THE EFFECT OF SOLAR CYCLE ON THE COUPLING BETWEEN THE LOWER ATMOSPHERE AND IONOSPHERE

Elsayed R. Talaat

The Johns Hopkins University Applied Physics Laboratory, Laurel, MD USA

Waves that originate in the troposphere grow in amplitude as they travel upwards into decreasing density at higher altitudes where they become the most prominent dynamical features of the ITM. At low latitudes, the wind-driven E-region dynamo generates large-scale electric fields, causing upward plasma drifts that combine with pressure forces and gravity to form the equatorial ionization anomaly in electron density. As a result, variability in E-region winds could translate upwards into the low-latitude ionosphere. The dominant dynamical feature in the E-region is the diurnal tide, and its longitudinal, seasonal, interannual, and daily variability are important factors in understanding the behavior of the ionosphere.
Lower atmosphere effects would theoretically be most evident during solar minimum when solar and magnetospheric driving is at the lowest levels. Recent global observations of the low latitude neutral atmospheric and ionospheric structure revealed by TIMED/SABER, TIMED/GUVI, TOPEX, JASON, COSMIC/FORMOSAT and DMSP allow us to investigate the interplay between the neutral, plasma, and background fields. In this talk we examine the relationship between the variability observed in mesospheric and lower thermospheric dynamical fields to variations observed in the low latitude ionosphere using these long-term global satellite observations under both solar minimum and maximum conditions.

ionosphere, waves, tides, solar cycle

Elsayed R. Talaat, The Johns Hopkins University Applied Physics Laboratory, 11100 Johns Hopkins Road, Laurel, MD 20723, USA, +1-443-778-3971, elsayed.talaat@jhuapl.edu