Study of The variation of plasmaspheric electron density from GRACE, GPS satellite receiver

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The variations of electron density in the plasmasphere were studied using the TEC (Total Electron Content) data observed by a GPS receiver on the GRACE (Gravity Recovery And Climate Experiment) satellite. The altitude of the GRACE satellite is about 500km, and the altitude of the GPS satellites is about 20,000km.The TEC between GRACE and the GPS satellites were obtained from the dual-frequency GPS receiver.

TEC between GRACE and GPS is the integration value of the electron density in the plasmasphere and the topside of the ionosphere. The peak and the bottom side of ionosphere do not contribute to the GRACE-TEC.

The TEC below GRACE, and GRACE-TEC were estimated to be 8.0 TEC unit and 0.6 TEC unit respectively, around LT 21:00 on 15 January, 2000 from an empirical model. It is difficult to distinguish the contribution of the plasmasphere from the ground-based GPS-TEC. On the other hand, the variation of plasmaspheric electro density can be identified with GRACE-TEC.The variations of TEC whose scale size are from a few hundreds to thousands kilometers were found at higher latitudes than the equatorial anomaly region during the magnetic disturbed periods in October and November 2003. They could be caused by the variation of electron density in the plasmasphere.

The physical mechanism of GRACE-TEC variations will be studied by comparison of the GRACE-TEC data with the electron density profile observed by the MU radar, and ground-based GPS-TEC data.