

Study of the vertical structure of the TEC enhancement at mid-latitudes using TEC data

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Enhancement of Total Electron Content (TEC) at mid-latitude with TEC data of low earth orbit satellite and ground-based GPS data was studied. Several low earth orbit satellites carried the GPS receiver to decide the location of the satellites. TEC data between GPS satellites and low earth orbit satellite can be derived from the dual-frequency GPS data. TEC between GRACE and GPS satellites is the integration value of the electron density in the plasmasphere and the topside of the ionosphere. The peak and the bottom side of the ionosphere do not contribute to the GRACE-TEC. The enhancement of TEC was observed between 50 degrees and 70 degrees latitude in the geomagnetic latitude. It tends to appear during geomagnetic storm period and day side. The magnitude of TEC enhancement was about 10TECU and the latitudinal width was about 10 degrees. This study clarified that the enhancement of TEC caused by the storm enhanced density (SED) and other phenomena. The enhancement of TEC was observed at 60 degree latitude at 20:48UT on May 29, 2003. The magnitude of GRACE-TEC enhancement was about 10TECU, while the magnitude of TEC enhancement in the ground-GPS TEC data was about 15TECU. This result indicates that about 66% of TEC enhancement which observed by the ground-GPS TEC data occurred above the topside ionosphere.