

Modulation of the surface impedance: effect of geomagnetic activity

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SUMMARY

The presentation introduces a study which demonstrates the slight modulation of surface electromagnetic impedance tensor according to varying geomagnetic activity. The results are based on registrations of telluric and geomagnetic variations besides observatory conditions.

Keywords: geomagnetic activity, source effect, ionospheric currents

ABSTRACT

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 Observatory (Intermagnet code: NCK).

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