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Response of main ionospheric trough for distance plasma disturbances

H. Rothkaehl (1), A. Krankowski(2), P.Koperski(3), A. Kulak (3), M. Parrot(4), J-J Berthelier(5), J-P Lebreton(6)

(1)Space Research Centre PAS 00-716 Warsaw, Bartycka 18A, Poland(hrot@cbk.waw.pl), (2) Institute of Geodesy, University of Warmia and Mazury in Olsztyn, Poland, (3) Astronomical Observatory of Jagiellonial University, Cracow , Poland,(2) LPCE/CNRS 3A, avenue de la Recherche Scientifique 45071 Orléans cedex 02 France, (3) CETP/ Observatoire de Saint-Maur 4, avenue de Neptune94107 Saint-Maur-des-Fossés CedexFrance,(4) RSSD/ESTEC/ESA Postbus 2992200 AG Noordwijk The Netherlands

The mid-latitude electron density trough observed in the topside ionosphere has been shown to be the near-Earth signature of the plasmapause and can provide useful information about the magnetosphere-ionosphere dynamics and morphology. Thus for present the evolution of ionosheric trough in time and space domain we need some multipoint measurements and different type of measurements techniques. To develop a quantitative model of evolution ionospheric trough features during geomagnetic disturbances the analyse of particle and waves in situ measurements and TEC data was carried out. The high resolutions plasma particle diagnostics and wave diagnostics located on board of currently operated satellite DEMETER can give us precisely description of trough signatures and instabilities at define point in space . On the other hand GPS permanent networks such as IGS and EPN provide regular monitoring of the ionosphere in a global scale. Recently, TEC maps have been produced with 5 min intervals and with spatial resolution of 150-200 km. In order to better understanding the physical process occurred in plasmapause region during strong geomagnetic disturbances we present the data gathered by help the ground-based ULF HYLATY station located in Bieszczady mountains. The aim of this paper is to present some general behaviour of trough dynamics as well as the fine structures of ionospheric trough and discuss the different type of instability generated inside the trough region

from ULF frequency range thru VLF up to HF frequency range. As a consequence of different time scales of physical processes occurred in the near Earth environment during geomagnetic disturbances we discusses the different fine structures of main ionospheric trough both in particle as well as in waves presentation. . In order to better understand the physical conditions and evolution of ionosphere trough region and describe the coupling between ionosphere and inner magnetosphere the global map of TEC parameters was constructed