Surface electromagnetic impedance and geomagnetic activity: results of long term observation

István Lemperger (1), Menvielle Menvielle (2), Viktor Wesztergom (1), Pál Bencze (1), Judit Szendrői (1), Attila Novák (1), Árpád Kis (1), and Sándor Szalai (1)

(1) MTA CSFK, Sopron, Hungary (lempi@ggki.hu), (2) ISGI/LATMOS, France

The magnetotelluric (MT) method is one of the most useful geophysical tool to discover even the deep subsurface structures. The target function of the MT data processing is the surface electromagnetic (EM) impedance. In case of practical MT exploration the surface EM impedance is computed based on a simplification related to the nature of the ionospheric source of the surface EM signals. Assuming that the ionospheric current systems result in homogeneous surface electromagnetic variations, the uncertainty of the computed surface electromagnetic impedance tensor depends only the duration of the EM observation. However the surface EM field can only be approached by plane waves in certain time periods and besides given uncertainty. The EM impedance may be sensitive to magnetospheric and -indirectly- interplanetary circumstances and solar activity.

Four years continuous observation of telluric and surface geomagnetic components allowed to perform a representative survey to discover if geomagnetic activity has any effect on observed EM impedance tensor. Geomagnetic indices (Dst, ULF-index, ASY-H, SYM-H) have been used to classify dates according to geomagnetic activity. Processing to estimate the mean surface EM impedance tensor has been performed in each dataset, each class separately. The sensitivity and the characteristics of the answer of the EM impedance tensor to the geomagnetic disturbances seems to be definite. This presentation aims to briefly summarize the preliminary results of our study based on the unique dataset of the Széchenyi István Geophysical Obsevatory (Intermagnet code:NCK).

In addition, pointing out the limitations of the routine way of practical MT data processing and interpretation is an important duty of this study.