Developing semi-empirical plasma model of the topside ionosphere and upper transition height using GPS and ionosonde observations

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In the topside ionosphere (above the F layer peak), plasma distributions are controlled by the plasma transport process; field-aligned upward plasma flows supply plasma in the plasmasphere during the daytime, while downward flows contribute to maintain the nighttime F region. This field-aligned plasma flux is considered in the dynamical diffusive equilibrium state. Total Electron Content (TEC) obtained by GPS satellites and foF2/M3000F2 measured by ground-based ionosonde systems are used to reconstruct topside ionospheric density profiles under the condition of dynamical equilibrium. O+ - H+ transition height, which is one of the key parameters to determine the shape of the plasma profile just above the peak height, is adjusted to reproduce the observed Slant-TEC by integrating the reconstructed plasma density profiles. The IRI electron temperature model is also modified to use in the model (Titheridge, 1998). O+ - H+ transition height is compared with the empirical model developed by Triskova et al.(2001). It shows that the newly modeled transition height is higher than that developed by Triskova et al.(2001) during the low solar activity period.