Geophysical Research Abstracts
Vol. 14, EGU2012-13073, 2012
EGU General Assembly 2012

The ionospheric storms' dynamics at new solar activity cycle biginning

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At the beginning of the new 24th Solar Cycle several geomagnetic storms took place. In this study we analyzed the geomagnetic disturbances occurred on May 2010 and March, August- October 2011, which caused the most considerable ionospheric response. The ionospheric behavior during these selected events were analyzed by using the multi-instrumental diagnostic facilities data. The data about peak electron density (foF2) variations was obtained by local "Parus" ionosonde in Kaliningard observatory and provided with European, Japanese and Australian ionosonde networks. The shape of the electron density profiles was derived from FORMOSAT-3 / COSMIC GPS Radio Occultation measurements. The global ionospheric maps of TEC (GIMs TEC), provided by International GNSS Service, were used in order to estimate global storm effects on the ionosphere. For detailed analysis of the height ionospheric structure changes we combined ionosonde-derived data with GPS TEC variations and the electron density profiles retrieved from Radio Occultation measurements.
The geomagnetic storms with similar magnitude lead to the different ionospheric response (positive and negative) over European, Japan and Australian regions. The considered ionospheric storms were mainly negative over European region with average duration of about 36 hours, but in May 2010 and September 2011 the significant positive ionospheric disturbances took place. The temporal and quantitative characteristics of the ionosphere modification during selected geomagnetic storms were revealed. It was carried out the comparison of observations with IRI-2007 model, that has the storm-time option. The best agreement between model and observations results was corresponded to the Northern Hemisphere midlatitude stations for negative ionospheric storms. Also it was estimated the effect of storm-time ionospheric variability on GNSS performance.
We acknowledge the European Digital Upper Atmosphere Server (DIAS), Australian IPS Radio and Space service and the National Institute of Information and Communications Technology (NICT) in Japan for providing ionosonde data. We are also grateful to International GNSS Service (IGS) for GIMs IONEX Data.