Global sporadic E layer occurrence rates derived from GPS-COSMIC Radio Occultation

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In this presentation a statistics of GPS radio occultation (RO) measurements from FORMOSAT-3/COSMIC are used to derive seasonal occurrence rates on sporadic E layers between July 2006 and May 2009. If there are electron density irregularities existed in the ray path of GPS and LEO (low earth orbit) satellites, the scintillation and multiple paths effects will disturb the received GPS signals. Thus from analysis on lower ionospheric disturbed signals the Es layer information can be extracted. The data process is based on a variance analysis similar to the method that introduced by Wu et al. [2005]. The statistics of 3 years measurements allows for global maps of Es occurrence rates of very high spatial resolution where the morphology of seasonal occurrence rates shows strong seasonal variations with highest occurrence rates during summer in the middle latitudes. The analyze occurrence rates varies with diurnal time shows explicit semidiurnal Es layer tidal signature for all seasons at midlatitudes. On the other hand, according to the windshear theory, the requirement of Es layer formation is a negative zonal wind shear to obtain vertical ion convergence. COSMIC Es layers occurrence rate interconnect with zonal wind shears estimated at height around Es region from horizontal wind model (HWM07) will be investigated. The results show that COSMIC Es layer occurrence rates behavior was consistent with the negative wind shear profile in daytime, but not well consist in nighttime. It implies a more complex nighttime Es layer mechanism includes considering the effects such as meridional wind and local electrical field are needed.