Geophysical Research Abstracts
Vol. 14, EGU2012-12164, 2012
EGU General Assembly 2012

Estimation of plasmaspheric electron content derived from GPS TEC and FORMOSAT-3/COSMIC GPS RO measurements under solar minimum condition

I. Zakharenkova (1,2), Iu. Cherniak (1), A. Krankowski (2), I. Shagimuratov (1), R. Sieradzki (2), and E. Koltunenko (1)

(1) West Department of IZMIRAN, Kaliningrad, Russian Federation (zakharenkova@mail.ru), (2) University of Warmia and Mazury in Olsztyn, Geodynamics Research Laboratory (GRL/UWM), Olsztyn, Poland (kand@uwm.edu.pl)

GPS Radio Occultation data establish the basis for a new remote sensing technique for vertical profile information on the electron density of the entire ionosphere from satellite orbit heights down to the bottomside. This data-source can be effectively used together with ground-based GPS measurements in order to estimate the contribution of ionosphere and plasmasphere to the GPS TEC value. So, in the given report the plasmaspheric electron content (PEC) was estimated by comparison of GPS TEC observations and FORMOSAT-3/COSMIC Radio Occultation measurements at the extended solar minimum of cycle 23/24. Results are retrieved for different seasons (equinoxes and solstices) of the year 2009. COSMIC-derived electron density profiles were integrated up to the height of 700 km in order to retrieve estimates of ionospheric electron content (IEC). Global maps of monthly median values of COSMIC IEC were constructed by use of spherical harmonics expansion. The comparison between two independent measurements was performed by analysis of the global distribution of electron content estimates, as well as by selection specific points corresponded to mid-latitudes of Northern America, Europe, Asia and Southern hemisphere. The analysis found that both kinds of observations show rather similar diurnal behaviour during all seasons, certainly with GPS TEC estimates larger than corresponded COSMIC IEC values. It was shown that both GPS TEC and COSMIC IEC values were generally lower at winter than in summer solstice practically over all specific points. Results of comparative study revealed that for mid-latitudinal points PEC estimates varied weakly with the time of a day and reached the value of several TECU for the condition of solar minimum. Percentage contribution of PEC to GPS TEC indicated the clear dependence from the time with maximal values (more than 50-60%) during night-time and lesser values (25-45%) during day-time.