Geophysical Research Abstracts
Vol. 13, EGU2011-4605, 2011
EGU General Assembly 2011

Validation of GPS signals during geomagnetic disturbances

Hanna Rothkaehl (1) and Andrzej Krankowski (2)

(1) Space Research Centre Polish Academy of Sciences, Warsaw, Poland (hrot@cbk.waw.pl,) 0048228403131), (2) University of Warmia and Mazury in Olsztyn, Geodynamics Research Laboratory (GRL/UWM)(kand@uwm.edu.pl,)

The magnetosphere-ionosphere-thermosphere system is strongly affected by electric and magnetic fields, particle precipitation, heat flows and small scale interactions.The magnetised solar-terrestrial space plasma is a highly non-linear medium, which exhibits many different types of turbulence and instabilities. Those emissions are produced mainly by natural perturbations, but some of them also have anthropogenic origin. A study of mass, energy, and momentum transport in the solar-terrestrial plasma is directly related to the study of space plasma turbulence. The feedback between the radiation belt region and the Earth atmosphere can be very important, although it is still not fully understood.
Geomagnetic storms cause strong changes in ionosphere. During storm horizontal gradients and scintillations of GPS signals increase. Irregular ionospheric gradients can complicate phase ambiguities resolving and as consequence will worsen the accuracy of GPS positioning. Storm-time geomagnetic conditions may influence also on the estimation of satellite/ receiver biases. Rapid phase and amplitude scintillations lead to degrade GNSS network performance.
The aim of this presentation is to show manifestation of ionospheric boudar layers structures and dynamic diagnosed by various measuring techniques as: in situ wave and plasma diagnostics registered on board of DEMETER satellite, GPS observations collected at IGS/EPN network, GPS observation carried out at the Antarctic and Arctic IGS (International GNSS Service) stations used and the data retrieved from FORMOSAT-3/COSMIC radio occultation measurements. We would like also to discuss the limitation of presented diagnose techniques with respect to different geomagnetic condition and localisation in space.