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Theoretical surface electromagnetic impedance as function of pulsation source geometry

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The magnetotelluric (MT) method is one of the most useful geophysical tool to discover even the deep subsurface structures. By means of MT one can obtain information even about the depth of the asthenosphere.
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 source of the surface EM signals. Namely the surface fields are assumed to vary like plane waves. Well known fact that this assumption holds only in certain latitude range but lapses in equatorial and auroral latitudes. It neither stands on mid-latitudes at long periods, namely above hundreds of seconds. Pointing out the limitations of the routine way of practical data processing and interpretation is an important duty of the theoretical geophysical research.
In a theoretical approach analytic computation of surface EM impedance has been performed in case of a more general source geometry. Realistic pulsation ionospheric current system model and horizontal layered media have been assumed throughout the works. The applied current system model is a temporally and spatially varying amplitude, 2D current density vector filed in the height of 120km. The subsurface model is the simplified geological model of the site of the Szechenyi Istvan Geophysical Observatory at Nagycenk, Hungary. The presentation provides a brief summery of the results of the analytic calculations of the so called source effect. The influence of the variation of the meridional and azimuthal extent, the wavelength of the source and the frequency has been estimated above a physically realistic domain of the geometrical parameter-space.