Tomographic Observations of a 'Mid-latitude Summer Nighttime Anomaly' over Japan

Smitha V. Thampi[1]; Mamoru Yamamoto[1]

[1] RISH, Kyoto Univ.

Recently, a chain of digital beacon receivers has been established over Japan, mainly for the tomographic imaging of the ionosphere over this region. These receivers were installed at Shionomisaki (33.45^0 N,135.8^{0}E), Shigaraki (34.85^{0}N, 136.1^{0}E) and Fukui (36.06^{0}N,136^{0}E), which continuously track the Low Earth Orbiting Satellites (LEOS), mainly the OSCAR, COSMOS and FORMOSAT-3/COSMIC satellites. The simultaneous line-of sight relative TECs from these three locations are used for generating the tomographic maps of ionospheric electron densities over 136^{0}E meridian. The images obtained during July-September 2008 are analyzed. In the tomographic images, a low-latitude enhancement in electron density was observed during the daytime, corresponding to the well-understood Equatorial Ionization Anomaly (EIA). In contrast to this, during night time, ionospheric density showed an enhancement in the northern latitudes compared to the southern and also a greater electron density at night than during daytime at the northern latitudes (30^{0}N or higher). This particular feature resembles the 'Mid-latitude Summer Nighttime Anomaly (MSNA)' observed in the northern hemisphere near Northeast Asia during June solstice using COSMIC/F3 satellite data by Lin et al (2008). This is considered similar to Weddell Sea Anomaly (WSA) which is an enhancement in the night time electron densities during December solstice around Antarctica. Though the COSMIC/F3 observations could show that the MSNA feature exists during the June Solstice, the day-to-day variability of the MSNA is still unknown. The present study using tomographic technique investigates this particular aspect of the MSNA feature. The ionosonde data from Wakkanai (45.4^0 N, 141.8^0 E) and Kokubunji (34.1^{0}N, 134.6^{0}E) are also used to investigate the MSNA feature in detail. It is seen that the MSNA has significant day-to-day variability in terms of its location as well as the degree of enhancement. The results will be discussed in detail in the presentation.