



Comparison of low-latitude sporadic E layer occurrence with tidal parameters obtained from SABER measurements

Christina Arras (1), Plamen Mukhtarov (2), Dora Pancheva (2), Christoph Jacobi (3), and Jens Wickert (1)

(1) German Research Center for Geosciences GFZ, Section1.1 GPS/Galileo Earth Observation, Potsdam, Germany
(arras@gfz-potsdam.de), (2) Geophysical Institute, Sofia, Bulgaria, (3) University of Leipzig, Institute for Meteorology, Leipzig, Germany

The GPS radio occultation (RO) technique is employed to study sporadic E (Es) layers on a global scale. Our data set is based on FORMOSAT-3/COSMIC radio occultations of the years 2008 and 2009 and comprises about 2200 globally distributed RO measurements per day. GPS RO signals are sensitive to strong vertical electron density gradients that are found in the presence of Es layers. These gradients cause strong fluctuations in the signal to noise ratio of the GPS L1 frequency which are attributed to Es in this study.

The GPS RO data are used to obtain a global picture of sporadic E occurrence and its spatial and temporal variability. In this study we focus on the equatorial region ($20^{\circ}\text{N} - 20^{\circ}\text{S}$) where a four-peaked longitudinal structure of sporadic E occurrence was detected. It is widely accepted that Es formation is due to the wind shear mechanism when the ionised constituents of the E region interact with the lower thermospheric neutral wind field. The lower thermospheric neutral wind field in turn is strongly influenced by solar atmospheric tides. Thus, we expect that the identified longitudinal wave-4 structure in equatorial sporadic E occurrence can be attributed to tidal activity, in particular to the nonmigrating tides. To investigate the correlation between Es occurrence and tidal activity, we compare Es rates with tidal information received from the lower thermospheric temperature field that was measured by the SABER instrument on the TIMED satellite. Initial investigations reveal a good correlation between both parameters.