



## **Main ionospheric trough as a duct of energy between ionosphere and magnetosphere region**

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The mid-latitude electron density trough observed in the topside ionosphere has been shown to be the near-Earth signature of the plasmopause and can provide useful information about the magnetosphere-ionosphere dynamics and morphology.

Thus for present the evolution of ionospheric 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. 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. In order to better understand the physical conditions and evolution of ionosphere trough region and describe the coupling between ionosphere and inner magnetosphere the detail examination of geomagnetic storm in January 2005 is presented. As a consequence of different time scales of physical processes occurred in the near Earth environment during geomagnetic disturbances and energy transfer between ionosphere and magnetosphere the examination of ion end electron fluxes inside ionosphere trough are disused.