



Simultaneously detecting of signature of main ionospheric trough by GNSS and in situ waves measurements during strong geomagnetic disturbances

A. Krankowski (1), H. Rothkaehl (2), I. Stanislawska (2), J. Blecki (2), M. Parrot (3), J-J Berthelier (4), J-P Lebreton (5)

(1) Institute of Geodesy, University of Warmia and Mazury in Olsztyn, Poland (kand@uwm.edu.pl; Fax:+48-89-5234768), (2) Space Research Centre PAS, 00-716 Warsaw, Bartycka 18A, Poland, (3) LPCE/CNRS 3A, avenue de la Recherche Scientifique 45071 Orléans cedex 02 France, (4) CETP/ Observatoire de Saint-Maur 4, avenue de Neptune 94107 Saint-Maur-des-Fossés Cedex France, (5) RSSD/ESTEC/ESA Postbus 2992200 AG Noordwijk, The Netherlands

The region of the main ionospheric trough is an unique region of the ionosphere, where different type of wave and instabilities can be generated and the main ionospheric trough acts like a lens focusing a variety instabilities and disturbances from a different region of the Earth's environment. The mid-latitude electron density trough can provide useful information about dynamics and morphology of magnetosphere ionosphere system.

Currently GNSS techniques have provided a very good chance to study ionospheric effects. GPS permanent networks such as IGS and EPN provide regular monitoring of the ionosphere in a global scale. The very dense GPS network in Europe (about 100 stations) permits obtaining TEC maps with high spatial and temporal resolution. Recently, TEC maps have been produced with 5 min intervals and with spatial resolution of 150 - 200 km. This high spatial and temporal resolution represents all local and regional features of TEC distribution. The TEC is very sensitive to changes in foF2 electron density. It is useful for identifying the spatial locations of the main ionospheric trough.

The satellites in situ measurements can provide comprehensive coverage in both the time and geomagnetic place effects. The aim of this presentation is to show typical

main ionospheric trough signatures during extreme geomagnetic disturbances. The global time varying picture of the ionospheric trough it is possible to reconstructed using the sequence of waves spectra registered and plasma measurements in the top-side ionosphere. Different approaches in describing of this activity produce desired results. However the very high, extreme activity demands very special characterization of the conditions. For these purposes the data gathered on board of current operated satellite DEMETER and past diagnostics located on MAGION- 3 spacecraft as well as TEC measurements seems to be excellent tools for analyse the signature of mid-latitude ionospheric trough phenomena during chosen extreme geomagnetic disturbances.