	50	40	30	30	20	20	20	10	10	10	–
40	40	40	+S	30	40	40	30	30	40	30	20	29
−10	−10	10	20	20	10	10	20	−S	OBS	OBS	0	–
–	20	10	20	−20	−20	−40	10	10	20	20	10	13
50	50	40	40	30	20	20	30	30	30	30	20	29
40	20	20	40	40	40	30	20	30	30	30	10	42
40	40	30	30	20	20	20	20	20	20	30	20	27
120	20	20	30	30	−S	+S	−10	−10	−50	−10	−10	–
40	40	30	30	20	20	40	60	60	40	30	30	–
20	30	10	10	20	20	20	30	20	30	20	20	–
40	20	40	40	30	30	30	20	20	40	40	40	
70	80	70	70	70	40	30	30	30	30	20	20	45
40	40	40	30	40	30	20	20	20	20	20	20	27
40	40	30	20	30	40	40	40	0	–	–	–	–
0	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
951001	–	–	–	–	–	–	–	–	–	–	–	–
951002	–	–	–	–	–	–	–	–	–	–	–	–
951003	50	50	90	120	90	50	70	40	[30]	30	10	10
951004	110	110	130	130	170	110	90	40	[10]	30	30	10
951005	40	40	40	50	40	30	10	0	0	0	30	40
951006	80	50	30	40	40	30	40	–	[50]	60	50	50
951007	50	50	100	110	90	[40]	50	50	50	60	50	40
951008	30	–10	30	30	10	10	30	40	[40]	40	50	50
951009	40	40	40	40	50	40	50	–	–	70	70	80
951010	40	40	60	70	80	100	60	40	[40]	30	30	60
951011	60	60	40	70	110	110	90	–	–	40	60	40
951012	20	30	30	20	30	60	40	30	[10]	30	40	40
951013	20	10	10	10	10	20	20	20	[20]	20	30	30
951014	20	20	10	10	20	20	[30]	30	20	20	20	30
951015	20	10	10	10	10	20	20	[20]	20	20	20	30
951016	30	30	30	30	30	30	[30]	–	–	[30]	40	40
951017	30	30	20	20	30	30	20	30	[20]	20	40	30
951018	10	10	10	20	30	30	40	40	[40]	30	50	60
951019	20	20	10	10	10	0	20	40	[40]	30	40	30
951020	20	20	20	20	20	30	30	[40]	40	40	40	40
951021	10	0	0	10	10	10	20	20	10	20	30	40
951022	10	20	20	20	30	30	[30]	40	40	40	40	40
951023	–20	–10	10	0	–10	–	–20	–10	20	30	40	50
951024	–20	–20	–20	–30	–30	–30	–20	–10	–	20	40	40
951025	10	10	0	–10	–10	20	0	–40	[0]	–10	20	40
951026	40	40	40	30	30	30	30	40	[40]	40	50	60
951027	20	30	30	40	50	60	80	80	[70]	20	10	20
951028	60	60	50	30	40	[40]	40	30	20	20	20	20
951029	30	30	30	20	20	30	[40]	40	50	10	10	10
951030	40	40	30	30	30	20	–	20	[10]	[30]	30	30
951031	10	10	10	10	10	10	0	0	[10]	10	20	30

12	13	14	15	16	17	18	19	20	21	22	23	Means
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	70	40	40	30	30	30	30	10	10	–
–	30	40	50	50	50	50	60	60	90	80	60	55
–40	–	–	–	–	–	–	–	–	–30	30	40	–
50	50	–20	30	30	40	40	10	10	40	50	50	29
50	60	60	80	80	80	90	90	100	80	50	50	60
50	50	60	50	50	50	50	60	50	40	40	30	55
40	50	50	60	50	50	60	50	40	50	50	40	39
80	80	70	40	60	70	60	40	40	40	40	40	–
60	70	70	70	70	70	80	70	70	70	40	60	60
40	70	60	60	60	30	30	30	20	20	20	20	–
60	60	40	60	60	30	20	30	30	30	30	20	35
40	40	40	40	40	20	30	40	30	30	20	20	25
30	30	40	30	20	20	30	30	30	20	10	10	23
30	30	30	30	30	40	60	40	40	40	30	40	27
40	50	50	40	30	30	40	50	50	40	40	30	–
30	30	30	30	30	20	30	20	20	10	10	10	25
50	60	50	50	40	60	50	40	40	30	30	30	38
30	20	30	30	40	40	40	30	20	20	30	20	26
40	40	50	50	50	60	60	40	30	30	40	20	36
30	30	40	40	50	60	60	70	60	40	30	20	30
40	30	20	20	20	20	10	10	10	10	0	–10	23
50	50	50	50	50	60	40	40	30	30	20	10	24
40	50	40	50	50	40	30	30	20	10	10	10	13
40	60	60	60	50	50	60	70	60	60	60	40	29
60	70	70	60	60	70	70	60	50	40	30	30	48
40	50	40	40	30	10	20	20	30	60	70	70	41
20	20	10	40	60	60	50	30	40	30	30	20	35
20	20	20	10	20	20	30	40	70	60	80	50	32
30	40	30	10	10	10	20	20	10	10	0	0	22
40	40	40	30	20	20	20	30	30	20	20	10	19

Date	00	01	02	03	04	05	06	07	08	09	10	11
951101	10	0	0	10	10	10	20	[30]	30	30	40	40
951102	–S	–10	0	10	30	30	40	[40]	–	20	20	30
951103	30	30	20	20	10	[0]	40	40	30	OBS	30	30
951104	OBS	–S	20	20	20	20	[30]	+S	+S	OBS	+S	10
951105	20	30	20	20	10	20	20	[–10]	40	60	30	90
951106	–20	0	10	10	20	30	40	[60]	–	20	–80	–70
951107	30	30	20	20	20	30	20	30	[–10]	10	20	20
951108	40	40	40	40	40	50	70	[60]	[60]	70	40	50
951109	50	40	40	40	40	40	30	40	[30]	10	–20	–50
951110	90	90	90	90	100	100	110	[110]	90	70	40	40
951111	0	0	0	10	0	0	30	[20]	10	0	0	0
951112	20	10	0	10	10	0	–20	[20]	30	10	0	10
951113	20	10	10	10	–30	–30	[–20]	–	–	–	–10	–10
951114	20	20	10	10	30	40	30	20	[20]	10	20	40
951115	70	60	40	50	30	40	50	[50]	[40]	40	20	20
951116	–10	–10	–10	–10	–10	–10	–10	[10]	[60]	50	40	30
951117	50	30	30	OBS	+S	OBS	0	OBS	30	10	–10	–30
951118	10	30	50	50	50	60	70	70	[70]	70	70	50
951119	40	30	20	10	20	30	20	[20]	20	20	30	30
951120	(20)	0	10	30	30	+S	30	–	–	40	30	30
951121	40	40	40	40	60	50	50	70	[70]	80	60	50
951122	30	30	30	30	30	30	30	20	[20]	20	40	40
951123	20	40	40	50	70	60	50	70	[70]	30	20	–20
951124	0	0	10	10	10	–20	–10	–10	[–10]	0	–10	–10
951125	–50	–60	–50	–50	–50	–40	–50	–50	[–60]	–60	–60	–50
951126	–30	–40	–50	–60	–50	–20	10	10	[–20]	–40	–20	–10
951127	–60	–70	–30	20	40	60	–	[70]	[–20]	–30	–20	–10
951128	30	60	60	40	50	70	80	70	[50]	40	20	20
951129	–50	–170	–10	0	10	20	40	40	[40]	40	40	30
951130	–50	–30	–80	–60	–10	–10	10	–	[10]	10	10	–20

12	13	14	15	16	17	18	19	20	21	22	23	Means
40	40	30	+S	30	−10	10	10	20	20	20	20	20
20	40	40	60	40	60	60	60	30	40	40	30	–
30	30	30	20	OBS	OBS	30	OBS	OBS	OBS	−S	OBS	–
20	40	110	110	80	150	100	20	30	20	20	10	–
OBS	+S	OBS	40	30	30	20	10	10	−10	−40	−10	–
10	10	20	10	20	30	−40	+S	−20	30	30	20	6
30	30	30	20	10	30	40	40	40	50	50	40	27
60	40	60	70	80	80	90	110	110	70	60	40	61
−10	30	40	40	50	60	40	80	80	40	60	170	40
40	40	30	20	20	30	20	10	10	0	0	0	52
−10	−10	−20	10	10	10	10	10	10	10	0	10	5
10	30	20	20	20	10	30	40	30	20	20	10	15
−10	10	10	10	10	0	10	20	0	10	30	30	–
20	30	40	40	30	10	20	40	40	40	30	40	27
40	30	10	0	10	0	0	0	0	0	0	−10	25
10	20	30	40	50	60	90	100	90	70	50	60	33
OBS	+S	−20	0	30	OBS	OBS	OBS	60	50	30	−S	–
50	50	50	60	50	60	50	40	40	30	20	30	49
40	40	40	30	40	20	20	30	30	20	20	10	26
20	30	30	40	40	40	50	60	40	40	40	40	–
40	50	60	40	80	70	70	50	30	20	10	20	50
40	40	40	40	30	30	40	20	20	10	−10	20	28
0	10	30	0	30	30	20	20	10	−10	−10	−20	25
−10	−10	0	10	10	−30	−40	−40	−40	−50	−50	−40	−14
−50	−50	−60	−60	−60	−40	−20	−20	−20	−20	−20	−40	−45
−40	−30	−30	0	20	30	20	−10	−10	−30	−70	−90	−23
20	30	40	30	50	70	70	70	80	−10	30	30	20
10	30	10	−10	−50	−80	10	−30	0	−20	−20	−20	18
40	40	40	40	40	50	30	30	10	10	10	0	15
−20	−40	−30	−10	20	50	60	60	70	70	50	30	4

Date	00	01	02	03	04	05	06	07	08	09	10	11
951201	−10	−10	30	10	10	20	40	[40]	30	30	50	30
951202	0	0	10	20	30	10	30	−10	[0]	0	20	20
951203	30	20	30	30	40	40	40	30	[30]	30	30	30
951204	10	−10	0	10	−10	−30	−30	0	–	10	20	30
951205	10	−30	−40	−40	−30	−50	−10	−20	[10]	0	10	10
951206	−20	−20	−10	−10	10	40	40	40	[80]	90	70	70
951207	30	10	30	40	30	30	−10	0	[0]	−20	−20	−40
951208	−20	−20	−30	−30	−30	−20	−10	0	[−10]	−20	0	−60
951209	−10	−30	0	−30	−30	[10]	[−40]	−40	−30	−20	−30	−10
951210	0	30	20	10	30	40	40	[20]	[0]	10	10	20
951211	20	10	30	40	40	50	30	[40]	–	30	20	30
951212	20	40	30	20	20	20	20	30	[80]	100	40	40
951213	10	90	+S	−80	80	60	30	10	[20]	[10]	20	20
951214	+S	−10	−100	+S	−110	−60	−70	−20	0	[0]	0	−40
951215	10	20	20	30	10	−10	−30	−20	[30]	−30	−20	−30
951216	−30	−30	−30	−30	−30	−20	−20	[10]	20	30	20	30
951217	−10	−10	0	20	0	−10	10	10	[0]	−10	−30	−30
951218	0	70	80	80	90	30	70	80	[60]	–	30	70
951219	130	80	100	70	50	50	70	70	[80]	70	70	90
951220	40	20	30	40	40	40	40	40	[70]	40	50	40
951221	10	−10	−40	−50	0	30	60	80	[80]	90	90	110
951222	−160	−130	−90	−110	−80	−80	−70	−40	[−20]	−20	10	10
951223	100	130	80	160	110	110	[140]	70	−20	−60	10	50
951224	40	40	40	30	30	30	30	[30]	–	−20	20	60
951225	80	90	80	60	60	40	60	[50]	[30]	30	30	20
951226	190	200	+S	30	20	20	20	[20]	[20]	10	30	50
951227	−10	0	10	10	20	20	30	30	[50]	70	60	70
951228	40	40	50	50	60	60	70	80	80	[80]	80	100
951229	50	50	50	50	70	60	70	60	[70]	130	100	90
951230	70	60	50	40	20	20	10	[10]	0	−10	−10	−20
951231	−50	−40	−40	−50	−50	−40	−30	[−50]	[−70]	−60	−60	−20

12	13	14	15	16	17	18	19	20	21	22	23	Means
10	30	80	80	80	50	70	70	30	10	10	−10	33
10	20	30	0	20	30	10	30	50	30	30	30	18
40	40	50	60	70	70	60	40	20	30	−S	OBS	–
40	40	30	60	80	40	40	70	60	60	20	20	24
60	70	80	30	70	30	−20	−40	−40	−50	−30	−40	−3
140	−S	+S	OBS	+S	30	20	10	10	30	10	10	–
−20	−10	10	20	0	−30	−50	−50	−40	−50	−40	−10	−8
−40	−50	−50	−60	−30	−20	0	−50	−20	−30	−40	−10	−27
20	20	10	30	−10	10	−10	−10	−20	−40	−30	−10	−13
30	30	40	40	30	40	50	30	20	20	30	40	26
20	40	20	−30	−120	10	30	70	30	20	20	20	20
60	70	100	100	30	−10	0	30	80	70	70	40	46
30	10	30	90	80	10	60	−30	−30	−40	−20	+S	21
−10	−40	−20	−30	−40	−40	−30	−30	−20	−20	−10	0	–
−10	−20	−40	−40	−30	−30	−20	−20	−60	−30	−30	−30	−18
10	10	10	−10	−10	10	−30	−20	−10	−10	−10	−10	−6
−10	0	−10	−10	−20	−30	−70	−60	−10	−30	−30	−40	−16
70	60	40	70	50	30	30	40	60	80	70	90	59
130	110	80	80	70	90	130	80	40	60	40	40	78
20	−10	0	10	30	20	10	40	140	70	40	20	37
140	140	140	140	110	80	80	10	−20	20	−80	−250	40
30	40	30	−20	−50	−20	20	80	20	−40	30	60	−25
20	30	50	30	−10	−10	20	40	100	80	70	60	57
70	110	100	100	100	100	130	140	100	100	80	100	67
60	80	130	140	180	80	70	19	+S	+S	+S	+S	–
70	90	90	50	80	140	+S	+S	−170	−90	−10	10	–
60	60	70	70	60	40	60	60	40	40	40	20	41
90	90	100	100	100	110	130	140	150	140	80	70	87
90	90	90	80	110	140	100	90	100	100	50	40	80
−20	−30	−40	−50	−60	−50	−60	−40	−50	−60	−80	−60	−15
−30	−20	20	10	10	−200	−170	50	130	100	80	90	−20

Hourly means of the
1996

Date	00	01	02	03	04	05	06	07	08	09	10	11
960101	80	60	70	0	−30	−60	−50	−50	[−50]	[−70]	30	70
960102	10	20	30	30	70	70	30	10	–	20	30	30
960103	−60	−40	−30	−40	−10	10	0	20	[30]	20	20	30
960104	20	10	20	30	30	50	60	50	[50]	60	60	70
960105	60	60	60	40	50	70	80	70	[30]	30	40	60
960106	−40	−40	−180	−120	−80	−80	−90	−80	−80	[−60]	−60	−40
960107	−100	−70	−80	−80	−90	−100	−110	[−80]	[−70]	−90	−40	−60
960108	70	60	40	−60	10	20	−20	–	–	[−90]	−110	−130
960109	−90	−70	−110	−130	−90	−10	20	30	[0]	−10	−10	−10
960110	100	80	30	30	90	80	10	−30	[−20]	30	30	−10
960111	−10	−10	−20	−40	10	−20	80	[110]	[150]	90	90	70
960112	−10	10	10	10	20	0	−10	[20]	[40]	30	20	40
960113	30	20	30	70	40	40	40	30	[20]	30	40	70
960114	30	40	70	30	60	70	80	[130]	130	130	90	70
960115	10	0	0	0	−10	−20	−20	[30]	–	40	40	60
960116	100	110	120	40	30	100	80	60	[70]	80	60	60
960117	90	90	60	30	80	90	100	[40]	80	90	80	30
960118	30	90	100	40	30	60	40	[70]	[40]	40	40	40
960119	40	40	60	40	30	30	40	[40]	[40]	40	60	60
960120	60	80	40	20	40	90	[70]	70	60	60	70	40
960121	10	10	10	30	20	20	30	[60]	40	40	40	40
960122	140	130	40	70	100	80	70	[70]	–	30	0	−10
960123	−10	10	20	30	−10	−40	−40	[−30]	[−30]	−40	−40	−40
960124	−30	−30	−30	−30	−20	−20	0	[0]	[30]	90	160	10
960125	−S	+S	+S	+S	20	90	80	70	[40]	30	40	40
960126	−20	−40	−10	30	30	0	20	30	[60]	30	0	−20
960127	90	30	20	40	40	40	40	70	[10]	0	10	−10
960128	10	10	−40	−40	−10	0	−10	−10	[−10]	20	20	20
960129	40	40	40	40	80	90	90	70	–	70	60	90
960130	−110	−50	−110	−60	−70	−60	−40	−10	[90]	100	100	100
960131	90	100	70	70	(80)	(90)	(80)	[90]	[100]	80	100	80

potential gradient

12	13	14	15	16	17	18	19	20	21	22	23	Means
10	30	30	40	50	60	50	40	40	30	30	30	18
30	70	80	70	60	40	30	60	20	–220	–80	10	23
60	40	50	30	–20	20	30	40	30	40	30	20	13
80	80	90	80	80	90	80	80	80	70	70	60	60
60	40	40	50	40	30	20	20	–30	–100	–40	–20	32
–40	–30	–60	–80	–80	–90	–110	–100	–80	–80	–100	–100	–79
–30	–40	–40	–30	–40	–60	–30	–60	–60	–40	–30	–20	–59
–140	–70	–20	30	40	30	40	–10	0	20	–80	–120	–
–10	–20	0	–10	–20	–30	–20	–10	60	70	40	80	–15
10	30	–20	–30	–10	30	–40	–60	–20	–20	–30	–20	10
30	20	20	60	100	90	70	70	40	30	0	–10	42.5
40	40	40	30	20	40	40	30	40	80	60	40	28
90	90	90	100	110	110	90	80	30	30	10	30	55
70	90	40	30	30	30	10	20	40	30	40	20	57.5
80	90	90	90	60	40	90	80	80	190	160	140	57
60	90	80	90	90	80	70	70	40	80	60	60	74
30	40	60	40	90	60	30	40	40	40	60	30	59
60	60	80	40	40	40	90	70	90	70	30	30	55
40	40	40	30	40	30	70	40	60	60	60	60	45
40	30	40	60	70	70	60	70	40	20	20	0	51
60	80	80	90	80	70	80	90	90	90	80	80	55
–30	–20	20	30	20	40	60	30	20	10	0	–10	39
–30	–40	–30	–40	–30	–20	–20	–20	–20	–40	–40	–30	–24
–20	–50	–20	+S	+S	–10	+S	+S	+S	+S	40	–S	–
20	40	10	20	40	80	60	30	40	20	30	20	–
–30	–30	–10	–10	30	70	140	120	80	60	40	40	25
0	0	–10	10	–10	–40	–80	–80	–50	–40	–10	10	3
20	10	10	20	40	20	30	80	90	80	40	30	18
130	120	120	130	90	90	10	–40	–40	–110	–90	–40	47
100	130	140	110	130	120	30	0	20	30	70	90	35
110	130	140	110	140	120	120	70	60	30	80	90	94

Date	00	01	02	03	04	05	06	07	08	09	10	11
960201	100	70	90	100	20	80	20	80	[60]	30	20	30
960202	–90	–170	–230	–180	–60	–30	–20	–50	[–30]	–30	–30	20
960203	–20	0	80	90	90	80	40	90	[70]	30	60	70
960204	40	40	30	20	30	30	30	40	[40]	80	60	70
960205	70	40	30	60	70	80	80	[90]	–	100	90	90
960206	80	80	70	40	70	30	70	[80]	[130]	130	100	100
960207	40	40	60	40	40	40	40	40	[70]	70	60	80
960208	10	–10	–10	10	–10	30	30	[30]	[70]	90	90	110
960209	120	130	140	130	30	40	40	[40]	[70]	70	80	100
960210	80	70	70	80	70	60	80	90	[100]	120	90	120
960211	10	10	30	20	10	0	–40	[–40]	[0]	30	40	70
960212	–30	–10	30	40	60	90	80	[90]	–	70	80	30
960213	–90	–110	–70	–30	–70	–80	–40	–90	[–60]	–10	–10	OBS
960214	70	60	60	60	60	60	80	[70]	[50]	50	40	40
960215	–20	–10	10	0	–20	–30	10	20	[40]	40	70	70
960216	30	40	30	30	10	20	30	[50]	60	80	100	80
960217	50	30	40	40	30	30	[40]	40	20	0	OBS	10
960218	30	30	30	30	30	30	[40]	50	70	70	80	90
960219	40	40	40	30	20	20	–	–	–	80	+S	30
960220	OBS	–S	50	30	30	30	30	40	[60]	50	40	40
960221	70	60	60	60	50	60	50	60	[60]	70	70	70
960222	60	60	60	60	60	50	60	60	[50]	50	60	60
960223	50	40	40	40	40	50	60	70	[70]	60	60	60
960224	60	60	50	40	40	30	40	[20]	50	60	50	50
960225	60	60	50	50	40	40	50	[60]	[80]	80	90	90
960226	70	60	70	50	50	60	50	[60]	–	90	90	90
960227	50	30	10	10	0	20	30	[40]	[40]	60	90	90
960228	80	90	90	90	110	80	70	[60]	[60]	90	100	100
960229	50	40	40	30	30	30	20	[40]	[50]	60	60	70

12	13	14	15	16	17	18	19	20	21	22	23	Means
60	90	80	40	30	30	10	30	40	30	−20	−10	46
60	80	90	60	60	90	80	100	100	110	100	60	4
60	40	70	80	100	100	30	80	100	90	90	70	66
80	90	90	90	80	100	90	70	40	40	40	60	57.5
90	100	100	120	120	140	140	110	90	90	90	80	90
80	60	60	70	80	80	80	70	70	70	40	40	74
90	80	70	60	70	40	30	−30	10	20	30	40	47
70	70	90	−10	−10	−40	−20	−10	10	30	60	110	33
130	140	130	100	100	140	170	130	150	240	130	110	107
140	130	150	210	160	130	130	90	70	40	40	20	98
90	110	110	100	90	80	60	30	20	30	0	10	36
40	10	−30	−30	−60	−90	−90	−80	−140	−110	−110	−80	−10
−60	0	80	130	120	50	0	−10	10	10	30	40	−11
30	30	20	30	40	30	30	20	30	30	−20	10	41
80	90	80	90	100	120	130	120	110	70	40	40	52
70	0	30	80	100	70	80	90	40	30	70	80	54
60	70	60	50	OBS	50	50	50	50	40	30	30	40
80	70	60	70	60	80	70	60	60	40	60	30	55
10	10	30	120	70	0	−10	130	30	OBS	OBS	OBS	–
40	50	60	50	50	40	50	60	60	70	60	60	–
80	80	80	90	90	90	80	70	60	60	50	50	67.5
60	60	50	60	70	80	60	70	70	70	60	60	61
70	70	60	70	70	110	120	70	60	50	50	60	62.5
60	70	80	90	120	90	80	80	80	80	70	60	63
110	130	120	130	140	110	90	80	90	80	80	70	82.5
110	120	120	120	130	120	100	90	90	100	90	80	78
130	140	170	130	130	130	130	130	110	110	80	80	81
100	120	110	110	110	110	130	140	100	80	70	60	94
70	90	110	110	110	110	100	70	50	40	40	40	61

Date	00	01	02	03	04	05	06	07	08	09	10	11
960301	20	10	20	20	30	−10	[10]	40	30	0	10	30
960302	−40	0	30	0	[−70]	20	30	30	[30]	20	40	−30
960303	30	40	30	30	30	40	0	20	[30]	50	30	OBS
960304	60	40	40	30	40	30	50	[50]	–	50	50	–S
960305	40	40	30	40	40	40	50	[70]	[50]	40	40	50
960306	10	10	20	30	30	40	40	[60]	[−10]	−30	10	20
960307	80	60	50	30	40	40	70	[40]	[30]	30	30	30
960308	30	30	30	30	20	20	30	40	[40]	50	60	70
960309	40	40	20	20	0	[20]	[30]	30	40	20	30	40
960310	30	20	20	0	−10	−20	[−30]	20	50	50	60	70
960311	40	50	50	50	–	–	–	–	–	60	40	40
960312	20	30	40	20	30	30	20	20	[20]	30	30	30
960313	10	−10	0	60	60	80	OBS	OBS	OBS	30	30	30
960314	20	10	30	0	20	30	40	60	[30]	70	60	90
960315	30	40	20	−10	10	10	30	70	[40]	30	30	40
960316	30	30	30	10	10	20	10	[30]	[20]	40	40	40
960317	60	70	60	70	40	40	40	[70]	[70]	70	70	70
960318	60	60	40	40	30	40	60	[70]	–	60	60	50
960319	10	10	10	0	10	10	40	[80]	[110]	40	30	50
960320	20	10	0	0	0	0	30	30	[40]	40	40	50
960321	0	0	0	0	0	10	0	10	[20]	30	40	40
960322	0	10	20	20	20	0	0	80	[30]	OBS	0	10
960323	80	50	40	30	30	30	30	[30]	30	60	60	80
960324	20	0	20	20	10	20	20	[10]	−10	10	30	30
960325	80	170	150	130	110	70	40	[40]	–	60	60	70
960326	40	50	60	40	40	10	20	10	[20]	30	40	40
960327	10	30	40	10	30	−10	[0]	–	–	–	–	–
960328	40	50	50	40	40	40	40	50	[50]	50	50	60
960329	30	30	30	30	40	20	20	20	[30]	30	20	30
960330	40	30	30	20	20	30	30	[40]	40	30	30	–S
960331	40	30	30	20	30	40	[40]	30	40	30	OBS	–S

12	13	14	15	16	17	18	19	20	21	22	23	Means
60	–S	50	40	OBS	OBS	30	80	40	30	40	20	–
+S	OBS	OBS	OBS	10	30	50	50	40	30	0	–10	–
–S	20	OBS	30	40	40	OBS	OBS	40	60	40	50	–
30	70	60	50	70	50	60	60	50	50	40	50	–
50	50	60	70	60	60	50	50	40	40	40	30	47
30	30	40	0	30	40	40	30	30	60	40	40	27
40	40	50	50	50	50	60	60	50	30	40	50	46
70	80	80	70	60	60	60	60	40	40	40	40	48
40	50	50	60	50	50	50	60	40	60	50	40	39
80	90	90	80	90	80	70	60	60	50	40	40	45
40	40	60	40	30	20	20	30	30	10	20	10	–
10	30	60	80	90	90	80	70	20	10	0	0	36
20	0	20	20	40	30	20	30	20	30	30	20	–
90	60	70	90	70	80	80	90	90	80	80	60	58
40	40	40	60	40	30	40	60	60	30	10	20	34
60	30	20	30	20	20	10	20	30	40	40	60	29
60	60	80	80	60	70	80	80	80	70	70	60	66
50	30	40	30	10	10	10	10	10	30	20	30	37
60	60	50	50	50	40	40	40	20	30	20	10	36
60	60	50	60	60	60	40	40	40	20	20	10	32.5
30	(10)	20	20	10	30	20	30	20	10	0	0	15
0	0	30	40	70	60	70	80	60	70	80	60	35
60	60	50	40	40	40	40	40	30	20	10	20	42
–30	OBS	OBS	OBS	–	30	70	90	130	130	110	110	–
70	70	70	80	90	110	110	100	90	80	70	60	86
30	30	40	40	30	20	40	40	30	40	30	10	32.5
–	–	40	40	50	60	60	70	60	50	40	40	–
60	60	70	60	60	60	60	60	50	40	40	40	51
30	40	40	30	30	0	30	40	40	40	40	30	24
OBS	OBS	OBS	40	0	OBS	OBS	30	40	60	40	40	–
50	60	40	50	50	60	70	60	40	30	20	30	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
960401	30	40	20	10	20	20	–	–	0	10	10	20
960402	–60	30	–30	–120	OBS	0	–90	[–120]	+S	+S	+S	+S
960403	60	40	40	40	30	50	30	[70]	50	20	30	30
960404	10	–10	10	–20	–10	–20	[–10]	[–30]	–60	–10	–30	–40
960405	20	–10	–20	–10	–20	–40	–20	[–20]	–10	10	20	40
960406	50	40	50	40	60	40	[30]	40	60	70	70	80
960407	40	40	40	30	30	40	50	[50]	50	60	70	60
960408	20	20	20	30	30	40	–	40	40	40	60	60
960409	10	20	10	20	10	20	30	–	[30]	40	40	50
960410	10	20	30	20	20	50	60	[70]	60	50	40	40
960411	10	20	10	10	10	20	30	[30]	40	40	40	30
960412	10	10	10	10	0	0	20	[10]	20	20	30	30
960413	40	40	40	30	50	[60]	[60]	60	40	40	40	30
960414	10	10	10	20	[20]	+S	20	30	50	20	30	–40
960415	80	+S	+S	+S	120	120	90	–	80	–10	0	30
960416	40	30	40	30	30	30	30	(30)	–	(30)	60	80
960417	40	50	40	40	40	60	[70]	[90]	80	70	70	60
960418	40	30	30	30	30	40	[60]	[60]	60	60	70	70
960419	–	–	–	–	–	–	–	–	–	–	–	–
960420	–	–	–	–	–	–	–	–	–	–	–	–
960421	–	–	–	–	–	–	–	–	–	–	–	–
960422	–	–	–	–	–	–	–	–	[30]	20	40	40
960423	20	20	20	20	10	20	20	[20]	10	10	10	0
960424	0	10	20	20	20	30	[30]	30	20	20	20	30
960425	30	30	20	30	30	30	[20]	[40]	40	50	50	60
960426	20	20	10	0	0	–10	[0]	–20	–30	0	–10	–10
960427	30	30	30	30	20	20	[30]	40	40	40	40	40
960428	0	0	0	–10	–10	0	0	10	10	10	10	20
960429	20	40	30	20	30	30	[40]	–	40	60	70	60
960430	30	30	20	40	30	40	40	[20]	30	20	20	20

12	13	14	15	16	17	18	19	20	21	22	23	Means
20	20	20	10	−30	−60	−80	−40	−110	−20	−20	−20	–
+S	180	+S	+S	80	150	80	90	40	30	30	40	–
−10	0	10	20	30	40	40	30	40	0	−120	+S	25
−20	−60	−10	10	−30	40	60	70	70	50	30	10	0
40	40	40	40	30	30	40	40	40	40	40	40	17
80	80	90	80	90	90	50	30	50	50	60	50	60
70	70	70	70	80	80	70	60	50	40	20	20	52.5
60	60	50	60	50	40	50	40	40	20	20	20	40
40	50	60	70	OBS	30	40	40	20	−10	−30	−50	25
40	40	40	50	50	40	40	50	20	20	20	10	37
40	40	50	30	40	20	−120	−10	−10	−10	0	10	15
40	OBS	OBS	20	30	30	60	50	60	70	50	40	–
30	40	40	50	40	40	40	30	30	30	20	20	39
20	OBS	OBS	+S	−80	OBS	OBS	−80	50	140	170	80	–
50	50	40	40	40	40	80	80	30	40	60	50	–
80	60	50	50	40	50	60	70	80	60	60	50	–
70	70	70	70	60	50	40	40	40	40	40	30	55
70	70	80	70	70	60	50	40	40	30	30	(30)	52
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
40	40	40	30	30	30	20	30	30	20	20	20	–
0	10	10	10	10	10	10	10	10	10	10	10	12
10	10	10	40	10	10	20	20	20	10	10	20	18
50	50	50	50	40	40	30	0	10	10	20	10	33
30	40	20	40	60	60	60	50	60	40	40	30	21
50	40	30	30	30	30	20	20	10	10	0	0	27.5
20	20	20	20	20	30	20	20	20	20	20	20	12
40	40	+S	−100	40	40	60	20	30	30	40	30	32
30	20	20	20	20	20	20	10	20	10	10	10	23

Date	00	01	02	03	04	05	06	07	08	09	10	11
960501	10	10	10	10	20	20	20	[30]	20	20	20	30
960502	30	20	10	10	0	0	10	[20]	30	30	30	30
960503	20	20	20	20	30	30	30	[30]	20	20	30	30
960504	40	30	20	20	[20]	30	40	40	40	40	40	30
960505	30	30	20	20	30	[20]	20	40	30	40	40	40
960506	10	10	10	–	–	–	–	–	30	30	30	20
960507	10	10	10	20	20	10	10	[30]	30	30	30	30
960508	20	30	30	30	–S	OBS	OBS	(OBS)	+S	+S	+S	OBS
960509	OBS	OBS	+S	180	[50]	120	130	–	–10	–10	+S	–80
960510	30	40	30	30	30	40	[40]	[30]	30	30	–	[50]
960511	40	40	40	50	[30]	40	30	10	20	30	30	40
960512	–10	–20	–20	–10	[–10]	–10	0	OBS	OBS	10	30	30
960513	90	90	70	30	80	70	60	–	30	10	10	20
960514	10	0	–30	–10	–10	–10	–10	0	20	20	10	0
960515	10	10	10	10	10	10	10	10	10	10	10	10
960516	10	0	10	10	10	10	[10]	10	20	20	30	40
960517	30	20	10	20	10	10	10	0	10	20	30	40
960518	40	30	20	20	[10]	20	50	60	30	10	20	0
960519	20	20	10	10	0	10	[20]	10	20	10	10	20
960520	30	30	40	30	30	30	30	–	–	30	–10	50
960521	60	60	50	60	50	60	40	[70]	70	60	50	50
960522	30	–10	+S	OBS	OBS	OBS	OBS	[30]	20	30	30	20
960523	30	20	20	20	30	30	[40]	40	(50)	40	30	20
960524	20	20	10	30	20	20	40	[40]	40	40	40	40
960525	40	30	20	20	20	20	–	40	40	50	50	40
960526	0	OBS	OBS	OBS	0	20	[40]	10	40	40	40	+S
960527	30	30	20	10	20	40	[40]	30	20	10	–10	–10
960528	20	20	10	10	20	30	30	[20]	–	–	–	–
960529	40	50	40	30	30	40	40	–	40	60	40	40
960530	20	0	–10	0	0	20	40	[40]	70	90	100	90
960531	20	20	30	40	40	40	40	[30]	40	60	60	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
30	30	30	40	60	30	30	40	20	30	30	30	26
30	30	30	30	40	40	40	30	20	30	30	30	25
40	OBS	30	40	40	40	40	30	30	30	40	40	30
-20	OBS	+S	60	40	40	40	40	40	OBS	OBS	20	–
40	40	40	40	30	20	30	30	20	10	10	10	28
30	30	30	30	30	30	20	20	20	10	10	20	–
40	40	40	40	30	30	30	30	30	20	20	20	25
30	50	40	40	40	40	30	10	30	10	-40	OBS	–
20	0	20	10	10	OBS	10	10	10	10	20	20	–
50	70	80	70	60	50	50	60	60	40	40	30	–
50	50	50	50	50	50	20	10	0	-10	10	0	30
10	20	10	+S	OBS	OBS	OBS	OBS	OBS	OBS	OBS	80	–
10	10	10	20	10	10	10	20	0	40	40	0	32
-10	-10	-10	-10	-10	10	10	10	0	10	10	10	0
20	30	30	30	30	20	20	30	30	30	20	20	18
40	40	50	50	50	60	50	40	30	20	20	30	27.5
40	50	30	-S	OBS	OBS	+S	50	80	90	80	60	–
20	30	40	40	30	30	20	30	30	40	40	40	29
30	30	30	30	30	40	30	40	40	40	30	30	23
-100	80	OBS	OBS	-80	OBS	+S	OBS	OBS	-80	10	40	–
40	40	40	50	40	50	50	40	30	20	20	20	47
30	30	20	30	30	30	30	30	20	30	30	30	–
20	30	30	50	60	60	70	40	0	10	10	20	31
40	50	40	40	40	40	30	30	30	30	30	30	33
50	+S	50	50	40	-S	OBS	OBS	0	-10	20	20	–
OBS	OBS	OBS	-S	60	50	40	40	30	40	40	30	–
+S	OBS	OBS	OBS	OBS	+S	20	20	50	60	40	20	–
–	–	30	30	30	40	40	40	50	60	50	50	–
40	60	70	70	70	80	80	70	40	40	40	30	50
100	100	90	80	60	40	40	30	30	30	20	10	45
60	70	70	70	60	40	40	30	20	20	10	20	41

Date	00	01	02	03	04	05	06	07	08	09	10	11
960601	10	10	10	10	10	10	0	[0]	10	20	30	30
960602	10	10	10	20	30	30	30	[30]	30	30	30	30
960603	10	10	10	20	30	–	[10]	–	30	70	60	60
960604	20	20	10	10	0	0	0	[10]	10	10	20	30
960605	0	0	0	0	–10	–10	0	[20]	[40]	40	60	60
960606	10	10	30	40	40	40	40	[20]	20	30	30	(40)
960607	–10	0	0	10	10	10	[10]	–	20	30	40	60
960608	20	10	20	20	30	[30]	10	10	20	30	40	40
960609	10	10	10	10	20	20	[20]	30	30	40	40	60
960610	10	10	0	0	0	10	10	–	–	70	90	80
960611	10	0	0	10	20	20	30	[30]	30	40	40	60
960612	10	10	10	10	10	20	40	[30]	40	70	70	70
960613	20	20	10	0	0	10	20	[10]	–20	–10	10	20
960614	10	10	10	10	10	20	30	[30]	30	30	30	30
960615	0	0	0	0	10	30	[30]	[40]	40	30	30	30
960616	10	10	10	0	10	10	30	[30]	30	40	40	40
960617	0	0	10	10	10	20	–	30	40	60	70	60
960618	0	0	0	0	10	20	[30]	30	30	40	60	40
960619	OBS	+S	-S	-S	–50	10	20	[–S]	-S	20	20	OBS
960620	10	10	0	10	10	20	30	[20]	30	30	30	+S
960621	OBS	OBS	OBS	10	+S	30	20	[10]	20	20	30	20
960622	20	30	10	10	10	10	[20]	[30]	20	30	30	40
960623	20	20	20	20	20	30	[0]	10	0	70	0	10
960624	30	30	30	30	40	40	–	–	40	0	20	40
960625	30	30	40	30	30	40	40	[60]	50	50	40	40
960626	10	–10	20	0	+S	–30	30	10	30	30	20	40
960627	10	20	30	30	30	30	[40]	[40]	40	50	30	OBS
960628	10	10	0	–10	10	0	30	[40]	40	30	30	40
960629	10	0	0	10	10	[20]	[30]	20	20	30	30	40
960630	OBS	OBS	OBS	OBS	–40	–10	[30]	[60]	40	30	30	10

12	13	14	15	16	17	18	19	20	21	22	23	Means
40	40	40	40	40	40	30	30	20	20	20	20	22
40	40	40	40	40	40	40	30	30	10	10	10	27.5
70	80	70	70	60	60	60	30	10	20	30	20	–
30	30	30	20	20	30	40	40	20	10	0	0	17
60	60	70	80	70	60	30	20	20	20	10	10	30
(40)	60	60	70	60	40	30	30	20	10	10	0	32
80	70	70	70	60	40	40	30	20	20	20	20	31
40	60	60	60	40	40	30	30	30	20	30	10	30
60	60	60	60	30	20	20	10	10	10	0	10	27
90	90	(90)	(70)	60	(40)	40	40	30	10	10	10	–
70	–S	–S	OBS	OBS	100	30	10	20	10	10	10	–
70	80	OBS	OBS	40	30	30	30	20	20	20	20	–
10	20	30	30	40	40	40	30	30	20	30	20	18
30	30	40	30	30	40	30	30	20	20	10	0	23
30	40	40	40	40	30	20	30	20	10	10	0	23
30	40	30	40	40	40	40	40	20	10	10	0	25
60	60	70	70	40	30	20	20	10	10	10	10	31
40	40	40	30	30	20	20	10	10	10	0	0	21
OBS	OBS	OBS	OBS	20	0	10	10	10	0	0	0	–
OBS	OBS	OBS	OBS	–	80	40	–10	20	40	20	10	–
20	+S	20	20	20	30	30	30	40	40	20	30	–
40	–10	OBS	–30	30	20	30	30	40	20	20	20	20
30	10	–10	20	20	40	40	30	30	30	20	30	21
40	40	40	40	40	70	40	40	40	40	40	30	–
40	40	30	30	40	50	40	30	50	50	40	30	40
40	40	30	10	30	30	30	40	40	30	20	10	22
+S	70	30	OBS	OBS	10	30	30	30	30	10	10	–
40	60	60	50	40	40	30	20	20	20	20	10	27
40	OBS	OBS	+S	+S	OBS	OBS	OBS	OBS	OBS	OBS	OBS	–
20	30	30	40	40	40	40	30	30	20	20	30	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
960701	30	30	30	40	40	0	–	–	30	30	20	30
960702	–50	–70	–50	0	10	20	40	[40]	40	40	40	30
960703	20	50	50	40	40	60	60	[50]	50	50	50	50
960704	–30	–20	0	20	30	40	40	[30]	40	50	50	50
960705	30	50	60	60	70	60	40	[30]	30	40	40	40
960706	30	10	10	20	10	20	10	20	30	30	30	OBS
960707	20	10	20	20	10	30	[30]	[80]	80	70	60	50
960708	20	20	20	20	30	[30]	–	–	–	30	40	40
960709	20	20	30	30	30	20	20	[20]	30	30	30	30
960710	20	20	10	10	10	20	30	–	–	–	–	–
960711	20	10	10	10	10	10	[10]	30	40	40	40	40
960712	10	10	–60	–30	–60	+S	–10	30	40	30	20	30
960713	10	20	20	10	20	30	30	[40]	40	50	50	60
960714	30	40	40	40	40	40	[40]	[50]	70	90	80	80
960715	20	20	20	20	30	40	20	–	–	60	70	80
960716	20	20	10	10	0	[20]	50	50	50	70	60	60
960717	50	50	40	40	40	40	[50]	[50]	50	70	60	50
960718	10	0	10	10	10	20	[40]	[40]	40	50	50	50
960719	40	40	50	50	40	50	[60]	[60]	50	50	10	50
960720	20	20	40	40	20	40	[50]	50	50	50	50	50
960721	20	40	40	20	40	50	[40]	60	70	80	70	70
960722	10	10	10	10	20	20	20	–	40	40	40	60
960723	10	10	0	0	10	20	[20]	20	20	20	20	30
960724	10	OBS	OBS	+S	10	–10	[20]	30	30	60	OBS	OBS
960725	30	OBS	+S	OBS	OBS	–20	[10]	[40]	80	40	30	20
960726	20	20	30	20	30	30	[20]	30	0	10	20	30
960727	20	20	20	20	10	30	[30]	30	30	30	30	30
960728	10	0	10	20	30	30	[20]	20	30	40	40	40
960729	30	30	40	40	60	[60]	–	[80]	–	70	40	50
960730	30	30	30	20	20	30	[40]	[10]	OBS	OBS	OBS	–S
960731	30	40	30	30	30	30	[40]	40	50	70	60	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
40	20	30	20	10	10	10	−10	−30	−10	−50	−30	–
30	40	40	40	30	+S	−S	−S	−S	OBS	OBS	−S	–
60	60	60	50	50	40	40	40	30	30	30	−10	44
50	50	50	50	40	50	60	50	40	30	30	40	35
50	40	40	40	30	30	20	20	10	10	10	20	36
OBS	OBS	+S	30	10	−10	10	20	20	10	0	10	–
40	40	40	40	30	40	40	30	20	20	20	20	36
–	–	–	OBS	OBS	50	30	OBS	−40	0	10	10	–
30	40	40	40	40	40	40	40	40	40	30	20	31
–	–	–	–	–	–	50	50	40	40	40	30	–
40	40	40	30	30	30	20	30	30	30	10	20	26
40	30	30	30	40	30	20	20	20	10	10	10	13
60	70	60	70	60	50	40	40	40	30	40	40	41
80	80	80	70	50	40	40	40	40	30	30	20	52
80	−S	−S	OBS	40	50	40	40	40	40	40	40	–
60	70	70	70	80	70	70	70	60	60	50	50	50
50	50	60	50	50	50	50	40	20	10	10	0	43
60	50	50	50	50	50	50	70	50	40	40	20	38
50	50	60	50	50	50	50	40	20	10	20	20	42.5
50	50	60	60	60	60	60	50	50	40	40	20	45
50	50	50	50	40	40	40	20	10	10	10	10	41
40	40	40	30	40	30	20	10	10	0	0	0	23
30	30	30	30	20	20	30	10	10	10	10	10	17.5
30	40	40	40	OBS	10	20	30	10	20	OBS	20	–
20	30	10	20	20	30	30	30	30	40	30	40	–
20	30	40	30	30	30	40	30	40	30	40	30	27
30	30	40	40	30	30	30	20	30	30	20	10	27
+S	+S	60	+S	OBS	OBS	OBS	OBS	20	30	40	30	–
70	80	OBS	OBS	30	40	40	40	40	30	40	40	–
50	60	40	40	50	50	40	40	40	30	30	30	–
50	50	40	40	40	30	30	20	20	30	30	20	37.5

Date	00	01	02	03	04	05	06	07	08	09	10	11
960801	10	10	10	10	10	20	30	[30]	30	40	50	40
960802	10	10	0	10	10	20	[20]	[10]	10	30	30	40
960803	10	10	10	0	–50	0	30	[50]	30	30	40	–S
960804	10	20	10	10	20	20	20	30	[40]	20	20	10
960805	40	40	30	40	40	[50]	40	–	50	50	50	40
960806	10	10	10	10	20	20	10	[20]	30	30	30	40
960807	20	30	30	20	30	30	30	[40]	40	50	60	50
960808	50	30	20	30	0	10	[40]	30	30	70	60	50
960809	20	10	10	10	20	30	40	[40]	40	40	50	50
960810	20	20	10	10	[10]	20	20	10	10	20	30	30
960811	20	20	10	10	10	[10]	20	20	20	30	40	30
960812	10	10	10	10	10	[10]	–	20	–	30	–10	–30
960813	40	40	50	40	40	50	60	[40]	40	70	60	50
960814	30	20	10	30	40	50	[60]	[60]	50	60	50	50
960815	10	20	30	30	40	40	40	[40]	40	40	40	40
960816	20	30	30	30	30	40	40	[40]	30	40	40	(40)
960817	40	40	30	40	40	30	20	[30]	30	20	30	30
960818	20	30	20	20	20	20	30	[10]	40	40	50	50
960819	30	40	30	30	40	40	50	–	50	50	60	60
960820	40	40	30	20	20	30	40	[40]	[60]	80	80	90
960821	20	20	10	20	20	[30]	–	40	40	40	40	50
960822	10	10	20	20	30	60	[50]	[50]	60	70	80	80
960823	30	10	10	20	30	20	20	[20]	30	40	40	40
960824	20	10	10	10	20	20	[30]	20	30	30	50	60
960825	0	10	20	10	10	20	OBS	–10	–S	OBS	OBS	OBS
960826	10	20	10	0	10	20	–	80	70	90	90	70
960827	10	20	20	10	10	30	40	[40]	30	30	30	30
960828	40	30	30	40	40	40	40	[40]	40	40	40	20
960829	OBS	OBS	40	40	40	40	90	[70]	60	40	40	40
960830	10	20	20	20	30	[40]	40	40	30	40	40	40
960831	20	10	10	10	20	30	[40]	40	40	40	40	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
40	50	50	40	30	30	20	20	20	20	20	20	27
40	60	40	30	30	40	30	20	10	20	30	20	24
OBS	OBS	–	–10	10	0	–10	10	20	10	10	10	–
20	20	20	30	30	20	40	40	50	40	40	40	26
40	40	40	40	40	40	40	50	40	40	30	20	40
30	50	60	60	40	40	40	40	30	30	30	30	30
60	50	70	80	80	80	70	50	50	40	40	30	47
70	70	60	60	50	40	50	40	40	40	30	30	42
60	70	60	60	50	40	40	20	10	10	10	10	33
30	30	30	30	20	20	30	30	20	20	20	20	21
40	30	30	30	30	30	30	20	20	20	20	20	23
–20	20	20	+S	OBS	–10	OBS	OBS	OBS	OBS	OBS	OBS	–
40	40	40	50	40	30	30	40	50	OBS	–S	30	–
30	30	50	40	40	30	20	30	30	OBS	OBS	OBS	–
30	60	40	40	30	20	50	40	30	30	30	30	35
40	40	40	40	40	50	40	40	50	40	40	40	38
30	30	30	40	40	30	30	40	30	20	30	20	31
50	40	40	40	40	30	OBS	30	40	50	+S	10	–
60	70	60	60	50	30	40	60	40	40	40	40	47
80	80	70	60	40	30	20	30	30	20	20	20	44
50	60	50	40	30	30	40	30	30	20	30	10	33
70	70	60	50	50	40	50	30	30	20	20	30	44
40	50	40	40	50	50	30	40	30	20	20	20	31
50	60	60	50	30	30	30	20	10	10	10	10	28
+S	–S	20	80	40	30	40	40	40	40	30	20	–
70	60	40	40	30	30	30	30	20	20	10	20	38
30	20	30	30	40	40	20	30	40	30	40	40	29
OBS	+S	30	20	20	10	10	–70	OBS	OBS	10	OBS	–
60	60	60	40	30	20	30	20	10	10	20	10	–
40	40	60	70	40	40	40	30	30	20	20	20	34
60	40	40	60	70	40	40	40	40	30	20	20	36

Date	00	01	02	03	04	05	06	07	08	09	10	11
960901	20	20	10	10	20	20	20	[30]	40	20	20	10
960902	−20	−10	OBS	OBS	OBS	[10]	–	10	10	−70	−10	−30
960903	+S	OBS	−10	10	30	OBS	OBS	30	60	90	80	90
960904	30	30	20	30	30	30	[40]	(40)	60	70	60	40
960905	30	40	40	40	+S	OBS	[20]	[90]	30	+S	60	40
960906	40	40	30	40	40	30	[30]	40	20	20	20	10
960907	30	30	30	40	40	40	40	40	[60]	70	30	−10
960908	–	–	–	–	–	–	–	–	–	–	–	–
960909	–	–	–	–	–	–	–	–	–	–	–	–
960910	–	–	–	–	–	–	–	–	–	–	–	80
960911	10	10	10	10	0	−10	20	–	70	40	40	30
960912	10	20	20	20	10	10	30	[40]	40	60	60	60
960913	20	20	30	20	60	30	[80]	[70]	60	40	40	20
960914	30	30	20	30	20	30	[30]	30	30	20	10	0
960915	40	30	30	40	40	30	[40]	[40]	40	40	20	30
960916	30	30	30	40	30	[40]	–	50	50	50	50	40
960917	30	20	20	20	30	30	30	[40]	40	50	40	40
960918	50	40	30	30	20	20	30	[30]	10	20	20	20
960919	70	80	50	50	50	40	[60]	[70]	40	40	50	50
960920	20	10	10	10	20	0	20	[30]	20	30	30	30
960921	20	30	30	30	20	[20]	20	10	10	20	0	10
960922	−40	0	10	10	10	20	0	10	10	10	10	10
960923	−10	−10	−20	−20	−30	−20	−30	–	30	40	40	30
960924	40	40	30	30	30	40	60	[70]	40	40	40	30
960925	10	10	20	20	30	40	40	[30]	(30)	40	40	30
960926	30	20	20	20	10	30	40	[60]	30	20	30	30
960927	10	10	10	20	10	20	30	[40]	40	40	60	70
960928	30	20	10	30	30	30	[60]	40	30	30	OBS	OBS
960929	+S	10	10	20	30	[30]	40	40	40	70	70	70
960930	20	10	10	20	20	30	60	70	[60]	40	60	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
10	20	30	30	20	20	10	30	40	−30	−200	−70	6
+S	0	30	30	20	10	20	20	10	OBS	+S	0	–
70	70	60	40	30	30	30	30	30	30	30	30	–
30	40	70	60	70	40	OBS	−20	40	40	20	10	38
40	40	+S	60	60	40	40	40	70	60	60	60	–
OBS	40	OBS	30	30	40	+S	OBS	30	40	30	30	–
20	−10	−S	OBS	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
40	30	30	40	40	30	30	30	20	10	10	10	–
40	40	40	40	60	40	40	30	20	20	20	10	27
40	30	0	OBS	OBS	−80	20	10	20	30	80	60	–
20	20	30	40	30	30	40	40	40	20	30	30	36
0	10	−90	−180	10	30	40	30	40	40	40	30	12
40	40	30	30	30	30	20	20	OBS	−S	20	20	–
40	40	40	40	40	40	30	30	30	30	30	20	37
40	40	30	40	50	40	40	40	40	40	40	40	36
20	20	30	30	20	30	40	50	50	40	50	80	32.5
40	40	30	20	10	20	30	30	20	10	10	10	38
60	80	40	10	20	10	20	−10	−10	40	20	10	22
10	20	20	30	30	20	0	0	10	10	−60	−40	11
20	20	0	−10	0	−50	−50	−40	−10	10	10	10	−1
0	10	20	30	40	40	40	40	30	40	40	40	16
10	10	10	20	40	40	40	40	20	20	30	20	33
10	40	10	20	40	40	40	80	70	60	60	40	36
30	10	20	30	10	20	30	30	30	20	10	10	25
70	60	40	30	30	20	10	10	20	10	−30	−30	25
0	40	OBS	OBS	20	30	OBS	0	20	20	30	40	–
40	−20	30	40	20	10	10	0	20	0	−30	20	25
60	70	60	40	20	10	0	−10	0	10	−20	−20	28

Date	00	01	02	03	04	05	06	07	08	09	10	11
961001	0	−10	0	0	−20	−20	[0]	10	−20	−20	0	40
961002	10	10	20	20	30	30	[40]	[60]	30	10	10	−10
961003	0	20	40	40	40	40	40	[40]	40	40	30	40
961004	40	30	20	20	30	30	60	[60]	30	40	60	60
961005	0	10	0	0	0	10	[−10]	0	20	20	10	−10
961006	20	20	20	10	60	10	[0]	10	10	10	30	30
961007	40	20	20	20	30	40	–	70	–	40	30	40
961008	30	30	30	30	40	30	[40]	80	40	30	40	60
961009	30	40	30	30	20	30	30	[40]	30	30	40	40
961010	10	10	20	20	20	40	[40]	30	20	30	30	30
961011	10	0	10	10	10	10	30	[40]	30	30	60	60
961012	20	30	30	20	0	−20	−10	[0]	10	10	10	20
961013	20	10	10	10	10	0	10	20	10	10	20	30
961014	10	10	10	10	10	–	−10	(−10)	(−10)	10	30	40
961015	10	20	10	−10	−10	−10	[−10]	[−20]	−10	−30	−10	10
961016	40	60	60	60	60	70	[70]	[+S]	30	90	+S	20
961017	40	30	40	40	40	70	[60]	[40]	40	20	20	30
961018	OBS	−S	40	60	60	40	[60]	[40]	40	40	40	30
961019	20	20	30	30	[30]	40	40	60	70	60	40	40
961020	30	20	10	10	20	20	[30]	40	40	40	30	30
961021	0	−10	−10	OBS	30	–	40	–	40	30	30	20
961022	−40	OBS	+S	OBS	0	30	20	−10	20	10	20	30
961023	20	30	30	30	30	40	[40]	40	40	30	20	−40
961024	–	–	–	–	–	–	–	30	30	30	30	20
961025	40	40	40	40	30	40	50	[50]	60	50	50	40
961026	20	10	20	20	30	20	60	[80]	[80]	40	30	30
961027	30	20	10	30	30	30	40	[60]	60	60	60	50
961028	40	30	30	−20	−40	−50	(−10)	10	20	20	30	40
961029	40	−50	10	80	100	130	140	150	–	40	40	40
961030	20	30	30	20	20	30	40	[30]	30	30	30	40
961031	30	30	30	20	20	30	[30]	30	40	40	40	40

12	13	14	15	16	17	18	19	20	21	22	23	Means
60	40	40	40	40	30	30	40	40	30	30	10	16
−10	−10	−10	−30	20	−10	−10	10	−10	0	−20	−40	6
70	70	80	90	70	60	70	40	40	40	40	40	47
60	40	40	40	30	40	20	20	10	10	10	10	34
(30)	−10	10	−10	−20	−10	0	30	100	OBS	OBS	20	–
10	20	0	10	10	−10	−10	20	30	40	60	30	18
40	40	40	60	40	60	70	40	30	20	20	30	–
60	60	30	30	40	60	30	20	30	30	20	20	38
40	30	30	10	0	0	–	–	–	–	–	–	–
20	−10	20	40	40	20	10	10	10	10	−10	–	20
30	–	70	60	40	40	40	40	30	20	20	10	30
30	40	40	40	30	20	10	0	0	10	30	30	17
40	60	60	40	30	20	20	20	10	0	20	0	20
40	40	40	30	40	30	20	30	40	40	20	10	–
30	40	40	40	30	40	40	60	40	40	40	70	19
40	60	40	40	40	60	60	40	60	40	40	40	–
30	10	40	40	40	40	60	70	40	30	60	70	42
40	40	40	60	60	40	60	60	40	30	30	20	–
40	40	40	60	60	40	60	70	40	40	40	40	44
30	20	30	30	20	20	−30	−110	−110	−50	−20	−20	5
30	10	20	20	30	40	30	20	10	0	−50	−10	–
30	20	30	30	40	50	−S	30	30	30	10	10	–
−10	40	0	30	60	60	90	80	70	60	–	–	–
40	40	60	70	60	60	70	70	60	40	40	40	–
40	30	30	30	40	60	50	40	40	30	20	20	40
30	30	30	40	40	20	30	20	10	10	20	20	31
50	50	60	60	50	30	30	40	30	20	10	20	39
30	30	40	40	30	30	40	40	70	80	70	50	29
40	60	40	30	30	40	30	30	30	10	10	10	47
40	40	40	60	60	60	70	60	40	40	30	40	39
40	60	40	60	70	60	30	0	10	30	20	30	35

Date	00	01	02	03	04	05	06	07	08	09	10	11
961101	40	40	40	40	20	−40	0	10	[30]	−10	0	90
961102	40	40	30	30	30	[30]	30	30	40	60	40	40
961103	30	30	30	40	40	40	60	60	[80]	60	60	60
961104	70	80	100	90	70	70	120	(130)	–	150	130	70
961105	20	20	10	70	70	40	40	50	[70]	60	50	60
961106	0	0	10	20	30	30	30	30	[20]	10	20	20
961107	40	40	40	40	40	40	40	70	[40]	30	30	40
961108	10	10	−140	0	20	30	30	30	[30]	30	30	40
961109	30	20	20	30	30	30	30	[30]	40	30	30	30
961110	10	10	0	10	10	10	10	[0]	−10	−10	10	10
961111	20	10	10	10	10	20	–	–	0	10	10	−10
961112	0	0	0	0	−10	−10	−40	−40	[−20]	−10	10	20
961113	10	−10	−30	−60	−40	−20	−10	10	[10]	10	20	10
961114	20	10	10	0	0	0	0	0	[10]	10	10	10
961115	30	30	30	30	30	40	40	60	[80]	60	60	50
961116	10	0	−10	0	10	40	40	40	[70]	70	50	60
961117	30	70	60	20	20	40	10	20	−10	−10	10	10
961118	40	30	10	0	10	20	–	–	−10	0	30	10
961119	20	30	20	0	10	20	[20]	–	–	–	–	–
961120	0	10	10	10	20	20	10	20	[20]	20	0	10
961121	10	40	30	40	40	40	[50]	60	–	–	–	–
961122	40	40	10	OBS	OBS	OBS	OBS	OBS	OBS	[10]	30	20
961123	50	40	50	40	30	40	40	50	[40]	30	40	40
961124	60	50	50	40	40	60	50	60	[40]	40	30	30
961125	30	30	30	30	40	30	40	[40]	–	40	40	40
961126	0	0	−10	20	10	30	100	20	[70]	40	10	40
961127	30	30	20	10	30	0	10	20	[30]	60	80	70
961128	0	−10	0	0	0	0	0	0	[30]	60	30	30
961129	40	40	20	20	30	40	40	[60]	70	70	60	40
961130	−30	−30	−40	−30	−20	−10	−20	[−10]	30	60	40	70

12	13	14	15	16	17	18	19	20	21	22	23	Means
40	10	0	−20	−10	0	30	40	0	30	30	40	19
40	60	60	40	60	70	70	80	70	30	30	30	45
70	60	40	40	60	40	40	80	70	80	90	80	56
70	70	70	60	90	70	60	70	80	90	70	40	–
60	70	70	40	40	50	60	60	40	30	10	0	45
30	30	30	30	30	30	40	40	40	40	40	50	27
40	40	50	40	40	30	40	50	40	40	30	20	40
40	30	40	40	40	50	40	40	30	30	30	20	23
30	30	30	30	20	10	20	10	10	10	20	10	24
10	0	0	−10	−10	10	−10	−10	0	10	0	0	2
−10	0	20	30	10	20	30	30	20	10	10	10	–
30	30	40	40	40	40	40	30	40	30	10	10	12
20	30	40	30	40	40	50	40	50	50	40	30	15
10	20	10	30	30	10	30	20	20	0	10	60	14
50	60	50	40	30	30	20	10	20	10	10	20	37
70	60	70	50	80	80	50	70	80	20	−10	40	43
0	10	10	10	20	40	40	40	30	40	40	40	25
−10	0	10	0	20	30	20	30	30	10	0	10	–
–	–	–	40	70	70	70	40	−10	−10	−10	−10	–
10	−10	10	20	10	−60	0	30	70	40	10	+S	12
–	40	50	60	70	70	80	60	60	70	50	50	–
10	30	70	70	80	80	80	120	90	90	60	60	–
40	40	40	30	30	30	40	40	50	60	70	70	43
20	20	30	40	40	40	40	40	40	40	30	30	40
40	40	40	30	30	30	10	−10	−20	−10	−10	0	24
40	80	40	30	30	−10	0	30	60	70	60	60	34
40	30	40	40	40	60	80	90	70	60	40	30	42
20	40	30	40	60	70	40	30	10	20	10	20	22
40	40	30	0	−10	−20	−30	−20	−10	−20	−40	−30	19
70	90	80	90	100	100	100	120	160	100	90	100	50

Date	00	01	02	03	04	05	06	07	08	09	10	11
961201	90	60	70	70	60	60	70	80	70	80	[110]	60
961202	60	60	40	40	40	40	30	(30)	–	30	–10	40
961203	40	40	40	30	40	40	40	[60]	[60]	50	50	60
961204	–20	–40	–70	–40	–60	–20	–60	[–20]	–30	(–30)	(–20)	–10
961205	–20	–20	–40	–20	–30	–30	–40	–30	[–40]	–60	–80	–70
961206	–60	–30	0	20	–10	–40	–10	[10]	[–20]	–10	–30	–20
961207	–10	–20	20	20	20	10	30	70	[40]	30	–20	40
961208	0	–10	0	0	10	0	10	0	[–10]	–20	–20	–10
961209	–	–	–	–	–	–	–	–	–	–10	–10	–10
961210	30	20	30	30	30	40	40	[30]	[20]	10	–10	0
961211	–10	–10	–10	10	10	10	[10]	[10]	–10	–20	–30	–30
961212	0	–10	–10	10	0	–10	–10	[–10]	[30]	0	–20	–10
961213	20	10	10	30	40	10	10	30	[0]	20	20	30
961214	40	40	60	40	40	40	[30]	[20]	40	60	60	60
961215	30	10	10	30	60	40	60	[40]	30	20	30	40
961216	40	30	30	40	30	40	60	80	80	–	60	40
961217	–10	–10	–10	–10	–20	–10	–20	[–10]	[–20]	0	20	30
961218	50	20	30	70	80	[80]	90	120	130	40	20	10
961219	50	60	60	70	60	110	80	100	[80]	[90]	40	50
961220	80	70	70	80	70	70	70	80	50	60	60	50
961221	–10	–20	10	10	20	30	[30]	40	40	40	60	70
961222	70	80	50	40	50	[40]	[70]	100	80	70	80	50
961223	20	–10	30	–20	10	10	–10	[10]	–	–10	–20	–20
961224	10	–40	–50	–10	–20	0	–10	[0]	10	10	20	30
961225	80	80	30	–10	–10	–10	[–10]	10	–20	–10	–20	0
961226	10	10	10	30	20	30	40	[50]	60	70	70	90
961227	–	–	–	–	–	–	–	–	–	–	–	–
961228	–	–	–	–	–	–	–	–	–	–	–	–
961229	–	–	–	–	–	–	–	–	–	–	–	–
961230	–	–	–	–	–	–	–	–	–	20	50	60
961231	–30	–10	10	0	–10	–40	–10	10	[0]	–40	–70	–40

12	13	14	15	16	17	18	19	20	21	22	23	Means
60	30	20	20	30	40	40	60	70	40	40	40	57
70	120	100	90	90	80	80	60	50	50	50	40	–
60	70	70	70	140	120	100	80	60	40	10	–20	56
10	10	(20)	(20)	30	40	40	10	–10	–30	–70	–30	–
–60	–40	–60	–40	–60	–60	–60	–40	–80	–40	–60	–20	–46
–30	–10	–10	0	–10	0	10	10	–20	–10	–20	–10	–13
10	20	0	20	10	0	–10	0	–40	–30	–10	0	8
–	–	–	–	–	–	–	–	–	–	–	–	–
–10	–10	–20	–20	–10	0	0	0	10	10	10	30	–
0	–10	–20	0	–10	0	10	–20	0	10	10	10	10
–30	–20	–10	–20	–10	–20	–20	20	20	10	10	–10	–6
–20	(0)	10	–10	0	10	30	40	20	20	10	20	4
80	70	40	40	90	90	70	70	40	60	70	40	41
70	60	40	20	20	10	10	10	30	30	30	30	37
60	60	70	70	90	90	60	40	40	40	40	40	46
40	40	20	10	30	–30	–40	–10	10	10	0	–10	26
50	70	30	40	50	40	40	50	30	20	60	40	19
10	10	–10	0	0	0	–10	–10	20	50	40	20	36
80	70	80	80	80	70	40	80	130	130	130	90	80
40	40	40	30	0	–20	–50	–50	30	40	30	–10	39
70	80	80	90	90	100	110	120	140	120	80	70	61
50	60	40	–20	0	30	–10	40	20	20	–20	40	43
–10	10	10	–10	20	30	30	20	0	30	80	20	10
40	50	50	30	20	20	20	20	40	60	60	70	18
0	10	70	80	50	20	30	40	30	30	10	0	20
130	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
60	70	60	50	50	70	40	10	20	–10	–30	–10	–
–30	–40	–10	–10	–20	–60	–50	–60	–60	–30	–80	–20	–29

Hourly means of the
1997

Date	00	01	02	03	04	05	06	07	08	09	10	11
970101	10	0	10	−10	0	70	10	−20	[80]	10	40	−20
970102	30	20	0	10	20	10	10	20	–	40	50	30
970103	−10	−20	−40	−30	−60	−60	−40	[−20]	[−20]	−20	−40	−100
970104	−40	−20	−10	−20	10	−60	−10	[70]	[80]	40	10	30
970105	50	40	70	120	140	140	90	[60]	[50]	40	50	60
970106	50	40	50	50	50	50	50	–	–	30	30	40
970107	10	−10	30	10	−10	20	30	0	[−20]	−20	−20	−10
970108	−70	−40	−30	−20	−20	−60	−20	−60	[−80]	−80	−60	−100
970109	−30	−30	−30	−20	−30	−20	−20	[−10]	[−30]	−20	−20	−30
970110	30	20	30	50	60	40	40	[40]	[40]	50	80	50
970111	−60	−40	−30	10	20	30	40	[50]	[60]	80	60	70
970112	50	70	60	50	50	50	50	60	[80]	70	70	80
970113	80	120	130	90	60	100	–	–	130	140	100	130
970114	50	50	120	100	70	50	40	[50]	30	50	40	40
970115	50	60	70	60	80	80	80	[70]	[80]	90	80	80
970116	80	70	60	70	60	60	60	[60]	[60]	80	40	30
970117	30	30	60	30	30	20	30	[10]	[20]	−10	40	20
970118	−20	10	30	30	30	20	50	50	[40]	30	0	10
970119	10	10	20	0	0	50	30	–	–	–	–	–
970120	–	–	–	–	–	–	–	–	30	30	40	40
970121	100	90	80	90	70	40	40	[90]	[70]	80	90	90
970122	−50	0	30	30	0	20	30	[30]	20	−10	−20	−20
970123	10	10	20	0	30	30	−10	[0]	30	10	10	20
970124	40	40	40	30	30	30	30	[40]	40	30	30	40
970125	60	60	40	40	30	30	30	[30]	10	−20	−50	−40
970126	30	30	−20	−10	0	0	−50	[−20]	[10]	20	60	80
970127	−40	−10	10	20	60	20	–	–	10	20	20	20
970128	40	40	30	20	20	10	20	[60]	70	60	70	70
970129	20	−10	10	30	20	30	30	[40]	[40]	40	50	40
970130	40	30	40	30	40	40	40	[40]	30	30	40	40
970131	40	30	20	30	40	40	40	[40]	[40]	40	40	60

potential gradient

12	13	14	15	16	17	18	19	20	21	22	23	Means
–30	–60	–40	20	50	50	80	60	40	30	30	–40	15
40	60	60	60	50	60	50	50	80	60	40	0	37
–20	–20	–40	–30	–30	–70	–60	–40	–60	–70	–90	–70	–44
OBS	OBS	OBS	–S	10	30	30	20	50	40	40	40	–
40	30	50	70	80	60	20	40	40	30	80	60	63
30	50	50	50	60	30	–10	–30	–10	–10	10	30	–
30	20	0	0	–30	30	–30	–60	–60	0	–20	–70	–8
–80	–60	–60	–70	–60	–70	–60	–80	–60	–60	–60	–60	–59
–30	–30	–30	0	–10	–10	–30	–30	–40	–60	–20	20	–23
40	30	40	30	40	30	10	–10	–10	0	–60	–70	25
80	70	70	80	80	50	60	(70)	(–10)	10	30	50	–
80	90	90	90	90	170	150	140	140	130	110	80	88
110	120	80	100	130	100	100	120	100	120	130	90	–
50	60	80	80	80	70	50	70	80	70	70	60	63
80	80	120	100	120	120	90	80	80	110	80	40	83
60	80	60	70	70	80	60	70	40	30	60	40	60
20	30	30	20	20	20	10	0	–10	10	–10	20	20
10	40	70	40	30	70	30	30	30	10	10	20	28
–	–	–	–	–	–	–	–	–	–	–	–	–
40	40	60	80	100	110	90	60	90	90	100	90	–
90	110	100	170	110	110	150	150	90	90	90	60	94
–40	–40	–30	–40	–30	–40	–40	–40	–40	–20	–20	–10	–14
30	80	70	70	60	80	30	40	30	30	40	30	31
80	40	40	40	80	80	90	90	80	40	20	40	48
0	30	20	40	30	40	40	40	30	30	30	30	24
90	100	100	100	60	30	20	20	20	10	10	–30	28
30	30	10	20	30	30	40	40	40	20	20	50	–
80	80	90	80	80	70	70	80	80	60	40	30	56
60	70	60	60	70	90	80	90	70	60	50	40	48
50	50	60	60	50	60	50	50	40	30	40	30	42
50	50	60	70	70	50	40	40	30	40	40	40	43

Date	00	01	02	03	04	05	06	07	08	09	10	11
970201	20	10	20	30	30	40	40	[50]	60	50	50	60
970202	40	40	40	50	50	50	60	70	[80]	80	60	40
970203	30	30	40	60	50	60	–	–	100	90	80	70
970204	80	80	40	40	40	80	70	[70]	100	90	90	90
970205	90	80	70	90	100	80	90	[130]	[140]	110	100	100
970206	40	30	20	–10	–20	0	40	[60]	70	80	70	70
970207	40	30	30	40	40	30	30	[40]	30	60	70	80
970208	40	60	70	60	60	70	60	[70]	[80]	80	80	80
970209	100	90	90	60	80	40	90	[80]	[70]	130	90	90
970210	60	70	60	80	40	80	[140]	–	–	+S	+S	200
970211	+S	200	190	+S	140	80	140	[120]	[40]	30	90	70
970212	30	30	20	20	30	30	40	[20]	10	–10	–70	10
970213	40	40	40	40	40	20	30	[20]	30	30	40	40
970214	20	10	10	10	20	30	30	[30]	[30]	20	20	20
970215	40	40	20	30	40	60	60	[80]	60	60	70	0
970216	40	40	30	30	40	40	40	[40]	30	30	30	40
970217	30	30	30	30	40	30	[40]	–	60	40	40	40
970218	10	10	10	10	20	10	30	[20]	[30]	40	40	40
970219	30	30	30	40	60	40	30	[70]	–10	30	30	30
970220	30	20	20	–10	–40	–20	30	[20]	40	40	20	OBS
970221	10	10	30	40	30	120	130	80	[20]	30	20	30
970222	30	20	10	10	10	10	10	[10]	[30]	30	30	30
970223	10	10	10	20	30	30	40	[40]	[30]	40	50	50
970224	30	40	40	40	30	10	–	–	10	10	20	40
970225	20	20	20	20	20	10	10	20	[30]	40	40	40
970226	20	10	20	20	30	20	20	[30]	[30]	30	40	40
970227	10	10	10	OBS	–50	20	20	0	[30]	10	10	0
970228	30	20	30	30	30	30	40	[40]	[60]	70	60	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
60	60	60	70	70	60	70	80	70	60	50	40	50
50	60	70	60	50	50	70	50	50	40	50	30	54
80	80	80	70	60	70	60	40	60	40	40	60	–
80	80	90	80	80	70	60	30	40	40	60	30	67
120	120	130	110	130	90	100	70	80	90	100	80	100
70	70	80	80	80	80	70	80	70	70	60	60	55
100	110	100	90	90	80	90	90	70	60	40	30	61
80	70	80	80	90	100	90	100	90	90	100	90	78
130	120	90	80	90	70	80	70	90	90	80	70	86
200	140	90	100	90	150	+S	+S	+S	+S	+S	+S	–
60	40	40	40	40	30	20	10	10	20	30	30	–
30	20	40	70	90	40	60	60	70	60	40	40	33
40	40	40	30	20	OBS	30	20	30	30	30	20	32
30	30	40	30	40	40	40	30	30	30	40	40	28
–10	30	60	60	30	20	40	70	70	70	60	40	46
60	70	60	60	60	40	40	60	60	40	30	30	43
50	50	50	40	40	30	30	30	40	40	20	20	37
40	40	30	30	30	20	–10	–140	–50	–20	0	0	10
30	30	+S	30	40	40	40	40	40	40	40	30	35
+S	(OBS)	0	OBS	40	70	80	50	40	40	30	30	–
30	30	30	40	50	40	40	30	50	40	40	30	42
30	30	40	30	40	50	70	50	40	30	20	10	28
40	40	40	40	40	50	60	50	50	40	50	40	38
40	70	80	60	20	20	10	10	10	20	20	30	–
60	60	40	40	40	40	40	40	30	30	30	30	32
40	20	10	+S	OBS	10	40	40	30	20	20	10	–
–10	0	–10	30	10	30	20	30	20	30	20	30	12
60	70	70	60	60	70	40	40	30	30	20	20	45

Date	00	01	02	03	04	05	06	07	08	09	10	11
970301	20	20	20	30	30	[30]	40	70	70	70	70	80
970302	30	30	40	40	30	40	40	80	[90]	90	60	60
970303	20	20	30	10	20	30	–	–	40	40	30	30
970304	10	20	20	10	–60	–10	–70	[–70]	–50	–40	–70	–80
970305	40	40	30	30	30	30	40	[40]	[40]	40	40	50
970306	30	20	20	20	20	10	20	[40]	[50]	50	50	50
970307	20	20	10	0	0	10	0	[10]	30	30	30	50
970308	20	20	30	20	10	10	20	40	[40]	50	40	50
970309	30	20	20	30	20	30	10	[30]	[30]	50	60	80
970310	–	–	–	–	–	–	–	–	10	40	50	60
970311	30	20	30	40	30	40	40	–	–	–	–	–
970312	20	10	10	20	30	40	40	[40]	40	40	40	50
970313	30	30	20	10	20	30	20	[40]	40	40	10	–20
970314	10	10	10	10	20	20	30	[30]	[40]	40	30	40
970315	10	10	10	10	–10	0	0	[0]	[10]	20	30	30
970316	10	20	10	40	40	30	–20	0	–40	–10	0	0
970317	OBS	OBS	OBS	OBS	OBS	OBS	–	+S	OBS	OBS	OBS	OBS
970318	60	60	70	50	40	40	60	[60]	[60]	50	60	60
970319	OBS	OBS	OBS	OBS	+S	20	30	30	–	60	50	–
970320	–	–	–	–	–	–	–	–	–	–	–	–
970321	–	–	–	–	–	–	–	–	–	90	110	110
970322	OBS	–10	10	40	40	[50]	80	80	80	50	70	–S
970323	–30	0	10	10	10	20	40	[80]	[60]	50	50	50
970324	40	–30	10	10	0	–10	–	–	20	20	20	40
970325	40	40	40	40	50	50	70	70	[50]	40	40	40
970326	50	50	40	10	20	50	60	50	(50)	(40)	40	50
970327	10	0	0	10	20	10	10	0	(10)	–20	–20	–10
970328	20	10	10	10	10	20	40	20	–	–	–	–
970329	–	–	–	–	–	–	–	–	–	+S	OBS	OBS
970330	50	40	50	50	40	[40]	40	50	60	50	50	50
970331	40	40	50	50	50	60	[70]	70	70	50	50	20

12	13	14	15	16	17	18	19	20	21	22	23	Means
80	30	30	40	30	70	60	60	70	70	40	30	48
60	40	40	30	30	20	20	30	30	30	10	10	41
10	20	30	40	50	30	20	30	40	40	30	20	–
10	30	40	50	40	50	40	40	20	10	20	30	0
50	50	50	60	50	50	40	30	40	40	30	20	40
50	50	50	40	40	40	40	30	40	30	30	30	35
60	60	70	80	80	80	60	60	70	60	60	40	41
50	60	60	60	50	60	50	50	40	40	30	30	39
90	90	90	80	50	70	70	40	40	–	–	–	–
70	80	80	90	70	80	80	70	50	40	30	20	–
–	–	50	60	50	50	50	50	40	30	20	20	–
70	60	60	50	40	40	40	20	20	30	20	30	36
30	30	20	OBS	OBS	20	–10	–10	0	10	20	10	–
40	30	30	20	20	30	20	30	30	10	20	10	24
30	30	40	40	30	40	40	30	20	10	20	10	19
10	–20	–30	–10	–50	–80	40	–60	0	–200	OBS	40	–12
30	OBS	0	50	30	50	50	30	30	60	70	50	–
40	40	30	40	40	40	40	40	40	30	20	OBS	47
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
50	20	20	10	40	–40	OBS	–40	10	20	80	OBS	–
OBS	OBS	OBS	OBS	20	50	50	80	60	50	60	20	–
70	70	60	40	40	50	50	60	50	50	50	40	41
40	50	40	20	10	10	20	20	40	40	10	10	–
40	50	50	40	10	20	40	0	–40	–30	10	10	32
70	50	50	50	40	40	40	10	10	10	10	0	–
20	40	50	50	50	50	40	50	40	40	20	20	21
–	–	–	–	–	–	–	–	–	–	–	–	–
OBS	OBS	OBS	OBS	50	50	60	60	50	50	50	50	–
40	50	60	60	50	50	50	50	60	60	50	50	50
20	10	20	40	40	–10	–20	40	20	20	10	10	34

Date	00	01	02	03	04	05	06	07	08	09	10	11
970401	20	10	10	20	40	40	50	–	–	40	(50)	80
970402	20	40	20	20	20	40	50	[40]	50	60	60	60
970403	60	50	50	50	40	40	60	[60]	(70)	–	–	–
970404	–	–	–	–	–	–	–	–	OBS	–30	OBS	+S
970405	40	+S	50	50	50	50	[60]	60	50	50	50	40
970406	0	40	OBS	40	OBS	OBS	[40]	50	40	50	60	60
970407	40	40	40	20	0	50	–	–	–	–	–	–
970408	60	50	50	50	60	80	60	–	–	–	–	–
970409	50	40	30	30	20	30	40	[40]	40	40	40	50
970410	40	40	40	40	40	60	[50]	–	–	–	60	60
970411	40	30	20	10	20	20	30	[30]	–	–	30	20
970412	20	30	40	40	40	40	40	[40]	30	30	OBS	OBS
970413	40	40	50	50	40	40	40	[50]	40	40	30	50
970414	30	20	10	10	10	–	–	–	40	40	40	40
970415	0	10	20	20	OBS	OBS	OBS	[40]	40	30	+S	+S
970416	–40	OBS	40	40	30	40	50	[30]	30	80	+S	–S
970417	+S	30	30	30	30	20	[30]	[20]	30	30	30	30
970418	0	10	0	20	30	30	40	[40]	40	30	40	40
970419	10	10	10	10	20	20	[20]	30	40	50	40	50
970420	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	+S
970421	40	50	50	50	50	–	–	–	–	–	–	–
970422	–	–	–	–	–	–	–	–	40	40	30	40
970423	20	30	30	30	30	40	[40]	[50]	50	50	40	40
970424	30	20	20	20	10	30	30	[30]	30	30	30	30
970425	20	10	10	20	10	20	30	[30]	30	30	30	40
970426	30	30	40	40	30	40	[40]	[20]	30	20	20	40
970427	40	30	30	30	40	40	[10]	[20]	20	30	40	30
970428	10	10	10	30	20	30	–	–	30	40	40	40
970429	30	30	30	20	20	–	–	–	–	30	30	20
970430	10	20	10	20	20	20	30	–	20	20	20	10

12	13	14	15	16	17	18	19	20	21	22	23	Means
70	60	60	60	60	50	40	40	50	40	20	10	–
70	80	80	90	90	80	60	80	70	70	50	50	56
–	–	–	–	–	–	–	–	–	–	–	–	–
OBS	50	OBS	–S	20	70	60	60	60	70	OBS	40	–
40	0	–10	–10	–60	–120	20	20	–30	–70	–90	–40	9
70	80	90	60	OBS	80	80	80	90	OBS	20	50	–
–	–	–	OBS	80	80	80	70	70	70	70	60	–
30	60	60	60	60	50	50	60	60	40	50	50	–
50	60	50	50	40	40	30	40	50	50	40	40	41
60	50	40	30	40	40	40	30	30	30	30	30	–
20	30	10	–10	–10	OBS	OBS	OBS	OBS	40	40	30	–
20	20	40	10	–S	–S	OBS	OBS	OBS	OBS	40	40	–
50	40	30	40	40	40	40	40	50	50	40	40	42
40	40	40	40	40	50	50	30	30	20	20	10	–
OBS	OBS	OBS	0	40	30	40	40	30	+S	30	10	–
+S	OBS	30	–S	30	50	40	OBS	30	50	30	10	–
30	30	30	30	0	–10	0	–10	0	10	0	0	18
40	40	40	40	40	40	30	30	30	30	20	10	30
50	40	40	40	40	40	30	40	40	40	40	30	33
50	10	0	30	50	50	70	70	80	70	60	50	–
–	–	–	–	–	–	–	–	–	–	–	–	–
40	40	40	40	30	30	40	40	40	40	40	30	–
40	40	40	40	40	40	40	30	30	40	40	30	38
30	40	40	40	30	30	30	20	10	20	20	20	27
40	40	30	30	30	30	30	30	40	40	30	20	28
40	50	60	–10	60	40	70	70	70	80	70	30	42
40	40	30	30	30	40	30	30	30	10	–10	10	28
30	40	20	OBS	40	60	70	40	40	40	40	40	–
–20	OBS	OBS	10	20	30	40	30	30	30	30	20	–
10	20	30	30	20	20	20	20	20	20	30	20	20

Date	00	01	02	03	04	05	06	07	08	09	10	11
970501	20	20	20	20	20	20	[10]	30	30	40	40	40
970502	30	30	40	40	70	60	[60]	[60]	60	60	70	70
970503	10	10	20	10	10	20	30	40	[40]	40	30	30
970504	0	0	0	0	0	0	10	[10]	10	20	20	30
970505	10	10	10	10	10	–	–	–	–	20	20	10
970506	10	0	10	10	20	20	20	[30]	20	30	30	20
970507	10	10	+S	OBS	OBS	30	40	[30]	40	40	40	OBS
970508	30	30	20	20	10	30	30	[30]	30	30	30	10
970509	20	10	10	10	10	20	[20]	[10]	20	10	10	10
970510	30	30	20	20	[30]	30	40	40	40	30	40	40
970511	10	10	10	10	10	20	[20]	40	40	40	30	10
970512	20	10	10	10	10	–	–	–	40	40	40	40
970513	10	10	10	10	10	20	30	[30]	–	–	–	–
970514	–	–	–	–	–	–	–	–	–	–	50	40
970515	30	30	10	10	10	40	[40]	0	40	OBS	40	40
970516	40	40	40	30	40	50	50	[40]	40	60	80	80
970517	10	30	30	10	40	50	50	[40]	40	50	50	60
970518	50	50	50	40	50	50	40	[40]	40	50	50	50
970519	50	40	40	40	30	40	40	[30]	40	40	50	60
970520	50	50	40	50	50	60	–	–	–	–	–	–
970521	–	–	–	–	–	–	–	–	60	40	50	40
970522	OBS	OBS	OBS	–S	–S	–S	–S	–S	–90	–240	–160	–60
970523	0	0	10	0	0	30	40	[60]	[0]	30	40	50
970524	100	80	10	10	0	30	[60]	90	80	80	80	50
970525	10	30	30	30	30	40	50	[50]	50	50	50	50
970526	30	30	30	10	10	–	–	–	–	–20	10	0
970527	30	30	20	20	30	30	30	[30]	30	0	–S	30
970528	40	50	50	–S	OBS	OBS	–10	[–S]	OBS	–10	0	20
970529	30	40	40	40	40	40	50	[50]	40	40	40	40
970530	10	30	40	–60	30	40	50	[40]	30	30	40	30
970531	40	40	40	40	40	40	[50]	40	40	30	30	40

12	13	14	15	16	17	18	19	20	21	22	23	Means
30	30	40	20	20	20	20	10	10	10	20	30	24
70	80	70	70	60	60	40	40	40	30	20	10	52
30	40	40	40	40	40	30	40	40	30	20	10	29
30	30	40	30	40	30	20	10	10	10	20	10	16
10	0	−10	20	20	20	20	20	10	10	0	−10	–
10	20	20	30	30	30	30	30	OBS	OBS	OBS	10	–
60	30	40	40	40	40	20	+S	OBS	80	30	30	–
0	20	20	20	0	20	30	30	30	30	30	20	23
30	30	30	30	30	40	40	30	30	30	30	40	23
40	40	30	30	20	20	10	20	20	20	10	10	28
10	10	10	20	10	20	20	20	20	10	10	10	18
40	40	40	40	30	20	10	10	20	20	10	10	–
–	–	–	–	–	–	–	–	–	–	–	–	–
60	80	90	90	80	60	60	60	50	50	50	40	–
50	50	60	60	50	50	40	50	40	40	40	40	37
80	80	90	80	50	40	30	30	30	10	30	30	49
60	60	80	90	40	OBS	10	30	30	30	40	40	42
80	60	80	60	50	50	40	30	40	40	40	50	49
80	80	60	60	50	50	40	40	40	30	40	40	46
–	–	–	–	–	–	–	–	–	–	–	–	–
50	50	60	80	50	30	10	30	+S	OBS	+S	OBS	–
−70	OBS	0	30	−10	0	0	10	10	10	0	10	–
50	OBS	40	50	40	30	OBS	−S	30	40	30	10	–
50	50	−30	−10	−60	0	40	30	40	−10	−30	−10	30
50	60	60	80	50	50	50	50	40	30	40	30	44
30	30	40	40	40	40	40	30	30	20	10	20	–
OBS	OBS	OBS	40	40	50	40	40	40	40	40	40	–
10	0	20	30	30	OBS	30	30	+S	40	40	40	–
50	50	50	50	50	50	50	40	40	30	20	10	41
+S	OBS	OBS	OBS	30	30	40	40	40	40	40	40	–
40	40	40	40	40	40	40	40	40	50	50	50	41

Date	00	01	02	03	04	05	06	07	08	09	10	11
970601	50	60	50	40	40	50	[50]	[50]	50	60	50	50
970602	40	40	40	40	50	–	0	[40]	30	30	40	30
970603	40	40	40	40	30	40	40	[40]	40	70	70	60
970604	20	10	10	10	30	80	90	[80]	70	80	70	70
970605	10	20	20	10	20	30	30	[30]	30	30	30	30
970606	0	+S	+S	–10	10	30	80	[100]	70	100	60	0
970607	OBS	–30	0	10	10	20	[10]	30	70	60	60	40
970608	80	70	60	30	40	40	40	[30]	40	80	80	80
970609	40	40	40	40	40	–	–	–	30	30	60	70
970610	20	20	20	20	30	40	40	[30]	60	80	80	80
970611	0	10	10	20	30	40	20	[20]	30	40	60	60
970612	30	30	30	30	40	40	40	(40)	70	70	80	60
970613	30	30	30	30	20	10	–	[40]	40	40	40	40
970614	30	30	30	30	40	40	30	[40]	60	80	80	80
970615	80	80	60	40	40	80	110	[110]	80	40	40	40
970616	30	20	10	20	20	30	30	–	[40]	40	30	40
970617	10	40	40	30	30	60	OBS	–S	[–30]	+S	90	40
970618	20	10	–40	0	10	20	40	[60]	–10	60	+S	OBS
970619	60	60	60	60	40	60	60	[70]	40	40	40	40
970620	30	–S	10	40	40	30	20	[40]	20	140	+S	40
970621	30	30	30	30	40	60	40	[40]	40	40	40	60
970622	20	30	30	40	40	60	[40]	[40]	40	60	60	70
970623	OBS	OBS	OBS	–S	OBS	+S	–30	–	80	110	70	40
970624	30	20	20	20	40	60	40	[60]	30	40	40	+S
970625	20	20	30	20	40	60	[70]	[80]	60	70	80	80
970626	30	30	30	30	30	40	40	[40]	30	30	20	30
970627	40	30	30	30	30	30	30	[20]	10	10	20	30
970628	20	20	20	20	30	40	[40]	30	30	40	60	60
970629	10	10	10	20	30	40	[30]	[40]	30	80	90	90
970630	40	30	40	30	30	30	–	[40]	40	40	50	40

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	50	60	60	50	40	30	40	40	40	40	40	48
20	20	30	30	30	40	40	40	40	40	40	40	34
80	80	80	80	60	40	+S	OBS	10	90	30	30	–
70	70	80	80	60	40	30	20	20	10	10	10	47
30	40	30	30	40	40	30	20	10	10	20	+S	26
70	70	70	40	–S	70	70	10	OBS	0	–80	–60	–
40	60	60	+S	+S	10	+S	10	20	30	40	60	–
80	70	70	70	60	70	60	40	40	40	40	40	–
90	80	90	90	70	70	60	40	30	30	30	30	–
60	80	70	60	40	20	10	0	0	0	10	10	37
60	70	70	70	60	40	40	30	30	30	30	30	38
90	0	OBS	40	70	60	40	40	30	40	40	30	45
60	60	80	90	70	60	40	40	30	30	30	20	42
70	–120	OBS	OBS	OBS	OBS	OBS	–100	–S	–40	80	80	–
60	40	60	70	70	80	80	40	40	60	40	40	62
60	70	60	40	OBS	OBS	30	30	10	20	–10	–S	–
40	40	40	40	OBS	OBS	OBS	+S	+S	OBS	OBS	30	–
30	60	40	110	70	OBS	OBS	20	30	60	60	70	–
40	30	40	OBS	OBS	OBS	0	20	20	10	30	–30	–
40	10	–10	20	30	30	30	30	30	30	30	30	–
60	70	80	70	60	40	30	30	30	40	40	30	44
60	60	60	40	30	10	20	20	20	20	–S	OBS	–
30	30	30	40	20	30	30	30	30	40	40	30	–
OBS	OBS	OBS	–10	+S	OBS	20	20	20	20	20	20	–
80	80	70	80	70	60	40	40	40	40	40	30	54
30	30	30	40	40	60	40	40	40	40	40	40	35
40	40	30	30	30	40	40	30	30	40	40	30	30
60	70	80	80	80	60	30	30	20	30	20	10	41
90	80	80	90	90	70	60	40	40	40	30	30	51
30	OBS	50	40	40	40	40	40	40	OBS	OBS	20	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
970701	50	60	80	OBS	OBS	20	20	[30]	40	10	50	60
970702	10	20	20	20	30	40	[40]	[50]	40	70	60	60
970703	40	40	30	30	20	40	30	[40]	40	40	40	40
970704	30	30	30	30	40	40	[40]	[40]	40	60	80	90
970705	40	40	50	40	40	30	OBS	[30]	OBS	OBS	OBS	OBS
970706	30	30	20	20	20	OBS	OBS	OBS	OBS	50	–120	–80
970707	30	30	20	20	30	20	0	–	0	10	10	30
970708	–80	–90	–50	–10	–50	–60	–50	20	50	80	80	60
970709	40	40	40	40	40	40	[40]	50	80	60	60	50
970710	40	40	50	40	40	60	[60]	50	70	80	80	80
970711	30	30	30	20	20	[30]	[40]	40	40	40	30	20
970712	40	40	30	30	[20]	20	30	30	40	50	60	80
970713	10	10	10	10	10	10	20	[30]	30	40	60	OBS
970714	0	10	20	30	40	[70]	–	80	70	90	80	90
970715	20	10	20	20	30	[40]	30	40	40	40	40	–S
970716	30	30	20	20	30	30	30	[40]	30	60	40	70
970717	20	30	30	40	30	40	40	[60]	40	60	70	60
970718	10	20	40	0	–20	10	[0]	[10]	30	20	30	60
970719	20	10	20	20	[30]	–	OBS	30	0	–10	30	30
970720	40	40	30	30	30	30	40	[30]	30	30	30	30
970721	20	30	30	40	30	[40]	–	50	30	40	20	20
970722	20	20	20	20	10	20	20	[20]	20	30	30	40
970723	30	20	30	20	30	40	–	–	–	–	80	80
970724	10	20	10	10	10	20	40	[40]	40	60	70	80
970725	30	30	40	40	30	30	30	[40]	50	50	60	60
970726	30	30	30	30	40	50	40	[30]	30	40	40	40
970727	50	50	50	50	40	50	[40]	40	40	50	50	50
970728	20	20	30	30	30	40	–	–	60	70	80	70
970729	20	10	10	10	10	30	30	40	OBS	OBS	–S	OBS
970730	20	20	10	20	30	30	60	[40]	40	60	80	80
970731	20	10	20	10	20	30	[40]	40	60	90	90	90

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	20	OBS	OBS	OBS	40	40	30	30	30	20	20	–
60	70	70	70	40	40	40	30	30	20	30	40	42
60	60	60	60	40	40	40	40	40	40	40	30	41
80	80	80	70	60	60	50	40	30	40	40	40	51
50	80	80	60	50	40	30	30	40	40	30	30	–
–30	0	30	70	80	40	30	20	40	40	30	30	–
20	–30	20	20	0	–10	10	20	20	20	0	–30	9
40	20	–30	30	50	80	30	30	40	40	40	40	13
40	60	60	60	60	80	60	60	60	70	60	50	54
80	90	100	80	40	30	10	30	0	+S	30	30	53
30	30	40	40	40	40	40	40	40	30	30	30	33
–S	OBS	40	70	40	30	20	10	20	10	20	10	–
30	OBS	OBS	70	30	30	20	10	10	0	0	10	–
80	90	90	90	70	40	30	30	30	30	40	30	53
OBS	+S	OBS	20	90	60	30	10	10	10	20	30	–
70	40	80	80	40	40	30	40	30	30	30	30	40
70	70	70	70	60	80	OBS	OBS	20	40	30	80	–
70	30	–20	10	70	40	30	30	20	10	20	20	23
30	0	10	40	70	40	30	40	30	40	40	40	–
30	20	40	40	30	40	30	30	20	20	20	20	20
10	20	30	30	30	30	10	10	20	10	10	20	25
40	40	40	40	40	50	50	40	40	40	40	30	32
80	90	80	50	40	40	OBS	+S	OBS	40	20	20	–
80	90	80	80	50	50	40	70	30	20	20	20	44
50	40	50	50	40	40	40	40	40	40	40	30	41
40	30	30	30	30	40	40	40	40	40	40	50	37
60	60	60	50	50	50	40	40	40	30	30	30	46
60	80	70	80	60	60	40	40	40	40	30	20	–
90	60	30	10	30	20	30	30	10	10	20	20	–
80	90	90	90	60	40	30	30	20	20	20	10	45
80	90	90	90	120	OBS	OBS	OBS	OBS	OBS	OBS	OBS	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
970801	OBS	OBS	−170	−200	−40	−10	40	[100]	80	30	20	30
970802	30	30	30	30	30	[30]	40	40	60	60	70	60
970803	20	10	20	20	20	20	[20]	20	10	10	30	40
970804	30	30	20	20	20	30	–	–	50	60	60	70
970805	40	30	10	−10	−10	10	20	[40]	60	60	60	80
970806	40	40	10	40	50	50	−S	+S	70	40	40	60
970807	40	40	30	30	40	60	[50]	[50]	60	70	70	70
970808	30	30	30	40	40	50	[40]	[40]	50	60	70	80
970809	30	20	30	20	–	[40]	40	40	30	30	40	50
970810	10	20	20	30	50	40	[40]	[40]	40	50	+S	OBS
970811	20	20	10	10	20	20	–	–	40	60	80	90
970812	10	0	0	0	0	20	40	[40]	60	60	80	90
970813	30	20	20	20	20	30	[40]	40	70	80	90	90
970814	10	10	10	0	10	30	40	[30]	40	40	80	90
970815	40	30	10	20	20	[30]	60	70	40	40	40	90
970816	30	20	20	20	30	[30]	20	30	30	40	60	80
970817	30	30	40	30	30	[40]	40	40	40	60	70	80
970818	30	30	60	OBS	+S	(OBS)	[40]	–	70	40	50	50
970819	−20	10	40	40	40	70	70	[40]	40	40	40	40
970820	20	30	20	20	40	70	70	[40]	40	40	40	40
970821	10	10	10	10	10	30	60	[40]	40	40	60	80
970822	10	10	10	10	10	20	[40]	40	40	50	60	60
970823	10	10	10	0	10	20	[20]	30	30	40	50	60
970824	30	20	10	10	10	20	[40]	40	40	40	60	80
970825	10	10	20	20	10	(20)	–	–	40	40	80	80
970826	30	20	10	20	30	40	40	[40]	40	60	80	90
970827	30	20	20	20	20	30	[40]	[40]	40	40	80	90
970828	20	20	10	10	10	20	40	[30]	30	40	60	60
970829	30	10	10	10	10	−S	90	[40]	100	40	30	60
970830	30	30	40	30	[20]	40	40	40	30	40	40	30
970831	60	40	40	30	20	20	[30]	30	30	40	40	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
20	30	−10	30	20	30	40	40	30	40	40	30	–
OBS	60	60	30	30	40	40	30	40	40	40	40	42
30	30	40	40	30	40	40	40	30	30	30	20	27
80	80	80	80	60	50	40	30	30	30	30	30	–
80	40	60	80	50	40	30	10	20	30	30	40	37
60	60	60	70	60	50	50	40	50	40	40	40	–
80	90	80	80	70	60	50	50	40	30	30	30	54
80	80	90	80	50	40	20	20	20	20	30	20	46
50	50	40	40	30	20	40	20	20	20	−10	OBS	31
70	50	50	50	50	40	30	30	30	30	30	20	–
90	100	90	70	30	20	30	30	20	10	10	10	–
90	90	90	80	60	40	30	20	20	20	20	20	41
90	90	90	80	60	30	10	20	30	40	40	30	48
100	100	40	20	60	60	40	40	40	40	40	40	42
OBS	OBS	+S	30	0	−20	−40	−20	−30	−30	0	20	–
90	90	100	80	70	40	30	30	30	40	30	20	44
90	90	90	70	60	40	40	40	30	20	20	20	48
80	OBS	OBS	OBS	30	20	−10	−10	10	−10	0	−20	–
50	40	50	40	30	10	10	10	10	20	10	10	32
50	40	50	40	30	10	10	10	10	20	10	10	32
70	80	60	40	40	30	20	10	10	10	20	20	34
70	70	80	70	40	30	20	20	10	10	10	10	33
70	80	70	50	40	20	+S	OBS	OBS	+S	10	20	–
80	90	90	70	40	30	30	20	10	10	10	10	37
90	100	90	80	60	40	40	40	30	20	20	20	–
100	100	100	70	40	30	30	20	20	20	40	40	46
90	100	100	60	40	20	20	20	10	10	10	30	41
60	70	60	40	40	30	40	40	40	40	60	40	38
30	20	30	40	30	30	40	40	40	30	30	40	36
20	10	30	10	20	30	10	30	20	0	20	30	27
40	60	60	40	40	40	40	40	40	40	30	20	39

Date	00	01	02	03	04	05	06	07	08	09	10	11
970901	30	20	30	20	30	40	–	40	40	60	80	80
970902	40	30	20	20	30	40	50	[40]	40	40	50	60
970903	30	30	20	20	20	30	50	[40]	50	60	70	70
970904	10	20	10	30	30	30	40	[40]	30	30	40	40
970905	20	10	20	20	20	20	20	[30]	40	40	50	50
970906	40	40	40	40	40	[40]	40	40	50	40	60	70
970907	40	20	OBS	+S	[20]	40	60	80	80	90	60	–S
970908	30	30	30	30	40	–	–	70	40	40	60	60
970909	30	40	30	40	30	[0]	30	40	60	60	30	30
970910	30	30	40	40	40	40	40	[30]	40	40	30	40
970911	30	30	30	20	30	30	[30]	30	40	40	60	70
970912	30	30	20	0	10	30	40	40	40	40	40	70
970913	30	40	30	30	[30]	[40]	60	60	60	40	70	70
970914	OBS	OBS	+s	40	40	70	90	[70]	80	80	70	80
970915	40	40	30	30	30	30	–	60	70	80	90	90
970916	40	40	40	40	30	40	[40]	[40]	30	40	60	60
970917	30	40	40	30	30	40	60	[60]	60	70	70	70
970918	30	40	40	40	60	40	[100]	90	60	40	40	60
970919	40	40	40	40	40	40	[60]	[40]	40	40	40	70
970920	10	20	30	40	[30]	40	60	60	60	70	70	70
970921	30	20	20	20	[10	20	30	40	40	60	70	70
970922	20	20	20	20	10	–	–	40	40	40	40	60
970923	20	20	30	40	30	30	40	[70]	60	60	40	40
970924	40	40	30	30	20	30	[30]	30	30	40	40	40
970925	40	40	30	30	30	40	[60]	70	70	70	70	70
970926	20	20	20	20	20	20	30	[40]	60	60	60	60
970927	20	20	20	10	10	[10]	[30]	30	30	40	40	40
970928	30	20	20	30	10	10	[20]	20	20	20	30	30
970929	10	20	20	10	20	30	[30]	–	40	40	50	50
970930	(20)	10	10	10	0	0	10	[20]	30	20	10	10

12	13	14	15	16	17	18	19	20	21	22	23	Means
80	80	80	80	70	60	40	40	50	40	40	40	51
60	70	80	50	40	40	30	30	20	20	30	30	40
70	70	80	60	40	40	40	30	20	20	20	20	42
40	50	50	40	40	40	30	30	20	20	20	20	31
60	70	50	50	40	40	40	40	40	40	40	40	30
80	60	OBS	OBS	OBS	OBS	20	30	40	80	OBS	30	–
10	+S	OBS	OBS	OBS	50	40	40	50	40	20	20	–
80	80	90	60	30	30	40	40	40	20	30	30	–
40	60	60	60	60	60	40	40	40	40	30	30	41
30	30	30	30	30	40	40	40	40	40	40	40	37
70	80	60	40	40	40	30	20	30	10	20	20	38
70	60	60	60	60	40	40	40	30	30	30	20	39
60	70	70	+S	OBS	OBS	20	30	40	30	–20	OBS	–
80	60	60	70	70	70	60	40	40	40	40	40	–
90	80	80	80	90	80	70	60	70	60	40	40	62
60	60	40	40	40	40	30	30	30	40	40	30	41
70	70	70	60	60	40	40	40	60	40	40	40	51
60	70	60	40	40	30	30	30	30	30	30	30	47
70	80	40	30	20	–20	20	30	30	60	30	10	39
70	60	60	60	60	60	40	40	40	40	20	20	47
70	70	60	30	30	30	40	40	30	20	20	20	37
60	70	60	40	40	40	40	40	40	30	30	20	–
40	70	60	60	40	40	40	40	40	60	60	60	45
40	40	60	60	60	70	70	80	70	40	40	40	45
70	60	60	40	30	30	40	40	40	30	20	20	46
60	70	70	70	60	40	40	40	30	30	30	20	41
40	40	40	40	40	40	40	40	30	40	40	30	32
40	40	40	40	40	30	30	20	10	10	10	10	24
50	60	50	40	40	40	40	40	30	30	30	30	35
20	10	10	10	20	10	20	10	10	20	20	40	14

Date	00	01	02	03	04	05	06	07	08	09	10	11
971001	30	30	20	0	0	[20]	40	OBS	–s	30	30	30
971002	20	30	50	60	80	70	80	80	80	80	110	70
971003	30	0	10	10	10	20	[30]	40	40	50	40	30
971004	30	40	30	20	10	20	[30]	40	40	40	40	40
971005	30	30	20	20	[30]	40	40	40	40	50	60	60
971006	30	30	30	20	20	20	30	–	40	60	70	70
971007	10	10	20	20	120	100	110	110	80	40	40	30
971008	30	20	20	20	30	[30]	40	60	40	70	70	80
971009	20	10	20	60	80	90	[90]	[70]	70	70	60	60
971010	20	20	10	20	30	20	[20]	[30]	60	70	60	60
971011	40	40	30	30	40	40	[40]	40	40	40	30	30
971012	20	30	20	20	30	10	30	30	70	80	70	70
971013	40	40	40	40	30	40	–	–	40	50	40	40
971014	20	20	20	20	10	10	[40]	50	50	40	40	40
971015	50	50	40	20	20	50	50	[50]	50	50	40	40
971016	50	10	10	10	50	40	[10]	[40]	70	40	0	50
971017	50	50	50	50	40	[40]	50	40	40	50	50	50
971018	50	50	40	40	20	20	40	[20]	40	50	50	50
971019	20	40	20	20	10	10	[0]	10	10	10	40	50
971020	50	50	50	60	70	80	[50]	–	–	60	70	60
971021	30	10	30	30	30	20	0	[–10]	10	20	30	40
971022	40	40	30	30	20	20	[30]	[30]	30	20	10	10
971023	40	40	40	40	30	20	[10]	50	50	40	40	40
971024	40	40	40	30	30	40	30	[20]	30	10	10	20
971025	30	30	30	20	20	30	[10]	20	30	40	30	40
971026	10	0	–40	0	20	20	40	70	[50]	50	40	30
971027	0	10	10	10	20	30	30	–	–	[50]	40	60
971028	60	50	60	40	40	50	50	[60]	[70]	70	70	60
971029	60	50	40	30	30	40	50	[60]	[60]	40	70	70
971030	40	30	40	40	40	40	40	[40]	[60]	40	40	50
971031	40	40	40	50	40	40	50	70	[70]	60	50	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
10	20	20	20	10	10	10	10	10	20	20	OBS	–
70	0	50	30	50	+S	40	40	50	50	0	20	53
30	30	20	40	30	0	30	50	60	40	40	40	30
50	60	40	40	30	20	30	40	40	40	40	40	35
70	60	50	40	40	40	40	50	40	40	50	40	43
80	80	60	40	40	30	30	30	20	10	10	10	37
40	40	40	40	70	70	60	40	60	40	60	30	53
90	90	80	60	60	40	40	40	30	20	20	20	46
40	40	40	40	20	20	30	10	20	20	10	10	42
70	60	40	40	20	30	20	10	30	40	30	60	36
40	40	30	40	20	30	40	30	20	30	10	0	32
70	60	80	80	60	40	60	60	40	60	60	60	50
40	50	50	50	50	50	50	60	50	50	50	40	–
40	40	50	50	60	60	50	70	60	50	60	40	41
40	50	20	0	–40	–30	20	60	50	20	20	40	32
50	60	70	60	50	60	80	90	60	80	70	60	49
50	50	50	50	50	50	60	60	50	50	40	50	49
50	50	50	60	50	50	50	50	50	40	40	20	43
60	60	60	60	60	50	50	20	0	10	10	40	30
60	60	50	50	50	60	40	40	40	50	30	40	–
40	40	50	70	80	80	70	50	40	40	40	40	37
0	10	30	30	20	10	10	20	30	40	40	50	25
40	40	40	40	30	30	30	40	40	40	40	30	37
20	30	30	30	30	30	30	30	40	30	30	40	30
40	40	40	40	40	40	40	50	30	20	10	10	30
30	50	60	50	50	40	40	40	40	20	20	30	32
70	70	60	60	50	70	70	70	70	80	80	70	–
70	70	80	60	50	60	80	80	80	80	80	70	64
60	70	60	60	80	100	90	80	90	70	80	40	62
50	50	40	50	50	80	70	60	60	50	40	50	48
60	60	50	50	60	50	40	50	50	40	30	30	49

Date	00	01	02	03	04	05	06	07	08	09	10	11
971101	30	40	40	30	40	30	30	[20]	30	30	40	40
971102	40	30	40	50	50	50	40	40	[40]	40	40	40
971103	40	40	30	30	40	50	50	[40]	–	40	50	50
971104	50	40	40	40	40	40	50	40	[40]	30	30	30
971105	–70	–40	–30	–60	–60	–10	[–30]	–20	–10	–30	–20	–10
971106	–80	–40	–70	–60	–80	–60	–70	–80	[–80]	–60	–60	–40
971107	–10	–10	–10	–10	–20	–20	–10	[0]	10	0	20	30
971108	20	20	30	30	10	20	40	30	[30]	30	40	30
971109	40	40	30	30	30	20	20	[20]	0	0	10	10
971110	30	70	80	70	50	–	–	–	–	70	80	+S
971111	40	20	20	20	10	30	60	80	[40]	60	70	OBS
971112	20	40	40	40	30	40	[40]	30	30	30	40	30
971113	20	30	30	30	10	10	10	10	–	–	–40	0
971114	20	20	10	0	30	30	30	30	30	30	30	70
971115	40	60	40	60	40	60	60	[70]	80	90	110	110
971116	30	20	30	40	30	–80	–170	[–160]	–110	–160	–60	–90
971117	20	30	20	10	10	10	20	10	10	[10]	–	40
971118	50	40	30	30	40	50	30	10	[30]	60	70	70
971119	80	70	50	60	60	60	60	90	90	[80]	80	80
971120	30	40	10	20	10	10	30	30	–	[30]	30	50
971121	70	70	60	60	60	60	70	30	[30]	40	30	10
971122	70	80	100	110	110	70	90	[100]	100	100	90	80
971123	50	50	40	30	30	20	20	20	[30]	40	40	50
971124	70	120	80	110	OBS	OBS	+S	60	–	40	50	70
971125	0	20	0	20	10	40	30	0	[–30]	10	0	0
971126	–30	–30	–40	–30	–10	10	30	40	20	–10	+S	OBS
971127	40	40	30	20	40	50	40	40	[60]	50	50	60
971128	50	30	30	60	50	50	50	70	[50]	50	50	40
971129	30	40	40	50	30	40	50	60	[80]	60	30	40
971130	40	40	40	20	–50	–50	0	20	[10]	20	40	20

12	13	14	15	16	17	18	19	20	21	22	23	Means
40	50	50	50	30	20	0	0	10	10	20	30	30
40	50	40	40	50	50	50	40	50	40	30	30	42
60	60	50	70	70	70	50	60	50	60	50	40	50
30	30	30	20	20	0	−20	0	−10	−20	−10	−60	20
20	10	−10	−10	−30	−20	−60	−80	−70	−70	−90	−70	−36
−20	−10	−30	−20	−10	0	10	10	0	−10	−10	−20	−37
40	40	40	40	40	40	30	20	20	20	20	30	15
0	10	20	(20)	20	40	60	70	50	30	40	40	31
20	20	30	30	30	0	−10	50	30	40	20	20	22
60	70	70	70	90	80	70	60	60	60	40	40	–
20	70	70	40	60	60	40	40	70	40	60	40	46
30	40	40	40	30	40	40	60	30	−S	OBS	+S	–
−100	−70	−10	−20	−80	−150	−130	−20	−10	−30	−20	−20	–
60	60	70	60	60	40	40	40	40	30	40	40	38
100	90	100	90	90	91	100	100	90	90	90	60	80
−20	−70	−10	30	0	−80	−10	20	40	80	90	60	−23
30	30	20	30	30	30	50	70	50	50	40	30	28
70	50	50	70	60	90	−S	−30	50	90	60	70	50
60	50	50	40	50	50	50	50	40	40	40	30	59
50	50	50	30	20	20	20	20	20	20	60	60	31
−30	20	−100	−30	70	90	70	110	140	120	100	40	50
70	70	70	50	50	60	60	50	50	60	50	60	75
50	60	50	20	−10	0	−50	−50	−60	−30	40	90	22
90	80	80	100	120	90	100	120	110	80	70	70	–
10	0	−10	−20	−20	−10	−50	−50	−40	−40	−30	−10	−7
50	50	70	50	40	60	140	80	40	50	40	40	–
70	70	50	50	50	70	120	70	40	40	20	40	50
50	50	50	40	50	50	60	70	60	70	50	30	50
40	30	50	50	50	50	40	30	20	20	30	20	41
20	−20	10	−10	−10	−50	20	20	10	20	10	10	10

Date	00	01	02	03	04	05	06	07	08	09	10	11
971201	10	0	10	0	10	10	10	[20]	–	20	10	–50
971202	80	80	70	40	40	70	60	60	[80]	40	40	30
971203	30	30	30	30	40	70	40	[30]	40	40	60	30
971204	30	30	20	20	30	30	20	30	[40]	80	70	70
971205	60	40	60	40	40	60	60	40	[60]	60	70	60
971206	40	40	70	70	70	70	70	70	[90]	100	100	100
971207	90	80	70	60	60	80	90	100	[110]	90	60	30
971208	140	170	200	230	130	90	90	–	–	90	80	80
971209	40	50	50	50	60	80	80	80	[80]	50	60	70
971210	20	50	30	30	80	100	120	80	[80]	60	80	40
971211	20	10	50	80	30	50	30	30	[40]	60	70	50
971212	70	50	80	70	–90	–90	20	10	[50]	–140	30	40
971213	40	30	40	40	30	40	50	[50]	50	50	40	30
971214	20	30	30	40	40	50	50	60	[50]	30	40	40
971215	70	70	90	80	90	80	70	–	–	30	40	40
971216	20	10	0	–70	–40	–10	20	0	10	50	0	10
971217	30	30	20	10	30	30	40	40	[50]	40	30	40
971218	–70	–80	–50	–40	–50	–50	–50	–50	[–50]	–50	–40	–40
971219	–100	–100	–90	–80	–130	–60	–60	–70	[–50]	–80	–70	–50
971220	20	30	40	40	–20	30	70	80	[80]	50	60	70
971221	90	70	90	80	130	130	140	100	[80]	120	150	120
971222	40	50	30	–100	–20	0	–20	–	–	0	50	70
971223	50	50	70	50	40	50	50	30	[30]	60	70	60
971224	50	30	30	30	20	30	30	40	[40]	30	30	40
971225	30	70	120	120	70	–10	0	–50	30	60	60	50
971226	50	70	50	30	40	30	40	[50]	–S	10	–S	–50
971227	40	30	30	30	30	30	40	[50]	50	60	60	70
971228	30	40	40	40	40	40	40	40	[40]	40	40	50
971229	30	30	30	30	30	40	40	40	–	–	30	40
971230	30	30	40	40	30	40	40	[40]	40	60	70	60
971231	80	80	80	90	80	80	120	140	[130]	120	110	110

12	13	14	15	16	17	18	19	20	21	22	23	Means
−40	−10	−30	20	30	40	40	70	80	90	80	70	21
40	70	60	40	60	60	60	40	30	30	0	30	50
30	20	10	10	20	20	30	40	40	10	0	10	30
70	70	70	60	70	80	80	90	80	80	70	70	57
70	80	70	40	80	70	70	80	80	80	60	40	61
90	100	90	80	80	80	70	80	70	80	90	90	79
80	200	140	160	160	100	10	10	10	10	60	110	75
90	100	90	90	80	80	750	660	60	60	50	40	–
60	60	40	−20	−10	10	−50	−60	−90	−100	−70	40	23
40	30	0	−40	−60	−80	−50	−20	−10	−10	30	30	26
80	70	30	−10	30	50	70	80	70	100	80	80	52
60	60	50	40	40	30	50	50	60	50	40	50	28
30	40	30	40	30	50	70	50	30	40	40	50	41
50	30	60	80	20	40	60	60	70	70	60	80	48
30	30	0	−50	−50	−40	0	20	40	40	30	30	–
0	20	10	10	50	80	80	80	70	40	40	10	20
40	30	20	0	−20	−50	−40	−40	−30	−30	−30	−50	8
−70	−50	−40	−50	−80	−60	−80	−60	−80	−50	−60	−80	−58
−110	−100	−70	−80	−50	−50	−50	−100	−100	−50	0	30	−70
10	20	20	−10	−10	–	–	80	30	30	30	30	36
80	50	50	50	80	80	90	130	90	40	20	30	87
80	80	90	80	80	100	110	90	80	70	70	50	–
50	50	50	50	60	80	80	90	80	80	80	40	58
50	50	40	30	10	20	50	70	80	110	60	30	42
50	50	50	60	70	60	60	50	50	60	50	60	51
+S	–	–	30	30	30	40	20	30	20	30	50	–
70	60	50	50	50	50	50	50	40	40	40	20	45
50	60	70	80	70	50	50	40	40	40	30	30	45
40	50	50	40	60	80	70	60	70	50	30	30	–
60	70	80	80	80	60	70	120	120	130	110	110	67
110	90	50	30	40	50	60	50	70	70	30	60	80

Hourly means of the
1998

Date	00	01	02	03	04	05	06	07	08	09	10	11
980101	110	110	100	80	70	90	90	100	[70]	[80]	80	70
980102	–	–	–	–	–	–	–	–	–	–	–	–
980103	–	–	–	–	–	–	–	–	–	–	–	–
980104	–	–	–	–	–	–	–	–	–	–	–	–
980105	–	–	–	–	–	–	–	–	–	30	30	40
980106	40	30	30	20	30	20	30	[40]	[60]	70	70	40
980107	50	50	40	30	30	30	40	30	30	80	70	70
980108	70	90	60	70	50	60	60	[50]	70	70	60	90
980109	30	30	30	30	30	30	30	30	(30)	40	30	40
980110	30	30	30	30	30	30	30	[30]	40	40	40	40
980111	30	30	30	20	30	40	40	50	[50]	50	40	50
980112	90	50	60	100	80	60	50	–	–	70	70	40
980113	30	70	50	0	20	30	–10	0	30	10	–10	0
980114	20	30	40	50	60	40	30	[50]	30	30	30	40
980115	30	30	30	20	30	40	40	[50]	40	40	70	60
980116	–10	10	50	50	70	100	110	[130]	80	40	–30	–30
980117	20	30	–20	10	10	10	40	[0]	[40]	30	30	30
980118	60	50	40	40	40	40	40	40	[50]	40	50	60
980119	40	20	40	40	30	0	20	–	–	20	–S	–S
980120	70	70	70	60	30	30	30	[40	[50]	40	40	30
980121	20	10	10	10	10	0	–30	–10	–10	–10	0	0
980122	50	20	20	20	20	20	10	10	–	–	–	–
980123	40	40	30	40	30	20	20	40	50	[60]	50	70
980124	50	50	40	30	40	70	60	40	[30]	30	20	20
980125	60	70	70	40	50	60	70	[60]	60	40	40	40
980126	30	20	30	20	30	50	50	–	–	70	70	90
980127	70	60	50	50	50	50	40	[40]	0	–10	–10	0
980128	70	70	80	80	100	90	120	[90]	[100]	150	80	50
980129	80	50	40	50	50	50	70	[40]	50	50	50	60
980130	40	50	30	40	30	20	40	[60]	60	60	80	70
980131	60	60	50	50	50	50	40	30	[20]	30	30	30

potential gradient

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	40	30	40	40	50	80	70	60	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
50	60	60	70	80	70	80	60	50	50	30	30	–
50	40	50	50	50	40	50	50	60	50	50	40	44
70	70	80	70	70	50	60	70	70	70	70	90	58
80	80	60	50	80	100	110	90	70	60	40	40	69
40	50	50	30	30	30	30	30	20	10	10	30	31
30	30	30	30	50	60	60	60	70	30	30	30	38
40	30	30	30	30	50	30	30	30	40	40	40	37
60	60	70	70	80	120	120	80	80	30	40	40	–
30	30	60	20	30	50	40	30	50	40	10	0	25
50	20	60	60	40	30	50	80	50	20	20	40	40
60	60	40	40	60	50	50	40	30	10	10	10	39
0	–10	–20	–10	–20	–70	–40	–70	–20	–40	–60	–20	12
30	50	50	40	50	60	60	70	80	70	60	60	38
60	60	60	60	60	60	70	60	60	40	40	40	51
20	20	70	50	0	20	20	20	60	70	60	30	–
40	40	30	30	30	30	30	20	20	20	10	20	37
0	0	0	0	0	0	0	0	10	10	20	20	3
–	70	70	70	70	70	60	60	70	70	60	50	–
70	80	70	60	50	60	70	70	70	50	40	40	51
30	30	30	40	50	60	70	70	70	50	30	20	43
60	60	70	50	30	30	20	20	20	30	30	30	46
110	110	120	120	110	120	90	70	60	60	70	70	–
10	20	40	50	30	30	30	40	20	30	30	40	32
50	40	50	70	70	60	70	70	110	120	70	70	80
60	70	50	70	70	60	50	70	80	80	110	70	62
70	70	60	70	70	70	70	90	70	60	50	40	57
40	40	50	30	50	60	70	60	60	70	70	60	48

Date	00	01	02	03	04	05	06	07	08	09	10	11
980201	60	50	50	50	50	50	60	70	[70]	50	50	50
980202	30	40	50	40	40	50	50	–	–	50	50	60
980203	–30	–20	30	40	60	70	70	[60]	50	70	70	70
980204	70	60	60	50	50	60	60	[110]	120	70	60	70
980205	40	40	50	40	40	50	50	[70]	90	80	90	90
980206	60	50	60	60	50	50	50	[80]	90	90	120	80
980207	70	70	50	40	30	50	50	[70]	70	60	50	50
980208	60	50	30	40	40	40	40	[50]	40	40	40	40
980209	40	40	30	30	30	30	40	–	–	40	50	60
980210	50	30	40	60	50	40	[60]	60	50	60	70	70
980211	50	50	60	40	30	30	30	[40]	60	60	30	40
980212	40	40	30	30	30	40	50	[60]	50	40	60	70
980213	40	30	30	40	30	30	30	[30]	30	20	20	20
980214	20	20	20	20	20	30	40	[50]	50	30	20	20
980215	20	10	10	20	20	30	50	[50]	50	40	20	30
980216	20	20	20	20	20	20	20	–	–	40	40	50
980217	10	0	0	30	20	30	10	[30]	10	20	10	-S
980218	40	30	40	30	30	40	40	[40]	50	40	40	40
980219	50	50	50	50	60	50	60	[70]	[80]	70	70	80
980220	40	40	40	40	50	60	60	[70]	70	60	60	50
980221	–10	–30	–40	–20	–10	–40	–40	–60	(–60)	–30	–20	30
980222	40	50	60	50	40	40	50	[50]	70	90	80	80
980223	40	40	40	30	50	40	40	–	–	40	40	40
980224	20	30	30	30	30	30	60	[50]	50	30	30	30
980225	10	0	0	10	0	10	10	[10]	20	30	30	30
980226	40	30	40	30	40	30	30	[30]	30	30	30	30
980227	30	30	30	30	30	30	30	[40]	50	50	50	60
980228	30	40	30	30	30	30	30	[30]	30	30	30	30

12	13	14	15	16	17	18	19	20	21	22	23	Means
60	50	60	50	40	40	50	50	50	50	40	40	52
60	60	50	40	10	−10	−10	−10	0	−30	−20	−20	–
100	90	60	70	70	70	70	90	110	80	70	70	62
70	60	50	40	40	70	100	110	110	60	30	40	68
80	80	70	80	90	80	120	120	110	100	90	70	76
100	80	70	70	50	80	120	90	90	90	90	80	77
50	40	40	50	40	40	40	50	50	60	70	60	52
40	40	40	40	40	40	50	50	50	40	40	40	43
60	60	60	60	60	60	60	60	70	70	60	50	–
70	70	70	70	100	80	70	70	70	70	80	70	64
30	30	20	20	20	50	40	70	60	70	50	40	43
60	60	60	50	60	50	60	60	60	70	60	40	51
10	20	30	30	30	40	40	10	20	20	20	20	27
20	30	30	20	30	30	30	30	20	20	20	20	27
40	50	40	40	50	50	50	40	30	30	30	20	34
50	70	70	50	40	40	40	50	20	0	20	−30	–
40	50	50	50	50	50	50	50	50	60	50	50	34
40	50	40	40	40	40	50	50	50	50	60	50	43
80	80	70	80	60	50	60	50	40	50	50	50	61
50	50	50	40	30	20	20	30	0	−40	−40	−20	35
50	50	50	40	50	50	30	20	−10	−10	20	40	5
90	90	80	80	60	50	50	60	40	40	40	40	59
60	50	40	30	20	−10	−10	−10	10	10	10	10	–
40	40	40	30	30	20	30	20	−10	20	10	10	29
30	20	30	30	10	20	40	50	40	40	40	50	23
40	40	30	30	60	60	50	30	30	30	30	30	35
40	40	30	30	30	40	30	30	40	40	40	50	38
40	30	40	60	40	40	30	–S	30	30	30	OBS	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
980301	30	30	30	10	−50	−80	−140	[90]	30	40	30	30
980302	20	20	20	20	20	20	10	–	–	20	30	30
980303	40	30	30	30	30	30	30	30	[30]	30	30	30
980304	30	30	30	30	10	20	30	30	[20]	30	30	10
980305	20	30	30	30	20	30	30	30	[50]	0	−120	−80
980306	30	30	30	30	30	30	50	40	30	30	30	30
980307	10	30	30	20	−10	20	30	30	[40]	20	30	30
980308	−10	OBS	−S	−30	10	30	[30]	40	40	30	30	30
980309	30	30	30	30	30	30	20	–	[30]	30	30	30
980310	40	40	40	40	50	60	70	[50]	30	30	40	OBS
980311	30	30	30	30	30	30	60	[70]	70	40	50	60
980312	30	30	30	30	30	30	30	[40]	30	30	40	50
980313	30	40	30	30	30	30	30	50	[30]	90	40	40
980314	30	30	30	20	20	30	30	[30]	30	20	0	10
980315	30	30	30	30	40	40	60	[70]	70	60	50	50
980316	40	50	50	50	60	70	70	–	–	70	70	70
980317	+S	30	30	80	−20	−60	0	100	[20]	−S	−S	OBS
980318	60	40	60	60	90	40	70	80	[90]	90	30	40
980319	30	30	30	30	20	−10	−10	[30]	30	40	40	40
980320	30	30	30	30	30	30	30	[30]	30	30	30	30
980321	50	40	40	40	40	40	50	60	60	50	30	OBS
980322	20	30	40	20	30	30	30	[30]	40	50	50	50
980323	30	40	30	30	30	40	50	–	[30]	50	40	30
980324	30	40	40	30	30	30	50	[50]	50	50	60	60
980325	50	40	30	30	30	40	50	[50]	70	70	60	50
980326	30	30	30	30	30	30	40	[50]	70	60	50	40
980327	20	30	20	30	30	30	30	[30]	40	40	40	40
980328	20	0	10	10	0	10	10	[20]	30	30	30	30
980329	50	70	90	70	70	110	[70]	70	60	60	50	50
980330	0	−10	−20	−10	10	0	–	[20]	30	30	30	30
980331	20	20	20	10	10	20	20	30	30	30	30	[30]

12	13	14	15	16	17	18	19	20	21	22	23	Means
30	60	50	40	40	30	40	50	60	30	30	30	23
40	40	50	50	40	40	40	50	50	40	30	40	–
30	30	30	40	40	50	50	40	20	10	30	30	32
–80	30	40	40	30	20	10	30	30	30	30	30	23
–50	0	–80	–80	10	20	30	30	30	30	30	30	3
30	30	40	[30]	30	30	–20	–40	0	–10	–10	10	20
40	40	40	40	40	30	30	30	30	40	30	20	29
30	30	30	–30	30	30	30	30	30	30	30	30	–
30	30	30	30	40	50	50	50	50	50	40	30	35
OBS	+S	OBS	50	OBS	30	30	30	30	40	30	30	–
70	70	70	70	60	50	30	30	30	40	30	30	46
50	–	–	–	30	30	30	50	40	30	30	30	–
50	40	40	30	30	30	40	50	40	30	30	30	38
10	10	10	20	30	30	–S	30	30	30	–S	30	–
40	40	50	50	50	50	40	40	60	30	60	30	46
70	60	60	70	60	170	80	50	70	70	70	110	–
–S	–S	OBS	–S	–S	–50	–10	–60	–30	30	20	10	–
40	40	40	40	30	50	40	30	30	30	40	30	50
40	OBS	20	OBS	30	50	50	50	50	40	40	50	–
+S	OBS	OBS	OBS	OBS	40	80	70	70	60	50	50	–
OBS	OBS	OBD	70	OBS	60	60	30	30	30	30	+S	–
OBS	OBS	OBS	30	40	30	30	30	30	30	30	30	–
30	40	30	30	30	30	40	60	70	50	60	30	39
70	50	50	40	30	50	60	70	70	60	50	40	48
40	30	30	30	40	50	40	40	40	40	30	30	42
40	40	40	40	30	30	30	30	30	30	20	20	36
50	40	40	30	30	30	30	30	30	30	30	30	33
30	30	60	40	40	40	60	30	0	30	50	30	27
50	40	30	30	30	20	30	30	30	20	10	0	48
30	30	30	30	30	30	30	30	20	20	20	20	19
40	40	40	30	30	30	20	20	20	20	20	20	25

Date	00	01	02	03	04	05	06	07	08	09	10	11
980401	20	30	30	30	30	40	[50]	60	50	60	60	70
980402	30	30	20	20	20	20	OBS	OBS	+S	OBS	20	30
980403	20	20	30	20	20	30	[40]	30	30	20	30	30
980404	10	10	20	20	20	20	[30]	30	30	30	20	20
980405	20	20	20	20	10	10	20	[20]	20	20	20	30
980406	20	–30	OBS	–S	20	30	–	–	10	–20	–10	30
980407	20	20	20	30	30	40	[60]	50	40	30	40	50
980408	60	OBS	OBS	+S	–10	20	[30]	40	50	40	40	40
980409	–40	–80	–20	0	20	30	[40]	40	(30)	40	40	30
980410	30	10	0	0	–20	–60	[–30]	10	30	40	50	40
980411	60	40	OBS	30	40	30	40	[40]	50	40	40	50
980412	50	50	40	40	20	OBS	10	20	40	60	40	30
980413	30	30	30	40	30	30	[40]	40	40	30	20	+S
980414	30	30	30	20	40	30	OBS	–	–30	+S	OBS	OBS
980415	30	20	20	20	30	30	–	–	40	40	30	30
980416	40	40	40	30	30	20	[10]	–60	–130	–130	–50	–110
980417	70	40	20	20	10	20	[40]	50	50	50	40	40
980418	20	10	20	30	40	[30]	40	40	40	40	40	40
980419	20	30	20	20	20	30	20	[30]	30	40	40	40
980420	30	20	30	20	20	30	–	–	20	30	30	30
980421	20	20	20	10	10	[20]	20	30	30	30	30	20
980422	20	20	30	30	30	30	[30]	50	60	40	–S	OBS
980423	20	20	20	20	20	[20]	40	40	40	50	50	40
980424	20	20	20	10	20	20	20	[20]	20	20	20	20
980425	20	20	10	10	[20]	30	70	60	40	20	30	30
980426	20	20	20	20	20	20	30	[20]	20	20	20	20
980427	0	0	0	0	0	10	–	–	30	30	40	40
980428	10	20	10	10	20	30	[20]	30	30	40	40	30
980429	OBS	30	40	40	30	[30]	20	50	10	30	–10	20
980430	10	0	0	30	30	30	40	50	40	30	30	30

12	13	14	15	16	17	18	19	20	21	22	23	Means
70	70	70	60	50	60	50	40	30	30	30	30	47
20	30	OBS	OBS	60	40	60	20	+S	OBS	40	30	–
20	30	20	20	20	20	20	20	20	20	20	20	24
20	20	20	30	30	20	10	20	20	20	30	20	22
30	30	30	30	30	30	30	30	30	20	30	30	24
–S	OBS	20	10	20	30	40	50	40	20	30	20	–
50	–	–	–	–	–	(40)	60	50	30	20	20	–
40	20	+S	OBS	30	+S	OBS	OBS	–S	40	30	–10	–
30	40	40	30	40	40	50	50	40	30	30	30	24
50	40	40	40	30	30	30	–20	30	30	30	40	20
40	40	40	40	40	40	50	50	50	40	30	40	42
30	OBS	50	30	0	80	OBS	0	–30	40	10	20	–
OBS	60	10	10	20	20	30	30	40	40	40	30	31
OBS	70	40	40	40	40	40	30	30	30	30	20	–
30	30	40	30	40	40	40	40	40	40	40	40	–
–180	0	–70	–10	30	40	60	50	60	60	50	50	–5
40	40	50	40	50	50	50	50	40	30	30	20	40
40	40	50	50	40	40	40	30	40	30	10	10	34
40	40	40	40	40	40	40	40	30	30	40	40	33
30	30	30	30	30	30	30	30	30	30	20	20	–
20	20	30	30	30	30	30	30	30	30	40	30	25
OBS	OBS	–S	30	30	30	20	20	20	20	20	20	–
40	40	40	30	30	30	30	20	20	20	20	20	30
30	30	30	+S	20	20	10	10	–10	–10	20	20	17
30	40	50	50	50	50	40	50	30	30	20	20	34
30	30	40	30	20	30	20	20	20	10	10	10	22
40	40	40	40	30	30	30	20	20	20	20	20	–
40	40	40	40	40	40	40	30	20	10	10	10	27
40	40	40	10	20	10	20	–10	30	30	20	30	25
30	[40]	40	30	20	30	30	30	30	30	40	40	30

Date	00	01	02	03	04	05	06	07	08	09	10	11
980501	40	30	40	20	30	40	50	[40]	40	40	30	30
980502	30	30	40	40	40	40	[30]	20	−10	40	40	40
980503	30	20	20	20	20	30	40	40	[40]	40	40	40
980504	30	30	30	−10	−20	20	–	[30]	30	30	0	10
980505	20	30	30	30	30	30	–	–	40	40	30	30
980506	40	40	20	20	20	[30]	40	40	40	40	40	50
980507	30	20	30	30	30	40	[40]	40	40	30	40	30
980508	30	20	20	10	20	40	[40]	40	40	50	50	50
980509	20	20	20	20	20	30	40	[40]	40	40	40	40
980510	10	10	10	20	30	30	[40]	40	40	50	60	60
980511	10	20	20	20	20	40	–	–	–	–	70	60
980512	10	10	10	20	30	40	[30]	30	40	70	70	70
980513	0	0	0	0	0	20	[30]	20	30	40	60	70
980514	30	30	40	40	40	40	[40]	40	40	50	60	60
980515	10	20	10	10	20	20	30	[40]	40	50	40	40
980516	20	20	20	10	[20]	30	40	40	40	30	–S	OBS
980517	40	20	10	20	−40	0	–	–	–	–	–	–
980518	–	–	–	–	–	–	–	–	–	20	10	10
980519	−10	−10	−10	−160	−110	−80	30	10	30	30	20	40
980520	0	0	0	10	10	30	[40]	–	10	10	10	20
980521	20	10	20	10	30	30	[30]	40	50	60	60	OBS
980522	−10	+S	10	10	10	30	[OBS]	-S	90	110	30	0
980523	20	20	10	10	20	30	[30]	30	30	30	20	30
980524	20	20	10	10	20	30	[30]	20	30	30	20	20
980525	10	10	0	10	10	10	[10]	–	20	30	40	40
980526	40	30	10	30	20	40	[40]	30	40	60	70	80
980527	20	20	10	10	10	30	30	[30]	40	60	50	40
980528	20	20	20	10	20	30	40	[40]	40	40	40	30
980529	10	20	10	10	10	20	[20]	30	30	40	50	50
980530	0	10	0	10	10	30	80	130	[70]	80	50	40
980531	10	20	10	30	40	50	40	[30]	40	40	50	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
30	40	50	40	40	40	30	40	30	30	30	30	36
40	40	60	OBS	OBS	OBS	OBS	10	30	40	40	40	–
50	40	40	40	40	40	30	30	40	40	30	30	35
20	0	–10	0	0	10	20	30	30	40	30	30	17
30	20	40	40	40	40	40	30	30	30	40	40	–
40	40	40	40	40	40	30	30	30	20	30	30	35
40	40	40	40	40	40	30	30	30	20	30	30	34
60	60	60	60	40	40	40	40	30	30	30	30	29
50	60	60	40	40	40	30	20	20	10	10	10	32
60	70	70	70	50	40	30	30	20	20	20	20	38
70	70	80	80	40	40	40	30	30	20	20	10	–
80	80	90	80	70	50	30	30	20	10	10	10	41
40	60	60	70	40	30	30	30	30	20	30	30	31
60	60	70	60	60	60	60	50	30	30	20	20	35
30	30	30	40	40	60	70	40	40	50	40	30	35
–S	+S	70	40	30	30	40	30	30	40	40	30	–
–	–	–	–	–	–	–	–	–	–	–	–	–
OBS	10	0	–50	–10	–30	–60	–40	–10	–10	–10	–10	–
70	60	80	30	30	10	0	0	10	10	0	0	3
20	30	30	20	20	20	30	20	20	30	20	10	18
OBS	20	40	OBS	OBS	+S	30	10	0	20	0	OBS	–
10	20	30	30	30	40	40	20	20	20	20	30	–
30	30	30	30	30	30	40	40	40	30	30	30	28
20	20	20	20	20	10	10	10	10	10	10	10	18
40	40	40	40	40	40	20	20	20	10	10	20	23
OBS	OBS	40	40	40	40	40	30	30	20	20	20	–
40	50	50	40	50	40	30	30	30	20	20	20	32
30	30	30	30	20	30	30	20	10	10	10	10	25
50	40	50	40	50	OBS	OBS	OBS	10	20	20	10	–
–S	+S	30	80	70	–S	OBS	+S	40	10	10	10	–
70	OBS	+S	–S	+S	OBS	–S	10	10	30	40	30	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
980601	10	20	20	30	30	40	50	[50]	−10	−70	−S	OBS
980602	0	10	10	20	30	40	[50]	–	–	50	50	60
980603	40	30	20	30	50	50	[40]	40	40	60	50	80
980604	OBS	20	10	20	30	40	[40]	[40]	50	70	80	60
980605	40	40	40	30	30	50	[50]	60	60	70	80	70
980606	40	40	30	30	40	40	[40]	40	40	50	50	60
980607	30	30	30	20	30	40	[40]	40	40	50	60	70
980608	30	40	40	40	40	40	[40]	–	40	50	40	40
980609	40	40	30	40	50	70	80	[100]	70	70	60	60
980610	30	30	30	30	30	40	[40]	40	30	40	50	50
980611	20	30	30	20	20	20	[20]	30	40	40	40	30
980612	20	30	40	40	40	40	[40]	60	60	50	70	10
980613	30	20	20	10	0	30	[90]	70	30	−20	50	30
980614	10	10	10	10	−70	10	[40]	40	20	40	60	50
980615	30	30	30	30	30	50	[40]	–	60	50	30	40
980616	20	30	40	30	20	OBS	[20]	30	50	40	30	OBS
980617	30	20	20	10	20	30	[30]	30	30	20	10	30
980618	10	10	10	10	10	20	[30]	40	40	20	20	30
980619	30	20	20	20	20	30	[30]	30	40	50	40	30
980620	30	30	30	30	30	10	20	30	[40]	40	50	50
980621	20	20	20	10	10	30	[40]	40	40	50	60	70
980622	–	–	–	–	–	–	–	–	30	30	30	OBS
980623	20	10	10	10	20	30	[30]	30	30	30	10	10
980624	0	0	0	10	10	40	[50]	120	50	30	50	40
980625	20	20	10	0	0	10	30	[30]	30	20	30	40
980626	30	20	30	30	30	40	[40]	40	50	60	70	70
980627	OBS	50	−S	30	OBS	OBS	50	120	[110]	70	70	50
980628	30	10	20	30	30	40	[60]	40	50	80	70	70
980629	30	30	+S	20	+S	50	–	–	50	30	30	40
980630	10	OBS	OBS	OBS	−10	20	[30]	30	1030	30	40	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
–10	80	120	70	30	20	20	10	20	10	20	10	–
70	80	80	80	60	60	40	40	30	30	30	30	–
80	90	90	70	–S	OBS	+S	–10	20	20	70	+S	–
80	100	90	90	80	50	40	40	40	40	50	40	52
80	80	90	80	70	60	60	40	40	40	30	40	55
80	70	60	60	50	50	40	40	40	30	40	30	45
70	80	70	70	70	50	40	40	40	30	30	20	44
40	40	60	–20	–S	OBS	OBS	20	40	30	30	30	–
70	70	70	70	60	50	50	40	40	20	20	20	54
50	50	50	50	40	40	40	40	30	10	10	10	36
30	50	–S	OBS	30	–10	–50	–30	0	20	30	20	–
20	OBS	OBS	OBS	+S	–30	–S	+S	–150	–150	–70	–30	–
40	60	30	50	40	40	50	40	40	30	30	30	35
70	50	40	40	50	50	50	40	40	40	40	40	33
+S	OBS	30	40	30	30	40	30	10	20	30	30	–
OBS	+S	40	50	OBS	+S	40	30	30	30	30	30	–
70	10	30	40	40	30	30	20	30	20	20	20	27
40	0	OBS	–S	30	70	OBS	30	30	40	40	30	–
30	10	30	30	30	40	40	50	40	40	30	30	32
50	50	60	60	70	60	40	30	20	10	20	30	37
80	80	80	70	50	–	–	–	–	–	–	–	–
10	50	50	–S	OBS	30	40	40	30	10	20	20	–
30	40	50	50	40	40	30	30	10	0	0	0	23
30	40	40	30	40	40	30	40	30	40	30	20	34
30	40	50	60	40	40	30	30	30	20	10	10	26
60	50	60	70	50	50	50	50	80	OBS	OBS	OBS	–
60	+S	OBS	OBS	OBS	OBS	OBS	–10	–10	20	40	40	–
40	50	40	+S	OBS	0	20	30	30	40	30	30	–
40	50	50	50	40	40	40	20	10	10	0	0	–
50	50	+S	OBS	–20	+S	30	20	30	30	20	10	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
980701	10	20	20	30	40	70	[60]	50	40	70	60	50
980702	20	20	40	40	50	70	[40]	20	OBS	OBS	50	110
980703	30	30	20	10	20	30	[40]	–	–	–	–	–
980704	–	–	–	–	–	–	–	60	40	30	50	20
980705	40	30	30	30	30	40	[40]	20	20	40	40	30
980706	20	10	10	10	10	–10	–	–	30	30	30	30
980707	30	30	30	30	30	30	[30]	30	30	40	40	–S
980708	60	40	40	40	50	80	[70]	50	30	30	30	OBS
980709	OBS	OBS	OBS	30	30	40	[70]	60	40	30	30	30
980710	40	30	10	10	10	30	[–S]	+S	70	50	30	30
980711	30	30	30	30	30	30	[40]	30	30	30	30	30
980712	10	10	20	20	–20	30	0	[20]	40	60	50	30
980713	30	30	30	30	60	–	–	–	40	60	60	60
980714	20	20	10	10	10	30	–S	[OBS]	–S	30	30	20
980715	20	20	20	20	40	70	[80]	90	110	80	50	40
980716	10	10	10	20	30	30	[30]	40	40	60	60	70
980717	70	40	30	40	30	40	[80]	40	70	60	50	40
980718	10	OBS	0	10	[20]	30	70	80	60	70	60	50
980719	+S	OBS	20	30	30	70	[80]	80	70	70	80	70
980720	20	20	30	30	30	30	30	40	–	–	70	70
980721	30	30	20	30	30	[40]	30	–S	50	60	70	70
980722	30	30	30	40	[40]	40	50	40	40	60	70	70
980723	20	10	10	20	30	[30]	40	40	50	60	80	80
980724	30	OBS	–S	+S	OBS	[+S]	40	80	80	50	50	40
980725	40	40	40	40	30	40	[40]	40	40	40	40	50
980726	40	40	30	30	90	60	60	[60]	70	80	90	80
980727	30	30	40	30	30	40	[40]	–	30	40	40	30
980728	–	–	–	–	–	–	–	–	–	–	–	–
980729	30	30	20	20	30	40	[40]	40	40	40	40	40
980730	20	20	20	30	30	40	[40]	60	60	80	70	60
980731	40	40	40	30	40	40	[40]	30	30	40	40	40

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	50	50	50	40	40	OBS	OBS	-S	20	30	40	–
100	90	40	40	50	60	40	40	40	40	40	30	–
–	–	–	–	–	–	–	–	–	–	–	–	–
30	40	40	30	40	40	50	50	40	40	40	40	–
+S	–50	–50	30	40	10	20	20	10	0	10	10	19
30	30	30	30	30	30	30	30	30	30	30	30	30
OBS	OBS	OBS	OBS	OBS	OBS	+S	OBS	30	30	60	60	–
+S	30	+S	40	30	30	30	30	40	30	–S	–S	–
+S	30	30	40	40	40	30	40	30	30	30	30	–
30	40	40	40	30	30	30	30	30	30	30	30	–
30	30	30	30	40	30	30	30	30	30	30	10	30
30	30	30	40	40	40	40	30	30	30	30	30	28
70	70	70	60	50	30	30	30	10	10	20	20	–
10	40	–10	–S	–S	–S	–40	30	30	30	30	10	–
50	50	60	50	40	40	40	30	30	20	20	20	45
80	80	80	50	30	30	30	40	30	–S	OBS	10	–
40	40	50	40	50	40	40	40	30	30	20	10	43
60	+S	70	80	60	40	OBS	50	40	40	40	40	–
80	OBS	OBS	30	+S	+S	30	30	40	30	40	40	–
80	70	70	70	50	60	50	40	40	40	40	30	–
80	70	70	70	50	50	50	50	40	40	40	30	48
70	80	90	90	70	40	40	30	30	10	10	20	47
90	90	90	70	60	50	40	30	30	30	30	30	46
50	50	60	50	50	50	50	50	50	40	40	40	–
50	40	40	50	40	OBS	40	OBS	+S	50	50	50	–
80	90	90	90	80	60	50	50	30	30	40	40	61
30	40	40	40	+S	OBS	OBS	+S	–S	OBS	–	–	–
–	–	–	30	50	30	40	30	40	40	30	40	–
50	40	40	50	+S	30	30	40	30	30	30	20	35
70	70	60	60	50	40	60	60	50	50	50	40	50
40	50	60	50	50	40	40	OBS	OBS	OBS	OBS	OBS	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
980801	20	30	30	30	20	–S	[OBS]	110	80	60	+S	50
980802	30	40	40	40	30	40	[40]	40	40	80	70	70
980803	40	40	40	50	60	70	–	–	[50]	60	70	80
980804	50	50	50	50	50	50	[40]	50	50	50	50	50
980805	OBS	+S	OBS	OBS	OBS	OBS	[20]	100	140	110	110	70
980806	50	50	50	50	50	40	[40]	50	50	60	70	70
980807	10	20	20	30	20	30	[40]	40	50	–	60	50
980808	10	10	10	20	20	30	[50]	[40]	40	60	70	80
980809	40	30	20	30	40	40	[40]	50	50	60	70	90
980810	20	20	30	30	30	40	–	–	–	–	–	70
980811	20	20	20	10	10	20	[30]	30	–	50	50	50
980812	20	10	20	20	20	30	[40]	30	30	40	70	60
980813	30	30	20	20	20	30	[30]	–	10	20	50	70
980814	20	10	10	10	0	OBS	OBS	30	20	30	30	50
980815	10	10	20	10	10	20	20	10	20	20	20	30
980816	20	30	20	20	20	30	[40]	50	60	50	70	70
980817	20	20	20	10	20	20	[30]	–	40	50	70	80
980818	20	10	10	10	10	30	[40]	[40]	40	40	50	60
980819	20	20	30	20	20	30	[30]	30	30	30	40	40
980820	10	20	20	20	30	40	[40]	[40]	50	60	60	70
980821	10	20	30	20	20	10	[10]	20	40	40	40	50
980822	50	40	20	10	10	OBS	–S	–S	+S	90	80	50
980823	OBS	OBS	OBS	–20	30	40	80	[40]	50	40	40	40
980824	40	40	40	30	40	40	[40]	–	[40]	50	30	50
980825	50	40	30	40	OBS	–S	[40]	50	50	30	40	40
980826	20	20	20	30	30	30	40	[40]	50	50	50	50
980827	40	30	30	20	20	[30]	40	40	40	60	60	50
980828	10	+S	20	30	40	40	[70]	70	50	40	30	30
980829	30	40	40	30	30	40	[40]	40	40	40	40	40
980830	20	20	30	20	30	30	[40]	40	60	50	–S	40
980831	30	20	20	20	30	40	[40]	–	20	20	–	40

12	13	14	15	16	17	18	19	20	21	22	23	Means
70	70	70	60	50	60	40	40	40	40	40	30	–
80	80	80	70	60	70	50	60	40	50	40	40	53
90	90	70	70	80	50	+S	OBS	40	40	40	40	–
50	70	70	50	70	70	40	40	–S	OBS	OBS	OBS	–
70	50	50	50	40	40	40	40	40	50	50	40	–
70	70	70	(100)	60	50	40	30	20	10	20	20	47
70	70	70	80	60	50	40	30	20	30	10	10	40
80	90	110	70	60	50	50	50	50	40	40	40	49
120	110	120	120	60	50	50	50	60	50	40	30	59
70	70	70	70	60	40	30	20	20	20	20	20	–
70	70	80	80	70	30	30	30	30	20	20	20	37
50	50	50	40	30	40	50	50	50	50	50	40	39
70	70	70	60	50	30	30	20	20	+S	40	30	37
50	50	50	40	50	30	30	30	30	20	20	20	–
20	[30]	30	30	20	30	30	30	20	20	20	20	21
70	70	70	70	60	30	30	30	20	20	20	10	41
80	80	90	90	50	30	30	10	10	10	10	10	38
60	70	60	50	40	40	40	40	40	30	30	30	37
40	40	50	50	60	60	40	40	30	30	20	20	34
70	80	70	60	50	50	40	30	30	20	20	20	42
50	50	50	40	40	OBS	–S	OBS	OBS	30	40	50	–
30	50	40	40	40	50	40	–S	OBS	OBS	–S	–S	–
40	40	50	50	50	40	40	30	30	40	40	40	–
60	60	60	40	+S	+S	OBS	OBS	–S	0	OBS	50	–
40	40	40	40	40	40	30	40	40	40	40	30	–
50	50	50	40	40	40	30	30	30	30	30	40	37
40	40	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	0	–
30	40	30	30	20	20	30	40	40	40	40	40	36
40	40	40	40	40	30	30	40	40	40	30	30	37
50	30	40	40	30	20	20	20	30	30	20	20	32
OBS	–S	40	40	40	30	30	30	30	30	30	20	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
980901	30	30	20	20	20	30	[30]	40	–	60	70	50
980902	30	30	30	30	20	20	20	[20]	20	30	30	30
980903	20	10	10	10	10	20	[20]	30	30	20	10	20
980904	–20	10	30	30	40	70	[30]	30	50	30	10	30
980905	20	10	10	10	20	20	[20]	30	10	20	20	20
980906	30	–50	10	OBS	40	70	70	70	50	60	70	60
980907	30	10	30	10	10	30	–	–	–	80	50	50
980908	40	50	50	40	40	40	[40]	[50]	80	60	60	80
980909	30	40	30	10	10	30	[50]	50	50	50	50	60
980910	0	0	10	30	10	10	[40]	40	50	50	50	50
980911	30	40	30	40	50	50	[60]	50	40	40	50	50
980912	50	50	50	50	40	40	–50	–100	10	40	40	100
980913	0	50	60	60	50	60	[80]	80	40	50	50	60
980914	50	50	50	10	50	60	[90]	–	10	20	30	40
980915	40	40	30	50	40	30	[10]	20	0	–10	–10	10
980916	30	20	20	20	30	40	[–10]	20	40	40	40	20
980917	10	OBS	OBS	OBS	10	20	30	[30]	30	20	30	20
980918	10	10	10	10	20	20	30	[30]	20	20	30	30
980919	20	20	20	20	20	[30]	30	30	20	30	30	40
980920	20	20	10	10	10	20	20	[20]	20	10	0	10
980921	10	10	10	10	10	20	[20]	–	40	40	40	40
980922	30	40	20	20	30	40	[70]	60	60	50	70	70
980923	30	30	40	40	30	40	80	[70]	60	50	70	70
980924	20	30	30	30	40	40	[80]	70	40	40	50	60
980925	40	30	30	10	0	10	0	0	10	40	40	40
980926	30	30	30	30	30	50	[50]	60	60	60	60	50
980927	30	30	40	40	30	40	[OBS]	40	40	40	50	70
980928	30	30	30	30	30	60	–	–	70	30	–10	–60
980929	40	30	30	30	30	40	40	[40]	70	50	40	50
980930	30	20	20	20	40	40	50	[60]	50	40	60	40

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	40	40	30	30	30	30	30	30	30	30	30	35
30	30	30	30	30	30	30	20	10	10	10	10	24
30	30	20	10	30	30	100	−150	−S	OBS	+S	20	–
30	30	30	30	30	30	30	30	30	30	30	30	29
10	+S	OBS	OBS	OBS	−20	−20	−20	0	−10	0	−20	–
40	50	+S	OBS	0	30	30	30	30	30	30	30	–
50	60	60	60	60	50	50	40	50	40	40	40	–
60	60	60	50	40	40	40	40	40	40	40	30	49
50	60	60	50	60	50	40	40	40	50	50	40	44
50	60	60	50	40	30	10	10	30	30	30	40	33
40	50	50	50	60	50	80	60	50	50	50	50	49
100	90	OBS	OBS	−50	10	−10	60	40	10	40	−20	–
50	60	80	50	0	10	80	OBS	50	60	60	60	52
30	30	30	30	30	30	40	30	40	50	30	30	36
30	−S	0	20	20	−10	30	30	30	30	20	20	20
30	50	−S	0	20	70	30	20	10	−10	10	10	20
20	OBS	20	20	20	20	20	10	10	20	20	10	–
+S	20	OBS	OBS	30	30	40	30	30	30	30	30	–
30	20	20	30	20	30	30	30	20	20	20	20	25
10	20	10	20	20	20	30	30	30	30	20	20	18
40	50	40	40	40	40	40	40	30	30	30	20	30
70	80	70	70	70	60	50	40	30	30	30	40	50
80	90	90	80	70	50	40	30	40	40	40	30	54
60	60	50	50	40	40	30	40	20	20	30	30	42
50	40	40	30	30	30	10	0	−10	10	30	30	23
40	50	40	40	30	30	30	30	40	40	30	30	40
80	70	70	−S	OBS	10	20	30	30	10	30	40	–
−90	−40	−60	−110	−60	0	10	20	20	20	30	30	–
50	60	60	60	40	40	50	40	40	30	30	40	43
50	50	40	30	30	40	30	40	40	50	40	40	40

Date	00	01	02	03	04	05	06	07	08	09	10	11
981001	30	20	30	40	40	50	[60]	30	–40	20	10	10
981002	10	20	40	30	10	–10	[–10]	10	20	0	–10	0
981003	30	50	50	60	50	[40]	50	90	80	60	50	40
981004	60	50	40	40	40	50	50	[40]	30	40	40	50
981005	40	30	30	30	20	30	[40]	–	40	30	30	20
981006	20	10	–20	10	10	20	[20]	30	50	30	20	50
981007	80	90	70	80	80	70	120	130	[80]	80	60	60
981008	50	50	40	60	40	30	20	[20]	30	10	10	40
981009	–10	–10	10	10	10	10	[30]	40	40	30	30	40
981010	40	40	70	80	60	50	[70]	60	80	50	40	40
981011	30	20	10	20	30	40	40	[50]	50	40	40	50
981012	0	–10	0	0	0	0	[0]	[40]	–	60	70	60
981013	40	40	40	40	40	40	[60]	60	50	40	40	40
981014	20	30	20	20	30	40	[40]	40	40	40	40	40
981015	30	–30	30	40	40	70	[70]	80	70	70	70	60
981016	40	30	–30	–50	30	20	[30]	60	70	40	40	40
981017	–10	10	–10	–20	–30	–10	–10	10	0	10	40	50
981018	100	100	90	70	30	40	[40]	20	30	40	40	40
981019	10	10	10	10	10	10	[30]	–	40	10	10	10
981020	–30	0	10	10	10	20	[40]	70	60	–	30	30
981021	30	30	30	30	30	30	[30]	40	40	40	40	40
981022	40	30	30	40	40	50	[60]	70	60	40	50	60
981023	40	40	40	80	130	80	[80]	110	90	60	40	60
981024	0	0	–20	20	30	20	[30]	80	70	60	60	40
981025	40	30	–10	–30	–30	–30	–20	–30	[–30]	–30	–20	–30
981026	40	30	20	30	40	40	50	–	–	30	40	30
981027	20	–40	–10	30	30	30	50	[70]	30	20	30	30
981028	40	30	30	30	30	30	60	[40]	40	30	–30	40
981029	30	40	30	30	40	40	+S	[20]	20	20	30	20
981030	20	20	20	20	20	20	20	[30]	30	30	20	20
981031	20	20	20	20	20	20	[20]	30	20	20	20	30

12	13	14	15	16	17	18	19	20	21	22	23	Means
10	10	20	30	40	30	–10	0	30	20	20	–10	20
–10	OBS	OBS	20	40	60	60	60	40	40	50	40	–
40	50	50	50	50	40	50	50	60	50	50	60	52
60	70	70	60	50	50	60	70	60	60	50	50	52
30	40	30	20	10	20	20	30	30	20	10	10	22
30	30	10	0	–S	OBS	OBS	OBS	OBS	+S	30	60	–
50	50	30	OBS	60	20	40	50	40	40	30	20	62
30	10	20	+S	OBS	–10	30	20	10	10	10	0	–
40	30	20	20	30	10	10	20	10	10	30	30	20
100	+S	30	40	30	30	40	30	20	30	30	30	47
70	50	40	70	50	40	30	10	0	10	0	0	33
60	+S	+S	OBS	OBS	OBS	OBS	10	–S	30	50	40	–
40	40	70	30	50	60	70	60	70	60	50	40	49
40	40	40	60	40	40	50	40	40	80	50	30	40
50	40	40	40	30	30	30	70	90	100	80	80	53
50	40	30	30	30	20	30	10	10	10	10	0	25
50	50	40	40	30	40	40	50	70	70	40	60	25
30	10	10	0	–20	–20	10	10	10	10	10	10	30
30	30	10	0	20	20	0	–20	–30	–50	–60	–50	3
30	40	30	40	40	40	30	40	40	30	20	30	29
50	50	50	40	40	50	50	50	50	50	40	40	40
60	80	70	60	30	10	20	50	50	60	40	50	48
70	70	80	50	0	–10	–20	10	30	30	0	0	48
50	30	–150	OBS	60	40	30	30	20	30	20	40	26
30	10	+S	–60	30	30	40	40	40	40	40	40	4
40	40	40	50	60	60	70	70	60	50	30	–S	–
30	40	50	40	40	–S	–10	0	20	40	40	40	27
50	60	70	60	50	60	60	50	40	40	30	30	40
20	–	–10	OBS	OBS	OBS	OBS	–50	0	20	40	0	–
20	30	30	30	10	20	40	60	30	30	20	10	25
30	30	20	10	–50	30	30	30	30	30	20	10	20

Date	00	01	02	03	04	05	06	07	08	09	10	11
981101	20	10	20	20	20	20	–40	–20	–10	[10]	20	20
981102	30	20	20	20	30	40	50	[40]	–	30	30	30
981103	10	10	10	20	20	20	20	[20]	30	50	50	60
981104	20	20	20	20	20	20	30	[20]	10	0	10	20
981105	0	–10	110	70	–80	–50	–10	[10]	20	30	30	30
981106	40	30	20	20	30	30	50	[50]	60	30	30	30
981107	20	20	20	20	20	30	30	[40]	30	30	40	40
981108	20	20	20	20	20	30	40	[40]	40	40	40	40
981109	10	20	10	10	10	10	10	–	–	–20	20	30
981110	–70	–20	–10	30	10	30	30	[0]	0	50	10	30
981111	60	60	40	40	20	[60]	40	40	40	30	30	30
981112	60	40	60	40	40	60	60	[80]	(70)	(40)	60	70
981113	10	10	10	10	10	20	20	[10]	30	30	10	10
981114	30	30	20	10	20	0	0	0	[–10]	–10	0	0
981115	30	10	10	–20	10	10	10	10	[40]	70	60	30
981116	20	20	20	30	30	40	30	–	–	[60]	40	70
981117	60	30	30	30	30	30	100	[30]	–	40	40	40
981118	30	30	30	30	30	40	50	[50]	50	50	40	40
981119	40	40	30	30	40	40	40	[40]	40	40	30	40
981120	30	50	70	50	40	30	20	20	0	0	–S	–S
981121	40	20	40	40	40	50	50	20	[30]	20	0	(–10)
981122	0	10	30	10	10	10	10	20	40	50	50	70
981123	30	30	40	100	60	120	50	10	–	30	40	40
981124	40	20	30	50	30	60	80	[70]	80	120	90	80
981125	30	50	40	50	70	70	70	[70]	90	70	70	60
981126	30	0	20	0	30	70	70	[60]	130	120	70	70
981127	50	30	30	50	60	70	50	[40]	30	40	50	10
981128	120	120	70	90	120	90	120	110	110	70	60	[70]
981129	50	40	20	40	30	–10	20	[40]	30	0	–10	20
981130	–	–	–	–	–	–	–	–	–	60	30	30

12	13	14	15	16	17	18	19	20	21	22	23	Means
30	20	–40	30	30	30	30	40	30	20	30	30	15
30	50	50	30	70	70	60	70	60	10	10	20	38
60	60	70	60	60	50	20	30	50	20	30	20	35
30	30	20	30	OBS	OBS	OBS	0	20	20	20	30	–
30	40	40	50	70	70	60	70	70	40	40	60	33
40	40	40	40	50	60	70	70	60	40	30	20	40
50	40	40	50	60	70	70	70	60	50	40	20	40
50	50	30	30	20	20	20	20	20	20	20	10	28
40	30	30	40	30	30	–10	–20	–10	0	–30	–50	–
30	OBS	OBS	OBS	–50	–S	–S	–S	–10	–20	–10	60	–
30	40	60	70	80	90	80	80	70	80	70	70	55
80	80	60	40	60	30	20	10	10	10	10	10	–
10	10	0	0	10	20	30	40	30	30	40	40	18
20	0	–10	10	0	10	–20	–20	0	80	–S	30	8
30	40	40	40	30	30	40	60	40	40	40	30	30
70	70	40	40	70	90	70	60	60	60	70	40	–
30	30	40	50	50	50	50	50	40	40	30	30	41
50	60	60	70	60	60	70	70	70	50	50	40	49
40	50	50	50	70	40	50	60	50	40	40	30	43
–S	–S	–S	50	60	50	60	70	60	70	50	50	–
(–20)	–10	–10	–10	20	–20	–70	–100	–20	–10	0	–10	5
50	50	60	60	70	60	50	30	50	20	30	10	35
50	50	60	80	110	100	70	70	50	40	50	40	57
90	100	90	70	60	70	60	50	40	60	50	50	64
30	50	70	50	30	10	20	30	0	–10	–10	10	43
70	70	70	70	50	50	60	60	70	50	60	40	58
20	30	50	60	30	110	120	70	60	80	80	120	56
70	50	50	70	120	70	80	110	80	40	60	50	83
10	20	0	–20	–40	–50	–40	–20	–40	–	–	–	–
30	60	60	50	50	50	50	60	70	70	30	–40	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
981201	−10	30	20	20	30	30	30	20	−10	−10	−20	10
981202	−10	−10	0	0	0	10	20	[50]	60	30	30	30
981203	20	−20	−10	−20	−30	−40	−20	[−30]	−50	−70	−70	−70
981204	−100	−90	−70	−50	−50	−40	0	−10	−10	0	30	110
981205	50	60	30	30	40	30	40	30	[40]	[50]	30	40
981206	30	20	20	20	30	30	30	[40]	50	40	50	60
981207	30	30	30	20	20	30	40	40	–	70	50	30
981208	40	30	0	10	20	20	10	−10	−10	−10	0	10
981209	30	30	30	20	30	30	30	[10]	10	30	30	40
981210	50	50	40	50	50	40	50	80	70	70	100	70
981211	50	50	40	50	50	40	80	[110]	50	80	70	30
981212	0	20	50	60	100	90	60	40	40	30	40	[50]
981213	150	120	70	50	70	90	50	70	[60]	40	80	90
981214	40	40	30	30	40	40	40	–	–	10	10	10
981215	−100	−20	−40	−20	−10	0	30	60	50	60	70	50
981216	50	60	120	120	130	150	100	110	−10	30	40	40
981217	50	50	50	30	30	40	50	60	60	60	60	50
981218	60	40	40	50	80	80	120	[130]	170	220	200	+S
981219	50	60	110	90	50	40	90	70	70	120	80	30
981220	70	70	80	50	50	60	60	50	[10]	20	−10	−10
981221	50	40	30	10	40	50	40	–	–	30	50	80
981222	50	50	50	50	50	50	80	90	100	60	60	60
981223	30	40	50	50	60	50	60	[100]	130	50	50	40
981224	−10	−10	−40	−50	−50	−50	−50	−40	[−60]	−50	−40	−30
981225	−70	−70	−40	−30	−20	−40	[−30]	−30	−30	−40	−10	−20
981226	−50	−60	−50	−70	−60	−60	−50	[−50]	–	−60	−40	−10
981227	0	−20	−50	−50	−70	−80	−40	−20	[10]	20	10	10
981228	40	60	60	80	90	100	50	30	70	60	70	30
981229	20	30	40	50	60	–	50	60	30	50	60	70
981230	30	20	40	20	−10	−30	−30	−30	−60	−50	−70	−60
981231	−60	−40	−50	−70	−60	−90	−90	−60	−30	[−30]	−50	−40

12	13	14	15	16	17	18	19	20	21	22	23	Means
30	60	−10	−20	−10	−10	−40	0	−10	−20	−50	−20	2
40	30	40	50	40	40	20	30	40	40	−10	0	24
−100	−90	−120	−90	−100	−130	−60	−60	−100	−90	−80	−90	−63
+S	OBS	OBS	+S	120	80	130	130	70	60	30	50	–
60	30	40	70	40	40	30	OBS	50	40	30	30	40
60	50	60	70	60	50	50	−S	−S	10	−S	−S	–
40	50	60	50	50	50	70	70	50	50	50	40	44
10	20	30	[40]	40	40	30	20	30	40	40	40	23
70	100	120	90	100	110	70	70	80	60	50	50	54
80	80	70	70	80	70	70	50	50	50	30	50	60
−30	−40	−50	−20	−40	−60	−80	−50	−50	−50	−30	−10	8
80	50	90	90	50	70	+S	+S	140	+S	+S	+S	–
−30	30	−10	70	60	60	50	50	50	50	40	40	58
40	30	30	30	30	60	30	10	0	−70	−110	−190	–
100	70	70	[60]	60	70	80	90	60	40	40	40	38
50	50	60	[60]	90	90	80	50	50	50	40	50	69
60	60	70	[50]	60	50	70	9	90	70	70	70	58
+S	200	+S	+S	240	+S	+S	+S	90	90	70	60	–
30	20	20	[50]	−10	30	20	20	20	20	30	50	48
30	−10	−10	10	−40	10	−10	−10	−20	OBS	OBS	+S	–
90	90	80	80	80	80	80	80	80	60	60	50	–
90	90	[90]	90	110	90	80	90	30	50	60	50	72
50	80	60	100	80	60	50	40	40	10	10	10	54
−30	−30	−20	−60	−70	−50	−50	−50	−60	−50	−50	−50	−44
−20	−10	0	0	−20	−10	−10	−10	−20	−20	−60	−50	−28
20	20	10	20	0	−20	−50	−10	10	−10	−10	−50	−27
30	40	30	50	100	80	70	80	70	90	60	20	18
10	40	40	20	40	–	30	0	30	−10	30	30	44
80	90	80	60	−30	60	[80]	70	70	50	50	20	52
−40	−50	−70	−90	−90	−80	−70	−80	−60	−70	−50	−50	−43
−40	−60	−90	−80	−50	−60	−70	−60	−60	−60	−50	−50	−58

Hourly means of the quantities of positive and negative
1994

Month		00	01	02	03	04	05	06	07	08	09	10	11
9401	+	0	0	0	0	0	0	0	0	0	3	14	0
9401	−	0	0	0	0	0	0	0	1	0	9	7	0
9402	+	0	0	0	0	0	0	0	0	0	0	0	0
9402	−	0	0	0	0	0	0	0	0	0	0	0	0
9403	+	0	0	2	0	1	1	0	4	3	0	3	1
9403	−	2	0	1	0	0	1	0	6	4	0	3	1
9404	+	6	0	1	7	5	5	2	0	0	0	0	0
9404	−	20	3	1	8	7	14	4	0	0	0	0	0
9405	+	8	2	1	0	0	0	4	4	0	0	3	9
9405	−	6	2	1	0	0	0	0	7	0	0	3	11
9406	+	9	0	4	8	11	0	0	0	1	2	3	1
9406	−	3	2	8	17	10	0	0	0	0	2	2	1
9407	+	0	0	0	0	0	6	8	8	19	0	4	6
9407	−	0	0	0	0	0	10	2	0	0	7	8	4
9408	+	0	5	5	4	0	0	4	21	0	1	0	0
9408	−	8	5	4	3	3	0	31	26	6	1	1	0
9409	+	2	15	0	14	17	12	12	4	7	0	0	0
9409	−	1	11	1	2	14	21	4	4	0	0	0	0
9410	+	0	0	0	0	0	0	0	0	0	0	3	5
9410	−	0	1	0	0	0	0	0	0	0	0	3	19
9411	+	0	0	0	0	0	0	0	0	0	0	0	0
9411	−	0	0	0	0	0	0	0	0	0	0	0	0
9412	+	2	0	0	0	0	0	0	0	1	1	0	0
9412	−	0	0	10	0	0	0	0	0	0	0	0	0

charges transported by point-discharge for each month

12	13	14	15	16	17	18	19	20	21	22	23	Means
0	0	0	0	0	0	1	6	0	0	0	0	1.0
0	0	0	0	0	0	0	3	0	0	0	0	0.8
0	0	0	0	0	0	0	0	0	0	0	0	0.0
0	0	0	0	0	0	0	0	0	0	0	0	0.0
0	0	0	0	0	0	0	3	0	0	0	4	0.9
0	0	0	0	0	0	0	0	0	0	0	1	0.8
1	0	0	0	0	0	7	24	11	0	1	2	3.0
0	0	0	0	0	0	6	26	1	4	2	14	4.6
4	1	3	1	5	11	0	11	6	2	14	7	4.0
4	0	5	2	4	2	2	5	9	2	4	5	3.1
0	0	0	4	1	1	3	42	1	0	3	0	3.9
0	0	4	8	12	9	23	51	3	0	3	0	6.6
6	7	0	1	0	9	8	1	1	6	0	0	3.8
4	20	5	8	2	24	18	4	2	0	0	0	4.9
1	4	15	34	7	21	22	7	32	5	0	0	7.8
11	7	37	17	26	33	95	32	23	20	2	0	16.3
0	0	0	0	0	0	5	5	6	1	0	0	4.2
0	0	0	0	0	1	10	25	15	17	0	15	5.9
0	0	0	0	0	0	3	1	3	1	8	4	1.2
0	1	0	0	0	0	2	1	0	1	3	5	1.5
0	0	0	0	0	0	0	0	0	0	0	0	0.0
0	0	0	0	0	0	0	0	0	0	0	0	0.0
0	0	0	0	0	0	0	0	0	0	0	0	0.2
0	0	0	0	0	0	0	0	0	0	0	0	0.4

Hourly means of the quantities of positive and negative
1995

Month		00	01	02	03	04	05	06	07	08	09	10	11
9501	+	4	36	20	0	0	0	0	0	0	0	0	0
9501	−	3	8	22	1	0	0	0	0	0	0	0	0
9502	+	0	0	0	0	0	4	0	0	0	1	0	5
9502	−	0	0	0	0	0	5	0	0	0	0	0	0
9503	+	0	19	11	4	0	0	0	0	0	3	10	10
9503	−	0	7	11	5	1	0	0	0	0	1	2	4
9504	+	0	1	0	0	0	3	1	1	3	0	4	1
9504	−	1	2	0	0	0	4	0	1	4	0	11	1
9505	+	1	0	0	0	0	0	2	0	0	0	0	1
9505	−	1	0	0	0	0	0	2	0	0	0	0	0
9506	+	1	2	3	22	0	1	0	0	5	10	2	5
9506	−	0	1	0	14	0	0	0	0	2	8	6	6
9507	+	0	0	0	0	0	0	0	0	1	0	1	0
9507	−	0	0	0	0	0	0	0	0	0	0	0	0
9508	+	1	3	0	1	0	0	0	0	0	0	0	4
9508	−	5	9	0	0	0	0	0	0	0	0	0	6
9509	+	0	0	0	0	0	3	0	0	0	0	0	0
9509	−	0	0	0	0	0	0	0	0	0	0	0	0
9510	+	0	0	3	0	0	0	0	0	0	0	0	0
9510	−	0	0	2	0	3	0	0	0	0	0	0	0
9511	+	0	0	0	0	0	0	0	0	0	0	0	0
9511	−	0	0	0	0	0	0	0	0	0	0	0	0
9512	+	0	0	0	0	0	0	0	0	0	0	0	0
9512	−	0	0	0	0	0	0	0	0	0	0	0	0

charges transported by point-discharge for each month

12	13	14	15	16	17	18	19	20	21	22	23	Means
0	0	1	2	9	2	0	0	0	1	1	2	3.3
0	1	2	2	3	1	0	0	0	0	1	2	1.9
0	0	0	0	4	7	3	6	0	0	1	0	1.3
0	0	0	0	0	17	4	2	0	1	0	0	1.2
7	17	11	2	4	45	43	12	4	0	0	0	8.4
10	13	6	6	3	6	4	23	0	0	0	0	4.3
0	10	3	7	8	5	5	1	0	1	0	0	2.3
0	14	1	7	24	12	5	2	0	0	0	0	3.7
3	4	22	9	12	11	10	5	3	1	0	0	3.5
1	4	15	18	5	26	24	5	2	1	0	0	4.3
6	12	18	2	20	6	14	16	3	14	13	0	7.3
11	11	33	42	33	29	20	2	7	6	39	0	11.3
0	9	1	0	1	0	0	0	0	0	0	0	0.5
5	8	0	1	0	0	0	0	0	0	0	0	0.6
29	3	2	2	4	0	0	0	8	2	0	1	2.5
10	16	17	8	8	0	0	0	5	0	0	1	3.5
0	0	0	0	0	0	0	0	4	6	3	0	0.7
0	0	1	0	0	0	0	0	7	11	2	0	0.9
0	0	0	0	0	0	0	0	0	0	0	0	0.1
0	0	0	0	0	0	0	0	0	0	0	0	0.2
0	0	0	0	2.5	0	0	0	0	0	0	0	0.1
0	0	0	0	2.5	0	0	0	0	0	0	0	0.1
0	0	0	0	0	0	0	0	0	0	0	0	0.0
0	0	0	0	0	0	0	0	0	0	0	0	0.0

Hourly means of the quantities of positive and negative
1996

Month		00	01	02	03	04	05	06	07	08	09	10	11
9601	+	0	0	0	0	0	0	0	0	0	0	0	0
9601	−	0	0	0	0	0	0	0	0	0	0	0	0
9602	+	0	0	0	0	0	0	0	0	0	0	0	0
9602	−	0	0	0	0	0	0	0	0	0	0	0	0
9603	+	0	0	0	0	0	0	0	0	0	0	0	0
9603	−	0	0	0	0	0	0	0	0	0	0	0	1
9604	+	0	0	0	0	0	0	0	0	0	0	0	0
9604	−	0	0	0	0	0	0	0	0	0	0	0	0
9605	+	0	0	0	0	0	0	0	0	0	0	4	0
9605	−	0	0	0	0	0	0	0	0	0	0	0	0
9606	+	0	0	0	0	0	0	0	0	0	0	0	1
9606	−	1	0	3	0	0	0	0	0	0	0	0	7
9607	+	0	2	1	0	0	0	0	0	0	0	0	0
9607	−	0	3	0	4	0	0	0	0	0	0	7	0
9608	+	0	0	0	0	0	0	1	0	0	0	0	0
9608	−	0	0	0	0	0	0		0	0	0	0	1
9609	+	0	0	0	0	0	0	0	0	0	0	0	1
9609	−	0	0	0	0	0	0	0	0	0	0	0	0
9610	+	0	0	0	0	0	0	0	0	0	0	0	0
9610	−	0	0	0	0	0	0	0	0	0	0	0	0
9611	+	0	0	0	0	0	0	0	0	0	0	0	0
9611	−	0	0	0	1	0	0	0	0	0	0	0	0
9612	+	0	0	0	0	0	0	0	0	0	0	0	0
9612	−	0	0	0	0	0	0	0	0	0	0	0	0

charges transported by point-discharge for each month

12	13	14	15	16	17	18	19	20	21	22	23	Means
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	3	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	0	2	1	2	0	0	0	0	0	0	0.3
1	0	1	2	1	0	0	0	0	0	0	0	0.3
0	0	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
1	24	0	0	1	2	1	1	0	0	0	0	1.4
1	7	0	0	0	5	2	1	0	18	0	0	1.4
4	0	1	6	2	0	0	0	0	0	0	0	0.6
18	18	15	13	6	0	1	0	0	0	0	0	3.4
1	0	3	7	1	1	0	0	0	0	0	0	0.7
4	0	17	14	1	1	0	2	0	0	0	0	2.2
1	0	0	0	1	0	2	0	0	0	0	0	0.2
1	0	0	1	0	0	0	0	0	0	0	0	0.2
1	0	5	1	1	0	1	0	0	0	0	0	0.4
5	0	2	1	1	0	0	2	1	0	0	0	0.5
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0

Hourly means of the quantities of positive and negative
1997

Month		00	01	02	03	04	05	06	07	08	09	10	11
9701	+	0	0	0	0	0	0	0	0	0	0	0	0
9701	−	0	0	0	0	0	0	0	0	0	0	0	0
9702	+	0	0	0	5	0	0	0	0	0	0	0	0
9702	−	0	0	0	5	0	0	0	0	0	0	0	0
9703	+	0	0	0	1	0	0	0	0	0	2	8	0
9703	−	0	0	1	2	0	0	0	0	0	0	0	0
9704	+	2	1	0	0	0	0	0	0	0	0	1	0
9704	−	1	1	0	0	0	0	0	0	0	0	0	4
9705	+	0	0	0	4	0	0	0	0	0	0	0	0
9705	−	0	0	0	0	1	0	0	0	0	0	0	10
9706	+	0	0	0	0	0	0	0	0	0	0	0	1
9706	−	0	0	0	0	0	0	0	0	0	0	0	0
9707	+	0	0	0	0	0	0	0	0	2	0	0	1
9707	−	0	0	0	0	0	1	0	0	0	0	0	5
9708	+	0	0	0	0	0	2	0	0	0	0	0	5
9708	−	0	0	0	0	0	0	0	0	0	0	1	2
9709	+	0	0	0	0	0	0	0	0	0	0	0	1
9709	−	0	0	0	0	0	0	0	0	0	0	0	0
9710	+	0	0	0	0	0	0	0	0	0	0	0	0
9710	−	0	0	0	0	0	0	0	0	0	0	0	0
9711	+	0	0	0	0	0	0	0	0	0	0	0	0
9711	−	0	0	0	0	0	0	0	0	0	0	0	0
9712	+	0	0	0	0	0	0	0	0	0	0	0	0
9712	−	0	0	0	0	0	0	0	0	0	0	0	0

charges transported by point-discharge for each month

12	13	14	15	16	17	18	19	20	21	22	23	Means
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	5	0	4	0	5	0	0	0	0	0	0	0.8
0	0	0	0	5	0	0	0	0	0	0	0	0.4
0	7	0	0	0	0	0	0	0	0	0	1	0.8
0	2	0	9	0	0	0	0	0	0	0	2	0.7
1	10	17	0	0	0	1	0	0	0	0	0	1.4
0	1	6	16	0	0	2	0	0	1	0	0	1.3
4	0	3	0	0	1	0	3	5	3	0	0	1.0
0	7	4	0	0	0	1	0	1	0	0	0	1.0
0	0	1	1	1	2	0	0	0	1	0	1	0.3
0	1	0	1	5	1	0	0	1	1	0	1	0.5
4	2	0	0	0	0	0	0	0	0	0	0	0.4
1	3	5	7	0	0	5	0	0	0	0	0	1.1
0	3	0	0	0	0	0	2	6	0	0	6	1.0
4	2	0	0	0	0	0	8	1	1	0	13	1.3
0	0	3	3	2	0	0	0	0	0	0	0	0.4
0	3	8	4	2	0	0	0	0	0	0	0	0.7
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0

Hourly means of the quantities of positive and negative
1998

Month		00	01	02	03	04	05	06	07	08	09	10	11
9801	+	0	0	0	0	0	0	0	0	0	0	0	0
9801	−	0	0	0	5	0	0	0	0	0	0	0	0
9802	+	0	0	0	0	0	0	0	0	0	0	0	0
9802	−	0	0	0	0	0	0	0	0	0	0	0	0
9803	+	0	2	0	0	0	0	0	0	0	0	0	0
9803	−	0	1	0	0	0	0	0	0	0	0	0	4
9804	+	1	0	0	0	0	0	0	0	0	0	0	1
9804	−	1	0	0	0	0	0	0	0	0	0	0	3
9805	+	0	0	0	0	0	0	0	0	0	0	0	0
9805	−	0	0	0	0	0	0	0	0	0	0	0	0
9806	+	0	0	0	0	0	0	0	0	0	0	1	5
9806	−	1	0	3	0	0	0	0	0	0	0	0	5
9807	+	0	0	0	0	0	0	0	0	0	0	0	1
9807	−	0	0	0	0	3	0	0	0	1	0	0	0
9808	+	0	0	0	0	0	2	0	0	0	0	0	0
9808	−	0	0	0	0	0	1	0	0	0	0	0	0
9809	+	0	0	0	0	0	0	0	0	0	0	0	0
9809	−	0	0	0	0	0	0	0	0	0	0	0	0
9810	+	0	0	0	0	0	0	0	0	0	0	0	0
9810	−	0	0	0	0	0	0	0	0	0	0	0	0
9811	+	0	0	0	0	0	0	0	0	0	0	0	0
9811	−	0	0	0	0	0	0	0	0	0	0	0	0
9812	+	0	0	0	0	0	0	0	0	0	0	0	0
9812	−	0	0	0	0	0	0	0	0	0	0	0	0

charges transported by point-discharge for each month

12	13	14	15	16	17	18	19	20	21	22	23	Means
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0.2
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
1	3	0	1	0	0	0	0	0	0	0	0	0.3
0	0	0	0	0	0	0	0	0	0	0	0	0.2
1	4	1	1	0	0	0	1	0	0	0	0	0.4
7	2	0	5	0	0	6	0	0	0	0	0	1.0
1	4	2	0	1	5	3	0	0	0	0	0	0.7
4	2	4	1	11	2	4	0	0	0	0	0	1.2
0	3	2	8	11	3	1	0	0	0	0	0	1.4
0	5	6	11	8	2	3	0	0	0	0	1	1.9
0	1	0	0	0	6	4	8	0	0	0	0	0.8
1	3	5	0	0	7	1	9	3	0	0	0	1.4
0	0	0	0	0	1	1	1	1	4	3	0	0.5
0	0	0	0	0	2	1	1	0	4	3	0	0.5
0	5	4	4	11	0	0	0	0	0	0	0	1.0
0	0	8	0	0	0	0	0	0	0	0	0	0.3
0	0	0	0	0	1	0	0	0	0	0	0	0.04
0	0	0	0	0	1	0	0	0	0	0	4	0.2
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0

IONOSPHERE DATA

Mean ionospheric absorption L'(dB) at oblique incidence (A3) $f = 270$ kHz

The following tables give the values of mean ionospheric absorption at oblique incidence (A3) for certain zenith distances of the Sun (χ) expressed in decibels (dB). Values for ground sunset (SS) and ground sunrise (SR) are given for periods of 20 minutes centered on the times of $\chi = 90°$. Night values have been determined by taking the periods ranging from $\chi = 100°$ to 23 00 GMT. The date column gives year, month, day (e.g. 920101 indicates 1992 January 1). SS and Night values in actual row are valid for the actual day, however, the SR values always for the next day's dawn. Values uncertain for some reason are entered in round brackets (). Some gaps are due to missing records.

The sky wave of the transmitter Československo ($f = 272$ kHz) has been recorded since January 1967. The geographical coordinates of the reflection point are 48.4° N, 17.1° E. Because of reconstruction works on the transmitter Československo, the absorption measurement at 272 kHz and the publication of data were suspended from April 1975 till September 1978. (At present the transmitter frequency is 270 kHz.)

The equipment and the method have been described in the papers by BENCZE P and MÄRCZ F: "Atmosphärisch-elektrische und ionosphärische Messungen im Observatorium bei Nagycenk". Observatoriumsberichte des Geophsikalischen Forschungslaboratoriums der Ungarischen Akademie der Wissenschaften vom Jahre 1966, Sopron, 1967, as well as by BENCZE P, HORVÁTH J, MÄRCZ F: "A new equipment for the measurement of ionospheric absorption" Geophysical Observatory Report of the Geodetic and Geophysical Research Institute of the Hungarian Academy of Sciences, Year 1975. Observatory of Nagycenk, Sopron, 1976. Further information is given by BENCZE P and MÄRCZ F: "The Geophysical Observatory near Nagycenk II. Atmospheric electric and ionospheric measurements" (*Acta Geod. Geoph. Mont. Hung.*, 16, 1981, 353-357).

See CD (program Seenck.exe, menu item Ionosphere/Absorption).

Mean ionospheric absorption L' (dB) at oblique incidence (A3)
$f = 270$ kHz
1994

Date	SS	Night	SR
940101	27.2	28.2	30.3
940102	41.2	31.7	37.7
940103	37.7	27.2	31.7
940104	29.2	23.8	31.7
940105	37.7	23.2	35.2
940106	37.7	23.8	41.2
940107	41.2	26.4	30.3
940108	41.2	19.5	33.2
940109	35.2	23.8	23.2
940110	33.2	22.2	21.0
940111	30.3	24.4	28.2
940112	35.2	27.2	30.3
940113	41.2	21.4	26.4
940114	33.2	25.7	31.7
940115	35.2	21.0	35.2
940116	30.3	26.4	30.3
940117	30.3	26.4	26.4
940118	37.7	23.8	35.2
940119	23.2	28.2	23.2
940120	29.2	22.7	26.4
940121	23.8	23.8	27.2
940122	27.2	27.2	31.7
940123	41.2	25.0	27.2
940124	25.7	23.8	23.8
940125	30.3	21.4	25.0
940126	27.2	20.6	23.8
940127	23.8	19.2	28.2
940128	25.7	24.4	29.2
940129	33.2	25.0	33.2
940130	31.7	26.4	31.7
940131	41.2	35.2	35.2
940201	42.2	33.2	35.2
940202	37.7	33.2	29.2
940203	41.2	25.0	30.3
940204	25.7	30.3	27.2
940205	37.7	23.2	27.2
940206			
940207	29.2	21.4	28.2
940208	30.3	26.4	26.4

Date	SS	Night	SR
940209	31.7	25.7	24.4
940210	33.2	28.2	29.2
940211	30.3	22.2	29.2
940212	37.7	20.6	24.4
940213	27.2	31.7	27.2
940214	33.2	24.4	30.3
940215	37.7	30.3	37.7
940216	30.3	20.6	23.8
940217	41.2	26.4	35.2
940218	41.2	25.0	37.7
940219	41.2	26.4	35.2
940220	35.2	27.2	25.7
940221	41.2	25.0	29.2
940222	30.3	19.2	20.2
940223	37.7	19.2	33.2
940224	29.2	25.0	31.7
940225	37.7	26.4	31.7
940226	35.2	18.3	27.2
940227	27.2	20.2	27.2
940228	33.2	17.8	26.4
940301	33.2	22.2	33.2
940302	30.3	21.4	22.7
940303	30.3	17.8	28.2
940304	28.2	18.6	23.2
940305	21.4	20.6	24.4
940306	25.7	15.4	22.2
940307	27.2	23.2	23.8
940308	25.0	19.9	21.4
940309	17.3	24.4	30.3
940310	31.7	21.4	29.2
940311	33.2	17.8	27.2
940312			
940313	31.7	19.5	28.2
940314	33.2	18.3	25.7
940315	19.9	23.2	26.4
940316	23.2	21.0	26.4
940317			
940318	25.0	22.2	27.2
940319	30.3	21.0	20.6
940320	28.2	24.4	25.0
940321	33.2	21.0	20.2
940322	27.2	18.3	19.9
940323	30.3	16.3	21.8

Date	SS	Night	SR
940324	24.4	15.7	22.2
940325	27.2	22.2	22.7
940326	21.8	21.4	17.6
940327	25.0	20.6	22.7
940328	26.4	24.4	25.0
940329	23.2	16.3	27.2
940330	30.3	15.9	19.2
940331	19.5	16.3	24.4
940401	20.6	15.7	23.8
940402	22.7	24.4	22.7
940403	23.8	21.8	21.0
940404	17.3	18.1	18.1
940405	22.2	15.4	20.6
940406	23.2	21.0	21.0
940407	25.0	21.8	21.8
940408	25.7	19.9	22.2
940409	33.2	25.7	25.0
940410	19.9	16.1	22.7
940411	17.3	16.9	19.9
940412	21.8	17.6	24.4
940413	30.3	13.6	25.0
940414	31.7	18.9	30.3
940415	22.7	20.6	20.6
940416	31.7	27.2	26.4
940417	19.9	21.4	31.7
940418	31.7	24.4	25.7
940419	18.1	19.5	21.8
940420	30.3	25.0	28.2
940421	23.8	21.4	20.6
940422	19.5	28.2	24.4
940423	23.2	23.8	25.0
940424	24.4	23.2	21.4
940425	24.4	28.2	27.2
940426	27.2	18.6	18.9
940427	21.0	16.5	19.2
940428	23.2	18.6	25.7
940429	28.2	17.8	22.2
940430	22.2	23.2	30.3
940501	30.3	23.8	28.2
940502			
940503	41.2	21.4	25.7
940504	27.2	25.7	24.4
940505	29.2	22.7	25.7

Date	SS	Night	SR
940506	28.2	28.2	
940507	31.7	25.7	23.8
940508	27.2	23.2	29.2
940509	22.2	22.7	25.7
940510	30.3	17.8	27.2
940511	33.2	27.2	31.7
940512	1.7	28.2	24.4
940513	41.2	19.9	
940514	31.7	23.2	
940515	23.8	22.2	24.4
940516	24.4	18.6	21.4
940517	27.2	23.2	22.2
940518	35.2	41.2	23.8
940519	27.2	37.7	22.7
940520	24.4	14.8	
940521	26.4	37.7	
940522	21.0	26.4	23.8
940523	41.2	20.2	24.4
940524	23.8		
940525	28.2		24.4
940526	33.2		25.7
940527	47.2		
940528	27.2		
940529	25.0		23.2
940530	29.2		23.8
940530	26.4		24.4
940601	33.2		28.2
940602	22.7		30.3
940603	35.2		
940604	25.0		
940605	37.7		25.0
940606	26.4		25.0
940607	24.4		(24.4)
940608	31.7		27.2
940609	28.2		25.0
940610	23.8		
940611	29.2		
940612	25.0		23.2
940613	27.2		22.2
940614	22.2		23.8
940615	33.2		
940616	25.7		25.7
940617	26.4		

Date	SS	Night	SR
940618	26.4		
940619	28.2		21.0
940620			
940621			
940622			
940623	30.3		22.2
940624	26.4		
940625	23.2		
940626	33.2		27.2
940627	30.3		30.3
940628	27.2		25.7
940629	23.8		23.2
940630	27.2		30.3
940701	24.4	18.6	23.2
940702	29.2	22.2	24.4
940703	24.4	21.0	18.9
940704	26.4	23.2	27.2
940705	23.2	20.2	25.7
940706	26.4	25.0	25.7
940707	28.2	25.0	25.7
940708	26.4	24.4	23.8
940709	21.8	21.4	21.0
940710	26.4	23.8	22.7
940711	29.2	21.8	21.8
940712	26.4	21.8	23.2
940713	41.2	22.7	21.4
940714	30.3	22.7	25.0
940715	30.3	21.4	29.2
940716	26.4	26.4	21.8
940717	29.2	21.4	25.0
940718	27.2	26.4	30.3
940719	27.2	27.2	28.2
940720	30.3	26.4	22.7
940721	28.2	21.8	27.2
940722	30.3	21.8	28.2
940723	41.2	2.8	27.2
940724	31.7	23.2	27.2
940725	30.3	21.4	22.7
940726	25.7	21.0	25.7
940727	31.7	18.9	35.2
940728	28.2	25.7	23.8
940729	26.4	21.0	27.2
940730	24.4	17.8	25.7

Date	SS	Night	SR
940731	26.4	20.2	29.2
940801	27.2	22.2	28.2
940802	22.2	20.2	22.7
940803	20.6	24.4	30.3
940804	29.2	19.9	29.2
940805	25.7	23.2	22.7
940806	25.0	21.4	31.7
940807	22.2	19.2	23.8
940808	22.7	19.9	25.0
940809	30.3	20.2	31.7
940810	27.2	21.4	
940811	29.2	19.2	22.7
940812	27.2	22.7	25.7
940813	26.4	21.0	23.8
940814	25.7	16.9	24.4
940815	24.4	20.6	23.2
940816	23.2	22.2	28.2
940817	25.0	21.4	28.2
940818	25.7	20.6	24.4
940819	25.7	21.0	25.7
940820	26.4	18.9	25.0
940821	23.2	21.0	28.2
940822	19.9	17.3	30.3
940823	22.2	20.6	25.0
940824	19.5	21.0	30.3
940825	27.2	19.9	29.2
940826	33.2	18.3	29.2
940827	18.6	18.3	28.2
940828	25.0	17.8	23.2
940829	21.4	16.3	28.2
940830	30.3	21.8	20.6
940831	25.7	18.3	24.4
940901	23.8	18.3	27.2
940902	24.4	21.0	30.3
940903	24.4	21.0	27.2
940904	23.2	21.8	
940905			
940906			
940907			
940908			
940909			
940910			29.2
940911	29.2	18.6	33.2

Date	SS	Night	SR
940912	24.4	20.2	28.2
940913	28.2	18.3	31.7
940914	25.7	21.0	26.4
940915	30.3	18.6	33.2
940916	30.3	18.6	31.7
940917	25.0	18.1	29.2
940918	27.2	20.2	28.2
940919	33.2	18.9	31.7
940920	27.2	18.3	23.8
940921	28.2	19.2	26.4
940922	23.2	18.9	25.0
940923	28.2	8.1	28.2
940924	24.4	21.8	28.2
940925	28.2	21.8	25.7
940926	18.9	17.8	24.4
940927	20.2	18.3	20.2
940928	24.4	18.9	22.2
940929	19.5	20.2	21.8
940930	26.4	17.8	25.7
941001	28.2	16.7	25.0
941002		16.9	22.2
941003	23.2	23.2	23.8
941004	18.1	19.5	21.0
941005	22.2	22.2	26.4
941006	17.6	23.2	31.7
941007	29.2	21.0	25.7
941008	20.6	23.8	23.2
941009	25.0	23.8	22.2
941010	22.2	18.6	19.2
941011	19.5	18.1	21.4
941012	21.4	19.5	
941013	21.0	18.9	25.0
941014	19.2	18.3	22.2
941015	18.1	19.2	
941016	21.8	18.3	24.4
941017	27.2	16.1	
941018	28.2	17.6	25.0
941019	21.0	17.1	25.0
941020	25.7	23.2	24.4
941021	21.4	24.4	31.7
941022	25.0	22.2	33.2
941023		26.4	27.2
941024	33.2	23.2	30.3

Date	SS	Night	SR
941025		21.4	17.8
941026	26.4	18.3	
941027	27.2	21.0	31.7
941028	23.8	21.4	27.2
941029	21.8	19.2	31.7
941030			
941031			
941101	23.2	21.4	24.4
941102	29.2	20.6	26.4
941103	25.0	21.0	22.7
941104	28.2	21.4	30.3
941105	25.0	19.5	23.2
941106	21.4	20.6	25.7
941107	35.2	19.5	23.2
941108	41.2	21.4	24.4
941109	30.3	21.4	30.3
941110	25.0	27.2	30.3
941111	31.7	22.2	33.2
941112	41.2	27.2	23.2
941113			
941114	41.2	26.4	
941115		20.6	
941116			
941117			
941118			
941119			
941120			
941121			
941122			
941123			
941124			
941125	41.2	18.1	
941126	27.2	(20.2)	25.0
941127	26.4	(20.2)	30.3
941128	16.9	21.4	22.7
941129	29.2	19.2	16.5
941130	33.2	18.9	29.2
941201	30.3	16.7	23.2
941202	30.3	23.8	28.2
941203	31.7		
941204			
941205	37.7	28.2	29.2
941206			

Date	SS	Night	SR
941207	37.7	23.2	33.2
941208	33.2	26.4	27.2
941209	31.7	24.4	
941210			
941211	41.2	23.8	31.7
941212	41.2	22.2	27.2
941213	37.7	25.7	35.2
941214	41.2	23.2	
941215			
941216	41.2	21.0	22.2
941217		23.2	
941218			
941219			
941220	23.8	17.8	22.7
941221	25.7	25.7	33.2
941222	31.7	25.7	28.2
941223	31.7	19.5	21.4
941224	33.2	19.9	23.2
941225	29.2	21.0	27.2
941226	37.7	23.2	17.3
941227	31.7	23.2	29.2
941228	23.8	23.2	23.8
941229	33.2	21.4	33.2
941230	35.2	23.8	27.2
941231	37.7	25.0	29.2

Mean ionospheric absorption L'(dB) at oblique incidence (A3)
$f = 270$ kHz
1995

Date	SS	Night	SR
950101	37.7	22.7	25.0
950102	30.3	21.8	27.2
950103	31.7	21.8	22.7
950104	25.7	21.0	21.8
950105	27.2	21.4	24.4
950106	29.2	21.0	25.0
950107	23.8	23.8	24.4
950108	37.7	24.4	35.2
950109	25.0	23.2	28.2
950110	37.7	27.2	35.2
950111			
950112	35.2	23.8	26.4
950113	23.8	21.0	(26.4)
950114	(33.2)	24.4	35.2
950115	37.7	23.8	37.7
950116	37.7	25.0	31.7
950117	37.7	24.4	
950118	33.2	23.2	47.2
950119	(25.0)	25.7	
950120	(23.8)	(23.2)	35.2
950121	27.2	21.0	37.7
950122			
950123	(30.3)	27.2	
950124			
950125	37.7	24.4	26.4
950126	27.2	24.4	31.7
950127	35.2	23.2	31.7
950128	27.2	23.8	28.2
950129	37.7	26.4	27.2
950130	28.2	31.7	31.7
950131	31.7	27.2	35.2
950201	29.2	23.8	47.2
950202	37.7	28.2	35.2
950203	33.2	31.7	37.7
950204	27.2	26.4	35.2
950205	41.2	28.2	35.2
950206	29.2	23.8	27.2
950207	37.7	21.4	23.2
950208	28.2	22.2	28.2

Date	SS	Night	SR
950209	41.2	19.9	22.2
950210	26.4	23.8	22.2
950211	22.2	22.2	23.2
950212	27.2	22.2	30.3
950213	41.2	21.8	31.7
950214	35.2	25.7	28.2
950215	37.7	26.4	37.7
950216	41.2	21.8	28.2
950217	26.4	22.2	31.7
950218	25.7	21.4	29.2
950219	37.7		
950220	30.3	21.0	31.7
950221	31.7	25.7	25.7
950222	28.2	21.4	
950223	37.7	19.5	25.0
950224	31.7	19.9	21.4
950225	20.2	25.0	28.2
950226	28.2	25.7	31.7
950227	24.4	23.2	30.3
950228	35.2	22.7	25.7
950301	29.2	21.0	28.2
950302	25.0	22.2	30.3
950303	24.4	21.8	29.2
950304	31.7	23.2	28.2
950305	27.2	20.6	29.2
950306	27.2	20.2	20.2
950307	33.2	19.2	23.8
950308	25.0	18.6	26.4
950309	20.2	18.6	23.2
950310	28.2	21.8	26.4
950311	31.7	25.0	23.2
950312	30.3		
950313	31.7	17.8	22.2
950314	35.2	19.9	20.2
950315	30.3	21.4	26.4
950316	37.7	21.4	23.8
950317	27.2	20.6	18.3
950318	37.7	21.4	25.0
950319	26.4	22.2	31.7
950320	31.7	23.2	19.2
950321	35.2	19.5	24.4
950322	30.3	21.0	22.2
950323	26.4	21.8	21.4

Date	SS	Night	SR
950324	19.5	21.0	21.8
950325	19.2	(16.7)	
950326			
950327	28.2	(19.9)	26.4
950328	27.2	(21.4)	23.8
950329	27.2	(20.6)	28.2
950330	19.5	(18.6)	27.2
950331	27.2	(19.2)	(26.4)
950401	29.2	20.2	28.2
950402	31.7	18.1	21.8
950403	28.2	18.6	18.9
950404	21.8	22.7	31.7
950405	19.5	21.8	23.8
950406	25.0	18.6	26.4
950407	24.4	19.2	25.0
950408	26.4	23.2	27.2
950409	25.7	21.0	24.4
950410	21.8	19.9	33.2
950411	26.4	18.6	23.2
950412	24.4	23.8	22.2
950413	25.7	21.8	21.8
950414	23.8	23.2	26.4
950415	26.4	21.4	19.2
950416	29.2	21.8	26.4
950417	25.7	22.2	21.8
950418	18.6	19.9	21.8
950419	18.1	16.5	18.6
950420	21.0	19.9	28.2
950421	18.6	22.7	27.2
950422	28.2	22.2	20.2
950423	30.3	23.2	23.8
950424	22.2	17.8	23.8
950425	24.4	23.8	21.0
950426	20.6	22.7	
950427	26.4	18.9	23.8
950428	23.2	18.9	22.2
950429	21.4	18.1	26.4
950430	21.4	24.4	25.7
950501	23.8	24.4	24.4
950502	25.0	23.2	19.5
950503	23.8	21.4	21.8
950504	28.2	23.8	29.2
950505	31.7	20.2	24.4

Date	SS	Night	SR
950506	31.7	25.0	23.8
950507	29.2	23.2	28.2
950508	37.7	29.2	23.2
950509	25.0	21.8	23.8
950510	27.2	19.5	25.7
950511	35.2		
950512	27.2	21.0	23.2
950513	25.7	20.2	25.0
950514	30.3	19.5	25.7
950515	29.2		
950516	41.2	21.4	31.7
950517	23.8		
950518	25.0		
950519	25.0	21.8	26.4
950520	22.7	23.2	24.4
950521	21.0	19.9	26.4
950522	26.4	20.2	28.2
950523	25.0	23.8	22.2
950524	30.3	21.0	26.4
950525	26.4	24.4	24.4
950526	27.2	20.6	27.2
950527	28.2	23.8	26.4
950528	27.2	19.5	24.4
950529	25.0	21.0	28.2
950530	23.2	20.2	25.0
950530	29.2	19.9	26.4
950601	25.7	23.2	21.0
950602	25.0	22.7	26.4
950603	26.4	20.2	24.4
950604	25.0	25.0	27.2
950605	23.2	20.2	28.2
950606	25.0	23.2	27.2
950607	28.2	20.2	26.4
950608	28.2	20.2	26.4
950609	21.4	20.6	27.2
950610	23.2	17.6	23.2
950611	23.2	25.0	24.4
950612	27.2	22.7	27.2
950613	25.0	18.3	26.4
950614	27.2	23.2	27.2
950615	24.4	19.5	26.4
950616	24.4	23.2	(27.2)
950617	25.0	21.8	27.2

Date	SS	Night	SR
950618	26.4	26.4	30.3
950619	26.4	25.7	25.7
950620	29.2	23.8	27.2
950621	25.0	23.8	30.3
950622	27.2	21.4	28.2
950623	29.2	21.4	29.2
950624	26.4		
950625			
950626	24.4	25.7	22.2
950627	23.8	22.2	25.0
950628	25.0	21.8	
950629	27.2	21.0	26.4
950630	27.2	22.2	27.2
950701	26.4	19.5	27.2
950702	33.2	24.4	35.2
950703	31.7	21.8	26.4
950704	26.4	22.7	27.2
950705	24.4	22.2	27.2
950706	25.0	21.4	26.4
950707	23.8	19.9	29.2
950708			
950709	25.0	24.4	30.3
950710	23.2	23.8	25.7
950711	33.2	26.4	27.2
950712	31.7	19.2	27.2
950713	26.4	19.2	25.7
950714	30.3	25.7	28.2
950715	29.2	23.8	27.2
950716	28.2	27.2	29.2
950717	37.7	21.4	28.2
950718	33.2	21.8	26.4
950719	25.7	24.4	27.2
950720	29.2	25.0	26.4
950721	28.2	21.0	27.2
950722	25.0	22.7	28.2
950723	26.4	19.9	26.4
950724	26.4	23.8	29.2
950725	28.2	21.4	30.3
950726	31.7	21.8	25.7
950727	30.3	21.4	26.4
950728	22.2	17.8	26.4
950729			
950730	27.2	19.5	26.4

Date	SS	Night	SR
950731	23.8	21.0	21.8
950801	23.2	19.9	26.4
950802	31.7	19.2	27.2
950803	25.0	22.2	26.4
950804	25.7	23.8	26.4
950805	25.0	21.8	25.0
950806			
950807	23.8	21.0	27.2
950808	27.2	22.7	28.2
950809	27.2	21.0	26.4
950810	25.0	21.8	25.7
950811	24.4	21.0	26.4
950812	23.2	21.0	26.4
950813	25.7	19.9	22.2
950814	24.4	19.9	23.2
950815	29.2	24.4	28.2
950816	26.4	21.8	26.4
950817	26.4	22.7	27.2
950818	20.6	19.9	27.2
950819			
950820			
950821			
950822	23.2	17.3	25.0
950823			
950824	22.2	21.8	29.2
950825	25.0	19.9	25.0
950826	22.7	19.2	26.4
950827	25.7	19.5	23.8
950828	21.0	18.6	(25.0)
950829	23.8	21.0	26.4
950830	23.2	21.8	26.4
950831	22.7	19.2	21.8
950901	22.7	18.1	27.2
950902	25.7	18.3	24.4
950903	23.2	19.5	27.2
950904	33.2	27.2	33.2
950905	31.7	30.3	37.7
950906	37.7	30.3	35.2
950907	30.3	29.2	37.7
950908	37.7	28.2	35.2
950909	35.2	27.2	31.7
950910	30.3	20.6	33.2
950911	29.2	21.4	31.7

Date	SS	Night	SR
950912	22.7	21.8	26.4
950913	25.7	19.2	30.3
950914	24.4	20.2	30.3
950915	33.2	23.8	29.2
950916	26.4	20.6	28.2
950917			
950918	24.4	20.2	27.2
950919	24.4	18.6	23.8
950920	23.8	21.4	23.8
950921			
950922	26.4	21.4	31.7
950923			
950924			
950925			
950926	25.7	17.6	28.2
950927	21.0	25.0	23.2
950928	18.6	19.5	
950929	21.8	19.5	22.2
950930	27.2	18.3	21.8
951001	22.7	20.2	23.2
951002	21.8		
951003	19.9	19.9	23.2
951004			
951005	21.4	18.6	21.0
951006	26.4	18.2	18.9
951007	21.0	20.2	24.4
951008	25.0	18.6	23.2
951009			
951010	22.7	19.5	22.7
951011			
951012	23.8	18.9	25.7
951013	25.0	19.5	26.4
951014	18.9	19.5	26.4
951015	24.4	18.1	22.2
951016	28.2	18.6	20.6
951017	21.8	21.4	22.7
951018	28.2		
951019	25.7	20.6	24.4
951020	21.0	20.6	22.7
951021	25.7	20.6	22.7
951022	23.2	18.1	18.1
951023	22.7	21.8	24.4
951024	20.6	21.4	20.6

Date	SS	Night	SR
951025	(22.7)	18.1	
951026		18.1	21.8
951027	27.2	20.6	
951028	22.7	19.2	22.2
951029	25.7	19.2	21.8
951030	21.8	20.2	23.8
951031	22.7	18.1	27.2
951101	22.7	20.6	26.4
951102	23.2	23.2	26.4
951103	23.2	23.8	21.4
951104	25.0	18.6	27.2
951105	24.4	21.4	28.2
951106	25.7	24.4	22.7
951107	27.2	19.9	27.2
951108	30.3	23.8	28.2
951109	29.2	20.6	25.7
951110	25.0	19.9	21.8
951111	23.8	19.9	27.2
951112	29.2	21.4	23.2
951113	23.2	22.2	23.2
951114	29.2	18.6	23.8
951115	25.7	18.6	24.4
951116	33.2	19.5	27.2
951117	26.4	21.0	28.2
951118	27.2	19.5	28.2
951119	33.2	25.0	23.2
951120	28.2	23.8	41.2
951121	30.3	19.9	28.2
951122	35.2	21.4	28.2
951123	25.0	23.8	22.7
951124	33.2	27.2	28.2
951125	28.2	21.0	25.0
951126	19.5	24.4	21.4
951127	25.7	24.4	21.8
951128	27.2	19.5	21.0
951129	21.8	19.5	20.6
951130	18.6	21.4	23.2
951201	23.8	21.8	24.4
951202	21.0	18.9	23.2
951203	29.2	20.6	24.4
951204	26.4	24.4	25.0
951205	25.7	19.5	31.7
951206	33.2	24.4	24.4

Date	SS	Night	SR
951207	24.4	21.4	28.2
951208	26.4	21.8	33.2
951209	37.7	20.6	21.8
951210	24.4	19.5	25.0
951211	28.2	20.6	22.2
951212	18.3	22.2	21.4
951213	23.2	21.0	20.6
951214	21.8	21.4	26.4
951215			
951216	28.2	20.2	21.4
951217	27.2	(19.2)	
951218	28.2	21.4	24.4
951219	25.0	21.4	23.2
951220	29.2	21.0	
951221	31.7	23.2	25.7
951222	33.2	23.8	
951223			
951224	35.2	23.8	33.2
951225	35.2	25.0	33.2
951226	35.2	29.2	37.7
951227	31.7	23.8	35.2
951228	33.2	23.2	31.7
951229	30.3	21.8	35.2
951230	35.2	23.2	30.3
951231	30.3	21.8	30.3

Mean ionospheric absorption L'(dB) at oblique incidence (A3)
$f = 272$ kHz
1996

Date	SS	Night	SR
960101	23.2	25.0	30.3
960102	33.2	19.9	33.2
960103	33.2	20.6	28.2
960104	35.2	23.2	27.2
960105	29.2	(25.7)	
960106	35.2	23.2	29.2
960107	30.3	23.2	25.0
960108			
960109			
960110	27.2	25.7	29.2
960111			
960112	24.4	22.7	27.2
960113	28.2	23.2	28.2
960114	33.2	23.2	23.2
960115	37.7	20.6	23.2
960116	29.2	25.7	27.2
960117	27.2	21.4	23.2
960118	33.2	24.4	29.2
960119	24.4	23.8	24.4
960120	29.2	23.8	24.4
960121	28.2	21.0	26.4
960122	30.3	28.2	25.7
960123	28.2	24.4	28.2
960124	23.8	24.4	25.7
960125	35.2	22.2	23.2
960126	29.2	23.2	27.2
960127	31.7	23.2	27.2
960128	28.2	24.4	27.2
960129	28.2	23.8	29.2
960130	29.2	25.7	31.7
960131	30.3	21.4	28.2
960201	37.7	21.0	29.2
960202	28.2	22.2	22.7
960203	31.7	27.2	29.2
960204	30.3	26.4	27.2
960205	27.2	22.7	26.4
960206	27.2	26.4	29.2
960207	33.2	21.0	28.2
960208	37.7	25.0	29.2

Date	SS	Night	SR
960209	33.2	21.0	27.2
960210	35.2	23.2	33.2
960211	41.2	23.8	24.4
960212	24.4	26.4	28.2
960213	27.2	21.8	21.8
960214	21.8	19.2	23.2
960215	21.0	21.0	26.4
960216	23.8	21.4	27.2
960217	29.2	22.7	31.7
960218	37.7	18.3	31.7
960219	25.7	22.7	29.2
960220	29.2	20.6	31.7
960221	27.2	23.8	
960222	30.3	21.8	27.2
960223	27.2	20.6	24.4
960224	21.8	19.5	22.2
960225	22.2	19.5	21.4
960226	21.4	23.2	24.4
960227	20.2	21.8	19.5
960228	27.2	23.2	23.8
960229	31.7	22.7	28.2
960301	35.2	25.7	27.2
960302	27.2	23.2	27.2
960303			
960304	21.4	22.7	24.4
960305	24.4	19.5	21.8
960306	20.2	18.3	19.2
960307	18.3	19.2	23.2
960308	18.3	18.9	21.4
960309	26.4	20.2	24.4
960310	24.4	22.7	21.4
960311	25.7	18.3	21.8
960312	25.0	20.6	20.2
960313	28.2	18.3	31.7
960314	24.4	21.0	19.5
960315	24.4	21.4	26.4
960316	25.7	20.2	19.2
960317	26.4	25.0	22.7
960318	24.4	27.2	19.2
960319	28.2	21.8	21.0
960320	22.7	26.4	23.8
960321	18.3	20.2	22.2
960322	25.7	24.4	18.1

Date	SS	Night	SR
960323	22.7	17.3	27.2
960324			
960325	23.2	20.2	23.8
960326	22.2	25.0	28.2
960327			
960328	25.0	21.4	20.2
960329	27.2	21.0	28.2
960330	26.4	18.9	
960331	26.4	17.8	27.2
960401	23.2	24.4	23.2
960402	19.2	18.9	19.9
960403	25.7	19.2	19.5
960404	22.7	21.4	21.0
960405	27.2	19.9	27.2
960406	23.2	21.4	26.4
960407	18.6	21.8	21.8
960408	24.4	16.9	21.8
960409	26.4	19.2	19.2
960410	18.3	23.2	20.2
960411	22.7	18.3	22.7
960412	19.5	19.2	23.8
960413	23.2	22.2	17.8
960414	22.2	18.9	19.5
960415	25.0	21.0	20.6
960416	16.5	19.9	25.0
960417	23.2	21.4	20.2
960418	20.6	21.8	23.8
960419	37.7	19.2	19.2
960420	18.1	16.9	21.4
960421	25.7	19.9	26.4
960422	22.2	21.8	19.9
960423	22.7	18.3	22.7
960424	19.2	18.1	
960425	27.2	18.3	25.7
960426	22.7	23.2	23.8
960427	24.4	15.7	26.4
960428	29.2	17.8	29.2
960429	26.4	23.8	23.2
960430	24.4	22.2	27.2
960501			
960502	27.2	24.4	30.3
960503	33.2	26.4	27.2
960504	25.0	17.8	24.4

Date	SS	Night	SR
960505	28.2	17.8	22.2
960506	22.7	23.8	29.2
960507	33.2	17.3	24.4
960508	25.0	22.7	25.7
960509			
960510	25.7	29.2	25.0
960511	33.2	19.2	33.2
960512	24.4	25.7	27.2
960513	25.7	27.2	31.7
960514	33.2	18.1	30.3
960515	30.3	21.0	30.3
960516	33.2	21.4	26.4
960517	27.2	18.6	23.2
960518	23.8	21.4	27.2
960519	31.7	21.0	28.2
960520	24.4	24.4	29.2
960521	33.2	23.8	27.2
960522	24.4	23.2	31.7
960523	31.7	24.4	23.8
960524	29.2	21.8	25.7
960525	30.3	25.7	28.2
960526	29.2	19.9	25.0
960527	21.8	23.8	30.3
960528	33.2	21.8	27.2
960529	30.3	20.6	24.4
960530			
960531	28.2	25.0	26.
960601	25.7	23.2	24.4
960602	27.2	20.6	25.7
960603	30.3	22.7	28.2
960604	30.3	21.8	33.2
960605	29.2	23.2	33.2
960606	27.2	19.9	27.2
960607	22.7	21.4	(29.2)
960608	35.2	23.2	31.7
960609	21.8	21.4	31.7
960610	24.4	23.2	
960611	30.3	23.2	29.2
960612	24.4	21.8	33.2
960613	27.2	26.4	27.2
960614	29.2	24.4	31.7
960615	28.2	20.6	(27.2)
960616	24.4	21.4	27.2

Date	SS	Night	SR
960617	27.2	22.7	28.2
960618	27.2	22.2	30.3
960619	35.2	21.4	27.2
960620	26.4	24.4	30.3
960621	31.7	21.8	(28.2)
960622	23.8	27.2	(31.7)
960623	30.3	28.2	29.2
960624	33.2	23.2	28.2
960625			
960626	31.7	21.4	
960627	37.7	23.8	29.2
960628	30.3	29.2	28.2
960629			
960630	28.2	23.2	
960701	23.2	21.4	28.2
960702	27.2	21.8	
960703	24.4	24.4	26.4
960704	24.4	24.4	25.7
960705	23.8	21.0	27.2
960706	22.7	23.2	26.4
960707	22.7	21.8	31.7
960708	26.4	21.8	27.2
960709	28.2	21.8	25.0
960710	27.2	24.4	27.2
960711	21.0	19.9	27.2
960712	26.4	25.0	27.2
960713	27.2	27.2	27.2
960714	(23.8)	19.9	27.2
960715	25.0	21.0	33.2
960716	23.2	23.8	29.2
960717	29.2	27.2	22.2
960718	29.2	20.6	25.0
960719	29.2	23.8	
960720	26.4	24.4	33.2
960721	28.2	27.2	26.4
960722	30.3	23.8	30.3
960723	27.2	25.0	24.4
960724	30.3	25.7	27.2
960725	30.3	25.0	27.2
960726	29.2	21.4	23.8
960727	27.2	19.5	29.2
960728	29.2	21.8	25.0
960729	25.0	22.7	30.3

Date	SS	Night	SR
960730	27.2	22.2	29.2
960731	35.2	26.4	28.2
960801	28.2	26.4	24.4
960802	29.2	21.4	29.2
960803	25.7	21.8	29.2
960804	33.2	23.2	24.4
960805	28.2	21.4	24.4
960806	31.7	18.3	31.7
960807	26.4	21.4	24.4
960808	21.8	21.8	27.2
960809	22.7	18.1	24.4
960810	23.8	25.0	25.0
960811	27.2	21.8	28.2
960812	24.4	23.2	
960813			
960814			
960815			
960816			
960817			
960818			
960819			
960820			
960821			
960822			
960823			
960824			
960825			
960826			
960827			
960828			
960829			
960830			
960831			
960901			
960902			
960903			
960904			
960905			
960906			
960907			
960908			
960909			
960910			

Date	SS	Night	SR
960911			
960912			
960913			
960914			
960915			
960916			
960917			
960918			
960919			
960920			
960921			
960922	25.0	19.2	27.2
960923	20.2	25.0	27.2
960924	25.0	20.2	27.2
960925	29.2	23.2	28.2
960926	26.4	23.8	28.2
960927	33.2	20.2	26.4
960928	27.2	21.8	27.2
960929	29.2	21.4	27.2
960930	24.4	21.0	18.6
961001	29.2	19.2	23.8
961002	24.4	19.2	27.2
961003	20.6	21.0	25.0
961004	25.0	18.9	22.7
961005	23.2	19.2	26.4
961006	26.4	20.2	25.0
961007	23.8	17.6	22.2
961008	21.0	18.6	20.0
961009	24.4	18.1	23.2
961010	21.4	20.2	22.7
961011	24.4	18.1	21.8
961012	21.8	17.1	19.2
961013	21.4	19.2	23.8
961014	21.0	19.2	22.7
961015	19.2	20.2	18.1
961016	22.2	19.2	28.2
961017	29.2	21.4	24.4
961018	24.4	20.2	29.2
961019	28.2	(19.2)	
961020	19.5	21.0	23.2
961021	20.6	19.5	22.2
961022	22.2	22.2	35.2
961023	29.2	21.8	

Date	SS	Night	SR
961024	35.2	21.0	22.2
961025	24.4	21.0	24.4
961026	22.2	18.3	24.4
961027	23.8	18.9	25.0
961028	25.7	18.3	30.3
961029	21.4	18.9	20.2
961030	27.2	17.6	22.2
961031	22.2	16.3	21.4
961101	19.2	19.2	20.6
961102	19.2	16.3	22.7
961103	19.5	15.9	23.2
961104	22.2	17.6	19.5
961105	24.4	18.6	21.4
961106	23.8	18.6	23.8
961107	27.2	16.5	24.4
961108	27.2	19.9	24.4
961109	27.2	19.5	24.4
961110	31.7	19.9	24.4
961111	25.7	21.4	24.4
961112	27.2	22.4	21.4
961113	27.2	21.4	33.2
961114	33.2	23.2	29.2
961115	35.2	23.2	33.2
961116	33.2	24.4	27.2
961117	28.2	24.4	(28.2)
961118	33.2	20.6	30.3
961119	25.7	19.9	26.4
961120	25.7	20.6	23.2
961121	26.4	18.9	25.0
961122	21.4	21.0	23.8
961123	21.8	21.4	21.8
961124	19.5	18.6	23.8
961125	22.7	23.2	23.8
961126	29.2	19.9	29.2
961127	30.3	21.4	26.4
961128	28.2	21.4	23.2
961129	33.2	19.2	27.2
961130	35.2	(23.2)	
961201	29.2	20.6	22.2
961202	35.2	23.8	31.7
961203	35.2	23.2	21.8
961204	22.7	23.2	23.2
961205	25.7	21.4	24.4

Date	SS	Night	SR
961206	23.2	22.2	26.4
961207	33.2	23.8	23.2
961208	29.2	23.8	
961209	31.7	24.4	24.4
961210	28.2	23.2	27.2
961211	28.2	25.7	28.2
961212	33.2	23.8	26.4
961213	21.8	19.2	
961214	29.2	19.2	27.2
961215	20.6	18.6	27.2
961216	27.2	22.2	29.2
961217	26.4	19.2	31.7
961218	29.4		
961219			
961220	25.7	20.6	29.2
961221	21.0	19.2	25.7
961222	27.2	20.6	27.2
961223	23.2	19.5	23.2
961224	23.2	18.9	
961225	33.2	23.2	26.4
961226	33.2	23.2	23.2
961227	41.2	21.0	27.2
961228	41.2	21.4	23.8
961229	41.2	26.4	26.4
961230	37.7	25.7	27.2
961231			

Mean ionospheric absorption L'(dB) at oblique incidence (A3)
$f = 272$ kHz
1997

Date	SS	Night	SR
970101	37.7	23.2	26.4
970102	41.2	24.4	27.2
970103	37.7	24.4	31.7
970104	41.2	29.2	31.7
970105	37.7	24.4	33.2
970106	33.2	23.2	25.0
970107	28.2	23.8	23.8
970108	27.2	23.8	25.0
970109	25.0	21.4	25.0
970110	27.2	23.8	25.7
970111	23.8	21.4	30.3
970112	33.2	26.4	28.2
970113	29.2	29.2	25.0
970114	31.7	23.8	26.4
970115	25.0	26.4	27.2
970116	26.4	27.2	28.2
970117	31.7	24.4	26.4
970118	31.7	23.8	28.2
970119	35.2	26.4	26.4
970120	22.2	23.8	28.2
970121	37.7	27.2	28.2
970122	35.2	20.6	26.4
970123	37.7	23.2	27.2
970124	37.7	24.4	29.2
970125	37.7	24.4	27.2
970126	28.2	22.2	26.4
970127	28.2	22.2	27.2
970128	31.7	27.2	27.2
970129	27.2	25.0	27.2
970130	33.2	22.7	27.2
970131	33.2	26.4	25.0
970201	31.7	21.4	26.4
970202	33.2	23.2	23.2
970203	28.2	25.0	29.2
970204	33.2	25.7	25.0
970205	31.7	19.9	37.7
970206	47.2	25.7	29.2
970207	31.7	26.4	41.2
970208	28.2	27.2	30.3

Date	SS	Night	SR
970209	30.3	28.2	37.7
970210	37.7	26.4	29.2
970211	30.3	23.8	29.2
970212	33.2	25.7	28.2
970213	27.2	23.8	25.0
970214	27.2	20.6	28.2
970215	37.7	22.7	25.0
970216	33.2	22.2	27.2
970217	35.2	27.2	25.0
970218	37.7	24.4	31.7
970219	37.7	21.4	29.2
970220	41.2	18.3	24.4
970221	35.2	23.2	26.4
970222	33.2	19.5	22.2
970223	37.7	21.0	22.2
970224	27.2	20.6	21.0
970225	25.7	21.0	26.4
970226	24.4	19.5	
970227	28.2	21.8	25.7
970228	33.2	21.8	23.8
970301	41.2	19.2	24.4
970302	23.8	23.8	23.2
970303	33.2	22.7	29.2
970304	35.2	19.5	21.4
970305	29.2	21.0	22.7
970306	26.4	21.4	19.2
970307	19.9	19.9	19.9
970308	28.2	23.2	25.0
970309	33.2	19.5	24.4
970310	25.0	23.2	23.8
970311	27.2	22.7	26.4
970312	33.2	21.4	24.4
970313	24.4	23.2	28.2
970314	24.4	19.5	24.4
970315	23.2	23.8	24.4
970316	24.4	19.9	28.2
970317	28.2	19.2	25.0
970318	25.7	19.5	26.4
970319	30.3	19.2	25.7
970320	23.8	22.2	22.7
970321		22.7	20.6
970322			23.2
970323	27.2	23.8	

Date	SS	Night	SR
970324			18.9
970325	27.2	22.2	16.3
970326			21.4
970327		21.0	23.2
970328	20.6	22.2	20.6
970329			
970330		21.0	
970331			
970401			23.2
970402	23.2	19.2	
970403	19.9	19.5	
970404		21.0	
970405	26.4		
970406	25.7	23.2	
970407	23.8	21.8	24.4
970408	23.8	(21.8)	29.2
970409			28.2
970410	25.7	19.5	23.2
970411	21.4	23.8	26.4
970412	22.7	(23.2)	
970413	23.8	18.9	23.8
970414		18.3	23.2
970415	20.2	18.6	19.5
970416			
970417	24.4	21.0	24.4
970418			
970419	26.4	25.0	
970420		22.7	
970421	24.4	20.6	
970422	23.2		
970423	21.8	23.8	
970424	26.4	27.2	
970425			
970426	23.8		
970427	27.2	(19.5)	
970428	28.2	23.2	26.4
970429	23.8	18.6	23.2
970430	31.7	26.4	24.4
970501	25.0	23.8	17.6
970502	28.2	(21.8)	19.9
970503	23.2	22.7	21.4
970504	25.0	19.9	23.8
970505	26.4	25.7	25.0

Date	SS	Night	SR
970506	33.2	20.2	23.2
970507	28.2	20.2	22.2
970508	25.7	21.0	25.7
970509	22.2	21.0	29.2
970510	21.4	19.2	23.8
970511	27.2	20.2	21.4
970512			26.4
970513	27.2		33.2
970514	29.2	18.9	27.2
970515	29.2	23.2	27.2
970516	25.7	22.7	23.8
970517	25.7	21.4	27.2
970518	23.8	22.2	28.2
970519	22.7	20.2	25.0
970520	21.0	21.4	41.2
970521	24.4	19.5	22.2
970522	27.2	18.3	21.0
970523	28.2	24.4	24.4
970524	23.2	25.0	28.2
970525	25.0	20.2	25.7
970526	25.7	25.7	26.4
970527	29.2	19.5	30.3
970528	31.7	22.2	30.3
970529	23.8	23.2	28.2
970530	26.4	22.7	30.3
970531	26.4	21.8	26.4
970601	26.4	22.7	28.2
970602	29.2	23.8	26.4
970603	27.2	19.2	23.2
970604	26.4	20.2	31.7
970605	24.4	20.2	25.7
970606	23.8	23.8	(24.4)
970607	30.3	20.6	(26.4)
970608	29.2	22.2	26.4
970609	23.8	23.8	27.2
970610	33.2	24.4	31.7
970611	24.4	20.6	24.4
970612	27.2	22.2	22.7
970613	29.2	18.3	23.8
970614	23.8	18.1	26.4
970615			
970616			27.2
970617	23.2	18.3	23.2

Date	SS	Night	SR
970618	30.3	24.4	27.2
970619	29.2	24.4	27.2
970620	26.4	23.8	29.2
970621	27.2	20.6	26.4
970622	26.4	19.5	26.4
970623	30.3	17.3	26.4
970624	28.2	20.2	23.2
970625	29.2	23.8	
970626	30.3	21.8	27.2
970627	26.4	21.4	30.3
970628	31.7	22.2	35.2
970629	30.3	21.8	26.4
970630	29.2	23.2	25.0
970701	27.2	22.2	30.3
970702	28.2	16.5	27.2
970703	25.7	19.5	23.2
970704	30.3	21.0	26.4
970705	29.2	16.5	27.2
970706	21.4	18.6	24.4
970707	26.4	24.4	21.8
970708	24.4	25.7	29.2
970709	29.2	21.8	27.2
970710	30.3	27.2	31.7
970711	35.2	21.4	28.2
970712	30.3	19.9	24.4
970713	27.2	21.0	26.4
970714	26.4	21.0	26.4
970715	25.0	24.4	29.2
970716	30.3	24.4	26.4
970717	30.3	20.6	33.2
970718	31.7	27.2	31.7
970719	33.2	21.8	23.8
970720	28.2	19.2	30.3
970721	27.2	20.2	27.2
970722	27.2	18.6	28.2
970723	33.2	23.8	26.4
970724	30.3	23.8	26.4
970725	31.7	23.2	23.8
970726	30.3	18.3	29.2
970727	23.8	21.4	20.6
970728	30.3	26.4	28.2
970729	30.3	20.2	28.2
970730	26.4	19.5	24.4

Date	SS	Night	SR
970731	31.7	19.5	33.2
970801	30.3	23.2	27.2
970802	27.2	23.2	29.2
970803	26.4	20.2	25.7
970804	30.3	21.0	25.7
970805	27.2	16.3	18.3
970806	21.4	21.4	24.4
970807	29.2	16.3	23.8
970808	29.2	20.2	24.4
970809	26.4	19.5	25.0
970810	27.2	20.2	33.2
970811	22.7	18.1	22.2
970812	30.3	18.3	23.2
970813	21.0	20.2	24.4
970814	30.3	23.8	26.4
970815	33.2	21.0	30.3
970816			
970817	27.2	21.0	20.6
970818			29.2
970819	29.2	21.4	29.2
970820	28.2	26.4	30.3
970821	26.4	19.5	27.2
970822	22.7	21.4	28.2
970823	21.4	18.6	24.4
970824	20.6	23.2	30.3
970825	26.4	21.4	23.8
970826	23.2	17.8	26.4
970827	25.0	21.4	30.3
970828	22.7	21.4	27.2
970829	30.3	19.9	30.3
970830	23.8	19.2	27.2
970831	27.2	18.1	29.2
970901	23.8	21.4	30.3
970902	23.8	19.9	
970903	22.2	21.4	29.2
970904	26.4	24.4	27.2
970905	21.4	18.6	30.3
970906	27.2	21.0	24.4
970907	35.2	20.6	37.7
970908	37.7	31.7	41.2
970909	41.2	31.7	41.2
970910	41.2	33.2	41.2
970911	37.7	24.4	37.7

Date	SS	Night	SR
970912	37.7	30.3	41.2
970913	41.2	31.7	26.4
970914	19.9	19.5	26.4
970915	23.2	21.4	28.2
970916	23.2	21.8	30.3
970917	22.7	21.0	28.2
970918	22.2	24.4	26.4
970919	26.4	21.4	26.4
970920	25.0	21.8	29.2
970921	30.3	21.4	33.2
970922	26.4	18.9	24.4
970923	25.0	21.4	26.4
970924	21.8	17.6	24.4
970925	28.2	17.8	26.4
970926	21.4	21.8	26.4
970927	22.2	21.4	27.2
970928	25.0	18.9	24.4
970929	22.2	18.3	25.0
970930	23.8	17.3	21.0
971001	26.4	22.2	25.0
971002	19.9	19.5	29.2
971003	26.4	18.1	21.0
971004	23.2	19.5	21.4
971005			
971006	23.8	19.2	21.4
971007	24.4	17.6	21.4
971008	23.2	18.9	21.4
971009	23.2	18.1	23.2
971010	29.2	23.8	24.4
971011	23.2	21.8	21.4
971012	23.2	21.4	22.2
971013	23.8	19.2	22.2
971014	20.2	16.7	21.0
971015	21.8	18.1	24.4
971016	18.1	18.6	23.8
971017	21.4	16.9	20.6
971018	23.2	18.6	23.8
971019	20.6	19.2	26.4
971020	21.0	19.5	27.2
971021	27.2	18.3	26.4
971022	27.2	19.2	27.2
971023	22.7	21.4	26.4
971024	22.7	21.4	23.2

Date	SS	Night	SR
971025	19.9	16.5	25.7
971026	26.4	19.2	26.4
971027	21.0	20.6	27.2
971028	19.2	21.0	26.4
971029	21.4	19.2	
971030	21.0	18.1	18.1
971031	28.2	19.9	25.0
971101	21.8	18.3	21.0
971102	22.7	17.8	(23.2)
971103	21.4	18.6	19.5
971104	25.7	17.8	21.0
971105	24.4	19.9	28.2
971106	23.8	23.2	31.7
971107	25.7	19.2	21.0
971108	23.8	24.4	28.2
971109	27.2	19.9	33.2
971110	23.8	21.8	31.7
971111	31.7	23.2	28.2
971112	33.2	20.6	28.2
971113	30.3	21.8	23.2
971114	35.2	23.2	23.2
971115	(27.2)	23.8	29.2
971116	27.2	21.4	25.7
971117	26.4	22.2	21.4
971118	28.2	21.4	25.7
971119	27.2	20.6	25.0
971120	30.3	23.8	26.4
971121	31.7	19.2	23.8
971122	28.2	21.0	21.4
971123	26.4	22.2	18.3
971124	23.2	19.5	19.2
971125	29.2	18.3	21.4
971126	26.4	20.2	23.2
971127	21.0	19.9	21.8
971128	30.3	19.5	23.2
971129	27.2	23.8	31.7
971130	33.2	21.0	28.2
971201	31.7	19.2	26.4
971202	31.7	19.5	29.2
971203	27.2	19.9	27.2
971204	31.7	18.6	27.2
971205	30.3	20.6	29.2
971206	23.2	20.6	31.7

Date	SS	Night	SR
971207	30.3	21.0	28.2
971208	31.7	23.2	29.2
971209	27.2	25.0	26.4
971210	26.4	22.2	33.2
971211	29.2	21.4	26.4
971212	35.2	23.8	25.7
971213	31.7	19.9	28.2
971214	33.2	19.9	28.2
971215	33.2	23.2	25.0
971216	33.2	18.6	
971217	26.4	22.7	
971218	25.7	21.0	27.2
971219	30.3	21.4	27.2
971220	26.4	21.0	27.2
971221	23.8	21.0	27.2
971222	22.7	21.0	28.2
971223			
971224	26.4	21.0	27.2
971225	23.8	19.9	35.2
971226	31.7	19.2	28.2
971227	25.7	19.5	29.2
971228	31.7	23.2	31.7
971229	28.2	18.6	25.0
971230	22.7	25.0	23.2
971231	27.2	19.2	26.4

Mean ionospheric absorption L' (dB) at oblique incidence (A3)
$f = 272$ kHz
1998

Date	SS	Night	SR
980101	16.3	21.0	24.4
980102	30.3	17.8	20.2
980103	28.2	21.4	21.4
980104	22.7	23.2	27.2
980105	25.0	19.5	19.9
980106	23.2	23.8	31.7
980107	29.2	23.2	29.2
980108	28.2	25.0	23.8
980109	26.4	27.2	33.2
980110	33.2	25.0	29.2
980111	37.7	21.0	26.4
980112	41.2	30.3	21.0
980113	41.2	31.7	28.2
980114	37.7	31.7	25.7
980115	28.2	28.2	29.2
980116	35.2	28.2	35.2
980117	35.2	23.8	37.7
980118	33.2	23.8	35.2
980119	31.7	23.8	31.7
980120	41.2	21.4	27.2
980121	35.2	21.4	29.2
980122	33.2	23.8	29.2
980123	33.2	19.5	23.8
980124	35.2	23.8	31.7
980125	35.2	21.4	28.2
980126	31.7	21.0	30.3
980127	25.0	20.6	24.4
980128	24.4	19.5	29.2
980129	21.8	24.4	21.8
980130	31.7	24.4	28.2
980131	25.0	23.8	24.4
980201	25.7	19.5	21.8
980202	24.4	24.4	24.4
980203	27.2	25.0	27.2
980204	30.3	27.2	28.2
980205	28.2	23.8	29.2
980206	30.3	22.7	29.2
980207	31.7	26.4	31.7
980208			

Date	SS	Night	SR
980209	29.2	27.2	
980210	35.2	25.0	33.2
980211	33.2	24.4	30.3
980212	37.7	23.2	35.2
980213	31.7	23.8	37.7
980214	35.2	25.7	25.0
980215	33.2	21.4	33.2
980216	37.7	28.2	31.7
980217	31.7	23.8	29.2
980218	30.3	23.2	25.7
980219	27.2	23.2	30.3
980220	27.2	23.2	31.7
980221	25.0	25.7	29.2
980222	25.7	30.3	31.7
980223	31.7	23.2	35.2
980224	30.3	23.2	31.7
980225	33.2	24.4	
980226	30.3	27.2	29.2
980227	22.7	25.0	25.7
980228	30.3	22.7	29.2
980301	30.3	25.0	33.2
980302	28.2	22.7	27.2
980303	37.7	25.0	33.2
980304	33.2	27.2	33.2
980305	25.7	25.0	29.2
980306	35.2	27.2	27.2
980307	37.7	21.8	30.3
980308	30.3	22.7	31.7
980309	25.7	23.2	28.2
980310	33.2	28.2	29.2
980311	31.7	26.4	33.2
980312	33.2	23.8	28.2
980313	30.3	25.7	29.2
980314	31.7	25.7	25.0
980315	29.2	23.2	31.7
980316	31.7	26.4	28.2
980317			
980318	19.9	21.8	24.4
980319	25.7	22.2	25.0
980320	25.0	23.8	21.4
980321	25.0	21.4	23.8
980322	27.2	22.2	22.2
980323	25.0	20.6	23.8

Date	SS	Night	SR
980324	20.6	18.9	21.0
980325	24.4	18.3	23.8
980326	28.2	27.2	21.8
980327	25.8	20.6	20.6
980328	29.2	19.9	28.2
980329	31.7	28.2	24.4
980330	19.5	17.8	19.5
980331	25.0	16.5	21.4
980401	18.6	18.1	22.7
980402	22.7	16.3	20.2
980403	22.2	19.5	23.2
980404	20.6	18.9	20.6
980405	24.4	17.8	21.8
980406	23.8	18.3	27.2
980407	24.4	(18.3)	23.8
980408	24.4	17.8	
980409	21.8	20.2	25.7
980410	27.2	25.0	24.4
980411	25.7	20.2	23.2
980412	31.7	25.0	23.2
980413	29.2	20.6	23.2
980414	22.2	19.5	21.4
980415	29.2	23.8	21.8
980416	21.8	18.1	22.2
980417	19.9	24.4	21.4
980418	17.8	21.8	25.0
980419	23.8	18.3	26.4
980420	29.2	19.5	23.2
980421	28.2	19.9	21.4
980422	22.2	21.4	
980423	21.4	19.5	19.9
980424	23.4	18.6	25.0
980425	24.4	25.0	18.6
980426	23.2	23.2	19.9
980427	24.4	22.2	22.7
980428	20.6	21.4	23.8
980429	28.2	21.0	23.2
980430	23.2	19.2	21.4
980501	28.2	23.2	25.0
980502	31.7	23.8	22.2
980503	20.6	24.4	23.2
980504	26.4	22.2	22.2
980505	28.2	24.4	24.4

Date	SS	Night	SR
980506	25.0	24.4	25.7
980507	29.2	18.1	28.2
980508	30.3	23.2	30.3
980509	28.2	21.0	28.2
980510	28.2	24.4	29.2
980511	27.2	25.0	24.4
980512	29.2		
980513	37.7	23.8	33.2
980514	19.9	18.1	26.4
980515	26.4	23.2	22.7
980516	24.4	22.7	23.8
980517	22.2	18.6	25.0
980518	31.7	29.2	28.2
980519	28.2	27.2	29.2
980520	29.2	26.4	29.2
980521	31.7	23.2	23.2
980522	28.2	23.2	25.0
980523	33.2	23.8	23.8
980524	28.2	21.0	29.2
980525	26.4	21.4	27.2
980526	21.8	22.2	31.7
980527	24.4	24.4	24.4
980528	25.0	22.2	31.7
980529	27.2	23.8	30.3
980530	27.2	23.2	26.4
980531	26.4	(21.4)	28.2
980601	28.2	19.5	31.7
980602	28.2	23.2	28.2
980603	33.2	24.4	27.2
980604	26.4	26.4	31.7
980605	26.4	26.4	28.2
980606	33.2	26.4	35.2
980607	35.2	21.4	37.7
980608	26.4	27.2	24.4
980609	29.2	23.2	28.2
980610	35.2	23.8	24.4
980611	26.4	24.4	28.2
980612	23.2	23.8	35.2
980613	18.1	24.4	30.3
980614	26.4	21.8	23.2
980615	23.2	24.4	27.2
980616	28.2	23.2	22.7
980617	26.4	20.6	24.4

Date	SS	Night	SR
980618	28.2	26.4	24.4
980619	35.2	19.9	30.3
980620	28.2	27.2	(26.4)
980621	25.7	20.6	31.7
980622	24.4	27.2	23.2
980623	30.3	21.8	25.0
980624	28.2	23.8	
980625	23.2	21.4	29.2
980626	26.4	23.2	27.2
980627	26.4	25.7	29.2
980628	25.0	22.7	27.2
980629	25.0	25.7	21.8
980630	29.2	24.4	29.2
980701	29.2	27.2	27.2
980702	29.2	21.8	23.2
980703	29.2	23.2	27.2
980704	24.4	23.8	31.7
980705	23.2	27.2	28.2
980706	33.2	22.7	23.2
980707	28.2	22.2	28.2
980708	25.0	21.0	25.0
980709	30.3	22.2	26.4
980710	25.0	21.4	23.2
980711	23.8	25.7	28.2
980712	27.2	23.2	23.2
980713	30.3	21.0	23.2
980714	25.0	19.9	23.2
980715	25.7	26.4	25.0
980716	26.4	23.8	25.7
980717	23.8	19.5	24.4
980718	30.3	24.4	25.0
980719	22.7	24.4	27.2
980720	37.7	21.0	27.2
980721	23.2	17.3	23.8
980722	27.2	21.0	24.4
980723	23.8	25.0	25.7
980724	25.0	23.8	31.7
980725	23.8	19.9	22.2
980726	33.2	19.5	22.7
980727	28.2	20.2	21.8
980728	23.8	28.2	25.0
980729	24.4	21.4	25.7
980730	28.2	21.8	23.2

Date	SS	Night	SR
980731			
980801	31.7	23.2	33.2
980802	31.7	21.4	33.2
980803	25.0	22.2	28.2
980804	24.4	23.2	31.7
980805	24.4	25.0	31.7
980806	29.2	25.0	27.2
980807	25.7	23.2	23.2
980808	28.2	22.7	33.2
980809	29.2	17.8	27.2
980810			
980811			
980812			
980813			
980814			
980815			
980816	33.2	22.7	30.3
980817	23.8	18.9	23.8
980818	19.5	21.4	27.2
980819	28.2	23.2	25.7
980820			
980821	30.3	22.2	28.2
980822	26.4	21.0	29.2
980823	29.2	21.8	28.2
980824	26.4	21.8	
980825			
980826	21.8	22.2	
980827			
980828	24.4		
980829	25.7	27.2	
980830	28.2	26.4	28.2
980831	33.2	22.7	31.7
980901	35.2	21.4	26.4
980902	28.2	23.2	
980903	27.2	18.3	27.2
980904	23.2	18.9	30.3
980905	22.2	22.2	29.2
980906			
980907			
980908			
980909			
980910			
980911			

Date	SS	Night	SR
980912			
980913	24.4	19.5	23.8
980914	21.0	19.2	27.2
980915	23.8	21.8	27.2
980916	25.7	21.0	28.2
980917	28.2	21.0	26.4
980918	24.4	21.8	26.4
980919	27.2	18.9	23.8
980920			(26.4)
980921	23.2	(20.2)	
980922	24.4	20.2	28.2
980923	26.4	(19.2)	28.2
980924	21.4	(21.4)	25.0
980925	27.2	21.8	28.2
980926	25.0	26.4	31.7
980927	28.2	19.2	31.7
980928	26.4	(17.3)	
980929			33.2
980930	(27.2)	(21.0)	(26.4)
981001	24.4	17.8	26.4
981002	24.4	22.7	21.8
981003	26.4	17.8	28.2
981004	23.8		(24.4)
981005	21.4	19.2	27.2
981006		(16.7)	26.4
981007	27.2	17.8	27.2
981008	21.4	(17.8)	24.4
981009	20.2	19.5	26.4
981010	26.4	21.0	26.4
981011	23.8	20.2	29.2
981012	30.3	(21.0)	
981013		19.5	25.0
981014	27.2	18.1	19.5
981015	31.7	18.6	23.8
981016	24.4	18.9	26.4
981017	26.4	19.9	
981018	33.2		37.7
981019	29.2	31.7	31.7
981020	29.2	23.8	31.7
981021	29.2	27.2	
981022	30.3	23.2	33.2
981023	35.2	21.4	27.2
981024	29.2	23.2	33.2

Date	SS	Night	SR
981025	33.2	21.4	27.2
981026	28.2	19.9	26.4
981027	21.0	18.6	31.7
981028	27.2	19.5	25.7
981029	30.3	19.5	23.2
981030	27.2	(19.5)	
981031	29.2	21.0	27.2
981101	31.7	18.1	28.2
981102	28.2	21.8	31.7
981103	30.3	19.5	24.4
981104	26.4	19.2	30.3
981105	18.3	23.8	25.0
981106	25.0	23.2	30.3
981107	27.2	(23.2)	29.2
981108	28.2	(21.4)	28.2
981109	24.4	23.8	23.2
981110	26.4	(24.4)	
981111	28.2	23.2	23.2
981112	26.4	24.4	27.2
981113	33.2	(23.8)	23.8
981114	27.2	19.9	26.4
981115	28.2	19.2	21.0
981116	24.4	21.8	21.8
981117	21.0	19.5	19.5
981118	33.2	19.2	19.2
981119	28.2	19.9	30.3
981120	30.3	21.4	21.8
981121	31.7	19.5	21.8
981122	25.0	19.9	22.7
981123	35.2	21.4	26.4
981124	31.7	22.7	22.2
981125	31.7	19.2	
981126	35.2	24.4	30.3
981127	28.2	20.2	28.2
981128	33.2	25.0	33.2
981129	35.2	19.5	29.2
981130	47.2	21.8	27.2
981201	31.7	21.4	37.7
981202	35.2	22.7	29.2
981203	30.3	24.4	31.7
981204	29.2		
981205	37.7	25.7	47.2
981206			

Date	SS	Night	SR
981207	35.2	20.2	29.2
981208	35.2	26.4	33.2
981209	33.2	23.8	35.2
981210	33.2	(19.2)	
981211	23.8	21.4	27.2
981212	22.2	20.6	23.8
981213	37.7	21.0	25.0
981214	33.2	(20.2)	
981215			
981216			
981217		22.2	23.2
981218	25.0	18.1	24.4
981219	23.8	16.9	23.2
981220			
981221	25.7	22.7	31.7
981222		20.6	35.2
981223	22.2	22.2	31.7
981224	20.2	23.8	33.2
981225	29.2	19.5	20.2
981226	30.3	19.5	26.4
981227	30.3	19.2	22.2
981228	31.7	22.2	29.2
981229	21.4	19.5	25.7
981230	35.2	21.4	35.2
981231	47.2	20.6	29.2

SCHUMANN RESONANCE OBSERVATIONS

G. SÁTORI

Schumann resonances are the electromagnetic eigenmodes of the Earth-ionosphere cavity maintained by the world thunderstorm activity (Schumann 1952).

The first efforts were already made in sixties to record the variations of the natural electromagnetic energy source in the Schumann resonance (SR) frequency range. P Bencze constructed an equipment for measuring SR and reported on the first results together with A Ádám (Ádám and Bencze 1963).

The experiments were renewed in eighties to realize the continuous measurements of Schumann resonance frequencies and amplitudes. Since May of 1993, the vertical electric field component in SR frequency range between 2 and 25 Hz has regularly been measured in the Nagycenk Observatory (47.6°N, 16.7°E) using a very stable ball-antenna, a preamplifier with high input impedance and low noise, an amplifier and a personal computer with high speed, multi-channel AD-converter. The complex demodulation as a spectral technique has been applied for the quasi-continuous determination of the actual peak-frequencies and the corresponding amplitudes of the first three SR modes (Sátori et al. 1996).

Using convolution filters the phase-variations of the complex wave vector relating to the central period of the filters are determined. By computing the phase changes versus time the frequency (and the amplitude) can also be monitored in time. Using this spectral technique, the frequency can be determined within a given range of frequencies, in the case applied here in the frequency range of the first three Schumann-resonance modes, namely between 7–9 Hz, 13–15 Hz and 19–21 Hz. An alternate sampling and computation process yields a quasi real-time technique.

The horizontal magnetic field components (north-south and east-west) have regularly been measured since January of 1997 using induction coils. The spectral technique is the same as in case of the vertical electric field component.

The electronics of the SR recording system was developed by J Pongrácz and J Horváth, the ball-antenna was constructed by Gy Pálla.

Recording SR-transients started in the frame of US-Hungarian Joint Found (JF.554) in 1998. These events, so called Q-bursts, are excited by individual energetic lighning strokes.

Fig. 1. Ball-antenna for the measurement of the vertical electric field component of Schumann resonances

The hourly averages of the peak-frequencies and the amplitudes for the first three modes and SR transients for selected time periods (international campaignes) are available (e-mail: satori@ggki.hu). Figure 1 shows the ball-antenna for the measurement of the vertical electric field component. Figure 2, as example, exhibits the daily frequency and amplitude variations of the first three modes characteristic for a winter month. Figure 3 depicts a SR-transient.

Some results based on SR observations

The observation of Schumann resonances is important from the point of view of the world thunderstorm activity in the troposphere, as well as the different emissions (red sprite, blue jet, elves) induced by lightning strokes and large scale influences of extraterrestrial origin in the lowest ionosphere.

The semiannual variations of SR amplitudes measured at the Nagycenk Observatory, Central Europe, are the manifestation of the semiannual variation of the surface air temperature in the tropical continental regions (Sátori and Zieger 1996).

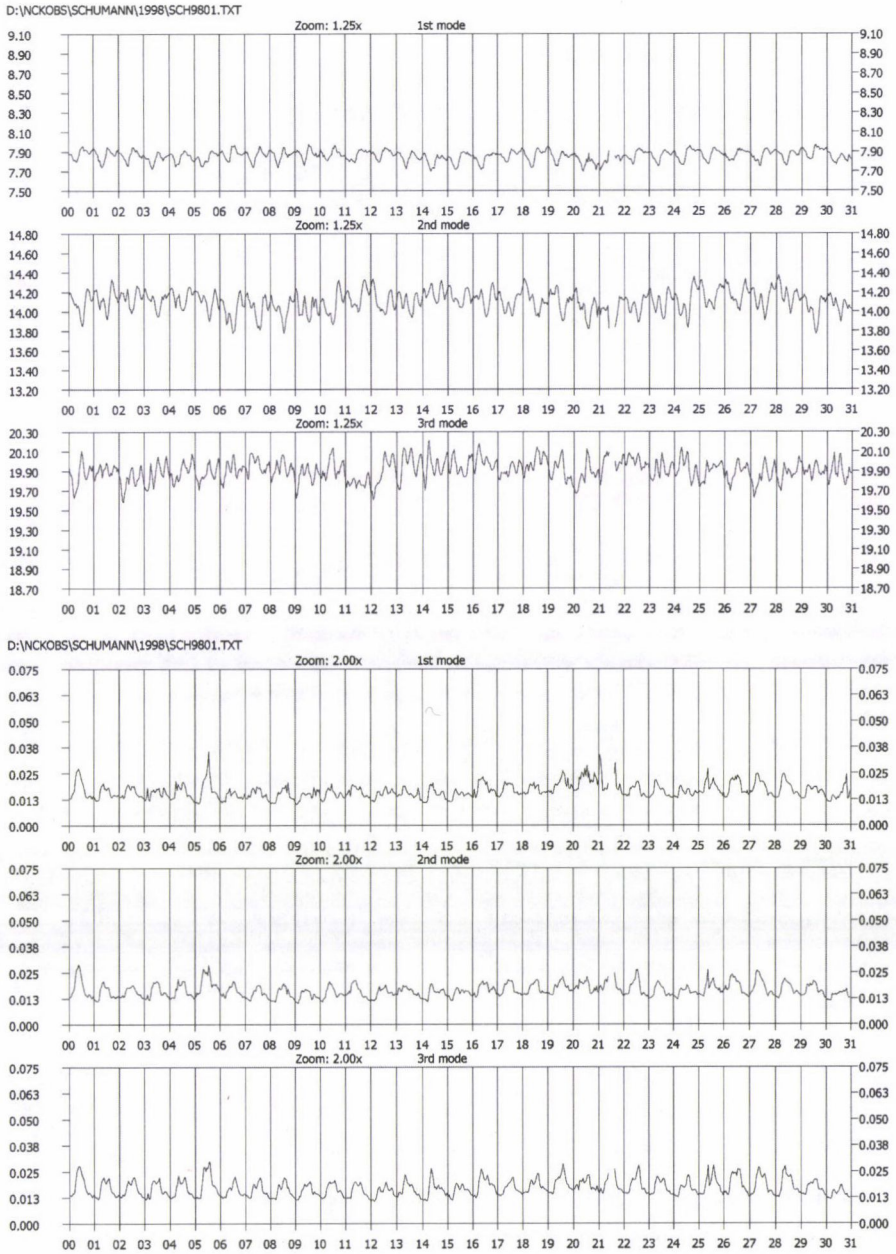


Fig. 2. Hourly means of SR frequencies in Hz (top) and relative amplitudes in V (bottom) measured for the first threee modes in the days of January, 1998

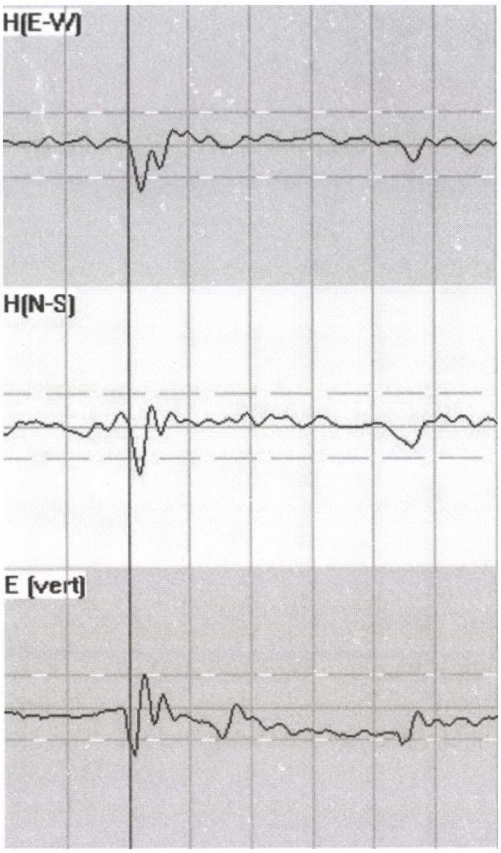


Fig. 3. SR-transient recorded at Nagycenk. Time markers include intervals of 100 ms. The horizontal broken lines indicate the trigger level of ±0.6 V

The latter is due to the semiannual wave of solar insolation with maxima at the equinoxes. The magnitude of the semiannual temperature variation is about 1.5–2.0 °C. The high significance level of the semiannual variation of the SR amplitudes at Nagycenk shows that the quality of this SR data set makes it suitable for detecting temperature variations at the level of some tenths of a degree centigrade. In this way, the observation of the SR amplitudes/intensities have great importance from the point of view of global climatic changes.

Parameters of global thunderstorm activity were deduced from the long term Schumann resonance records at Nagycenk (Nickolaenko et al. 1998).

The ENSO (El Niño Southern Oscillation) phenomenon is among others characterized by sea surface temperature anomaly in the equatorial Pacific which can

affect weather patterns around the world. A meridional redistribution of the world thunderstorm activity was deduced from the variations of SR frequencies on the ENSO time scale observed at Nagycenk (Sátori and Zieger 1999).

See CD (program Seenck.exe, menu item SchumannRes).

References

Ádám A, Bencze P 1963: Study of naturalenergy sources in the low frequency band (in Hungarian). *Magyar Geofizika*, 4, 29–35.

Nickolaenko A P, Sátori G, Zieger B, Rabinowicz L M, Kudintseva I G 1998: Parameters of global thunderstorm activity deduced from the long term Schumann resonance records. *J. Atmos. Sol. Terr. Phys.*, 60, No. 3, 387–399.

Sátori G, Zieger B 1996: Spectral characteristics of Schumann resonances observed in Central Europe. *J. Geophys. Res.*, 101, No. D23, 29663–29669.

Sátori G, Zieger B 1999: El Niño related meridional oscillation of global lightning activity. *Geophys. Res. Lett.*, 26, NO 10, 1365–1368.

Sátori G, Szendrői J, Verő J 1996: Monitoring Schumann Resonances – I. Methodology. *J. Atmos. Terr. Phys.*, 58, No. 13, 1475–1481.

Schumann O W 1952: Über die strahlungslosen Eigenschwingungen einer leitenden Kugel, die von einer Duftschicht und einer Ionosphärenhülle umgeben ist. *Z. Naturforsch.*, 7a, 149–154.