

Ground-satellite conjugate observations of daytime traveling ionospheric disturbances by the GPS-TEC network and the CHAMP satellite over Japan: Preliminary results

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We report preliminary results of ground-satellite measurements of daytime traveling ionospheric disturbances (TIDs) over Japan by using the GEONET GPS receiver network and the CHAMP satellite. We use GPS measurements of TEC (Total Electron Content) and neutral and electron densities measured by CHAMP satellite for the years 2002 and 2008. A total of twenty-five TID events with ground-satellite conjugate measurements are found. On 2002, conjugate events are observed in January, 1 event, and February, 4 events. On 2008, twenty events are observed around winter months (January (3 events), February (5), March (1), October (3), November (5), and December (3)). For all events, there are clear southward moving structures in the GPS-TEC measurements. For all events neutral and electron densities measured by CHAMP show quasi-periodic fluctuations throughout the passages. The CHAMP satellite crossed at least one clear TID phase front for all the events. We observed corresponding phase relationships between total electron content (GPS-TEC) and neutral and electron densities measured by CHAMP. We categorized events into three categories; out-of-phase, in-phase and changing phase. In the presentation, we report correspondence of these TID structures seen in the ground TEC and CHAMP electron and neutral densities and discuss their phase relationship to identify the source of the daytime TIDs at middle latitudes.

Keywords: Daytime Traveling Ionospheric disturbances (TIDs) observed at mid-latitudes, Total Electron Content by using GPS satellite (GPS-TEC) and CHAMP satellite conjugate observations, TIDs caused by gravity waves in the neutral atmosphere