

CzechGeo/EPOS Section of Geomagnetism

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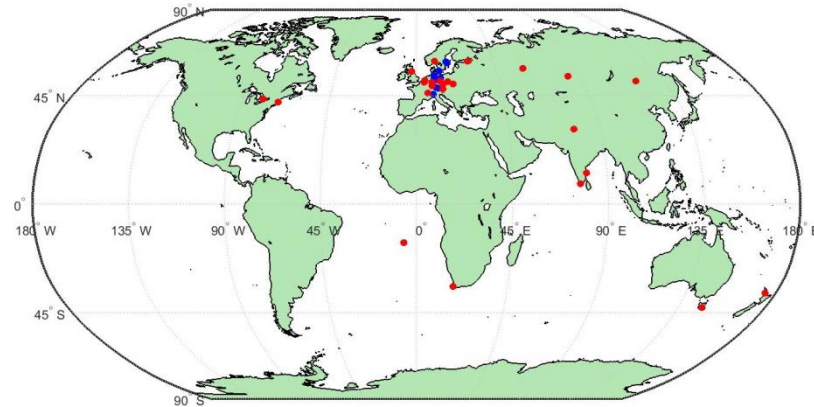
Historical background

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- The Observatory participated on coordinated observations organized in the frame of Göttingen Magnetic Union
- In spite of large number of observatories participating in GMU only 11 observatories – including Prague – operated continuously from 1850 to 1900, three of them probably without baseline control
- After 1900 magnetic measurements were more and more disturbed by urban noise. They were definitely stopped in 1927.
- Construction of a new observatory was started in a park of Průhonice Castle, 14 km from Prague centre, in 1939 and put in operation in 1946. Electrification of railways by DC power system deteriorated Průhonice locality and observatory was closed in 1972.

Budkov Observatory (BDV)

- New site for observatory was found in Budkov in South Bohemia. Regular measurements were started in 1967.
- The observatory was equipped with Bobrov and La Cour variometers (photo-registration).
- Digital system CANMOS (triaxial Narod S-100 ringcore magnetometer and ELSEC 820 PPM) was installed in co-operation with Ottawa Geomagnetic observatory in 1992.
- The observatory was admitted to INTERMAGNET in 1995. The 1994 collection of data was for the first time published on the INTERMAGNET CD-ROM
- Digital system GDAS (triaxial fluxgate FGE magnetometer, Overhauser PPM and BGS data acquisition system) was installed in 2003.

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- the observatory was connected to CESNET by optical line
- all observatory huts were linked with the central hub by optical lines and power network was also renovated



Mobile Geomagnetism

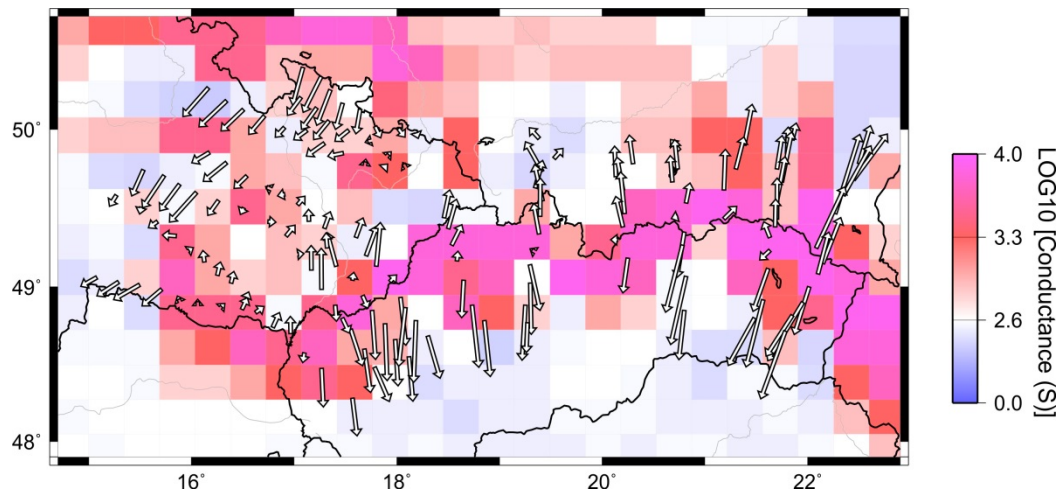
- mobile set of instruments for absolute measurements
 - DI-flux (Zeiss THEO 010B with Elsec 810 fluxgate magnetometer)
 - Overhauser effect proton precession magnetometer GEM Systems type GSM19G
- repeat station measurements
 - coordinated by MagNetE initiative
- magnetic survey for research and applications
 - e.g. magnetic meridian on airports

Electromagnetic induction

- Electromagnetic induction studies with passive sources started in the 1960s and focused on studying the electrical conductivity distribution on a crustal and upper mantle scale by carrying out:
 - A) Analyses of simultaneous geomagnetic records from European and global observatories for upper mantle electrical conductivity distribution
 - B) Long period magnetotelluric experiments ($T > 30$ s) with analogue equipment (observatory-type Bobrov variometers, lead-plate electrodes, photo-registration) for crustal electrical studies (e.g., a regional MT model along the DSS VI profile across the former Czechoslovakia)

Electromagnetic induction

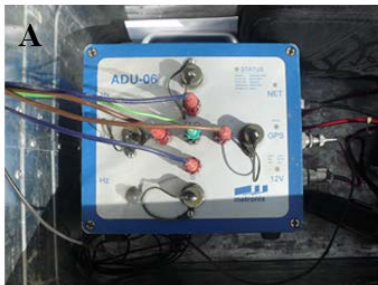
- C) Long period geomagnetic depth soundings (magnetic variation soundings, $T > 600$ s) with observatory-type Bobrov variometers for tracing regional conductivity anomalies via a distribution of induction arrows (e.g., the Carpathian conductivity anomaly)



- In the late 1980s, Bobrov magnetometers were equipped with a digital output (to magnetic tape) and extended by a feed-back loop to enhance the sensitivity and period range ($T > 2$ s), to allow for more detailed crustal electrical investigations

Electromagnetic induction

- In 2000, two broad-band digital MT systems GMS06 (Metronix Geophysics, Braunschweig, Germany) were acquired for audioMT and MT experiments within the range of 10kHz to 4096 s (penetration depths from hundreds of meters down to tens of kilometers).



The sensors are MFS05 Metronix ultra low noise induction coils (1kHz – 4096 s, B) and Pb-PbCl non-polarizable electrodes (C). Signals are brought to a battery-powered ADU06 datalogger (A) equipped with GPS time/position control, A/D conversion and flash data storage, and computer-controlled via a WLAN interface.

Electromagnetic induction

- In 2007, two long-period MT systems LEMI-417 (Inst. Space Res., Lviv branch, NAUkraine) were added to the MT pool for long-period measurements ($T > 20$ s).



The magnetometer is based on flux-gate sensors (E) with low temporal and thermal drift, the electrodes are Pb-PbCl non-polarizable probes (C). Signals are brought to a battery-powered LEMI-417 datalogger (D) equipped with GPS time/position control, A/D conversion and external flash-card storage. On-line inspection of the signal is possible via a serial interface.

Electromagnetic induction

- In the recent decade, the instruments have participated in several experiments on a continental and regional scale (Central Europe Mantle geoElectrical Structure, CEMES; Electromagnetic Study of the Trans-European Suture Zone, EMTESZ; MT studies of the eastern margin of the Bohemian Massif and of the West Carpathians crustal structures)
- Detailed local studies of structural features in fault zones with high frequency audioMT data attempted recently, e.g. at a Mariánské Lázně fault, jointly with electrical tomography
- In parallel, methodological investigations have been carried out, especially into numerical modelling of electromagnetic fields in heterogeneous and anisotropic Earth's structures, as well as into strategies of MT data cleaning under conditions of pervasive anthropogenic noise