Preface

The Széchenyi István Geophysical Observatory was founded during the International Geophysical Year (in 1957-58) as a dedicated research infrastructure of the electromagnetic (EM) phenomena of the solid Earth, upper atmosphere and near-Earth space. The observatory is situated on the southern shore of lake Fertő on thick conductive sediment within the Fertő-Hanság National Park. The favorable situation shelters the observatory from most of the anthropogenic EM noises.

Nowadays the spreading common use of space technologies and the increasing exposure of the surface critical infrastructures requires the continuous observation of the state and processes of the Earth's plasma environment which became known as space weather. These, sometimes extreme changes are associated with solar activity. In addition, comprehensive observational data from several solar cycles provide an opportunity to study long-term changes in the energy coupling between the Sun and the planet.

The infrastructure consists of telluric, geomagnetic, atmospheric electricity and broadband EM field measurement systems, lightning detection, ionospheric sounding and additional background measurements like meteorological observation and ground-based support of satellite Earth observation.

The uniquely long geomagnetic and telluric recordings allow us to model and reconstruct the geodinamo and the external source current systems in the ionized upper atmosphere. Furthermore, the contemporary magnetic and electric measurements serve as remote reference for the magnetotelluric deep sounding geophysical exploration method.

Records related to atmospheric electricity and lightning activity enable the investigation of the variations of regional and global thunderstorm activity which are indicators of climate change. Signals from individual lightning strokes can be used to diagnose the momentary state of the plasmasphere.

The observatory is a member of INTERMAGNET, a global network of the geomagnetic observatories. High time resolution (1 Hz) geomagnetic data are uploaded quasi-real time and also displayed real time on the website of the observatory. The DPS-4D digisonde automatically transfers data to the Global Ionospheric Radio Observatory (GIRO) system collecting ionosonde measurements from around the globe. These data are used to study the electron density changes and the plasma motion of the ionosphere in regional and global scales.

A station of the LINET lightning detection network is working in the observatory and contributes to the mapping of lightning strokes in Europe real-time. Data collected by the atmospheric electricity measurement systems are displayed quasi-real time on the website of the observatory. The observatory is part of the Automatic Whistler Detection and Analyzer Network (AWDANet) providing a cheap and effective way to routinely infer the cold plasma distribution of the inner magnetosphere.