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Study of characteristic appearance of TEC enhancement at mid-latitude using TEC data of LEO satellite

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The characteristic appearance of Total Electron Content(TEC) enhancement at mid-latitude was clarified by TEC data. Enhancement of TEC in topside ionosphere was detected with TEC data. TEC data between GRACE and GPS satellites is the integration value of the electron density in the plasmasphere and the topside ionosphere. GRACE satellites observed the enhancement of TEC between 50 degree and 70 degree latitude in the geomagnetic latitude. It tends to appear during geomagnetic storm period and to appear dawn side and dayside. It clarified that the enhancement of TEC in dayside caused by the storm enhanced density (SED) and other phenomena and that occurred above the topside ionosphere. The characteristic appearance of TEC enhancement was studied statistically. The north-south asymmetry of TEC enhancement at mid-latitude was observed. The longitudinal dependence of TEC enhancement in dayside was observed. In the north hemisphere, it tends to appear from 230 degrees longitude to 310 degrees longitude, and in the south hemisphere, it tends to appear from 100 degrees longitude to 220 degrees longitude. On the other hand, the seasonal variation of TEC enhancement at mid-latitudes was observed in dawn side. The night of the midnight sun cause the seasonal variation of TEC enhancement at mid-latitudes. These results indicate it was different that the characteristic appearance of TEC enhancement between in dayside and in dawn side. This difference suggests the physical process of enhancement is not same between in dayside and in dawn side. The ionospheric plasma in low-latitude could make the TEC enhancement in dayside as the phenomena with equatorial ionospheric anomaly. The ionospheric plasma in high-latitude could make the TEC enhancement in morning side by solar irradiation in polar region near midnight.

Keywords: TEC, mid latitude, Plasmasphere, SED