Simultaneous Ground-Satellite Observations of Daytime Traveling Ionospheric Disturbances over Japan by the GPS-TEC Network and the CHAMP Satellite

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We report results of the daytime travelling ionospheric disturbances (TIDs) over Japan by simultaneous ground-satellite GEONET GPS receiver network and CHAMP satellite measurements. We used TEC (Total Electron Content) from GPS data and neutral and electron densities from the CHAMP satellite. We examined total of seventeen events for the years 2002 and 2008. From the events, twelve of them have clear southward moving structures while the remaining five have clear northward moving structures in the GPS-TEC measurements are found. On 2002, total of 3 southward-moving simultaneous events are observed in January (1 event) and February (2 events). However, there is no northward-moving events in 2002. On 2008, fourteen events are observed (January (3 events), February (5), May (1), June (1) September (1), October (2) and November (1)). For all of the events CHAMP satellite measurements show quasi-periodic fluctuations in the neutral and electron density data throughout the passage. Criteria of CHAMP satellite crosses at least one clear TID phase front used to select the events. To determine if the both measurements are observing the same wave and to calculate the phase differences of those measurements, we fitted a sinusoidal function to the data and calculated frequencies and phase differences. In this presentation, we give the results of southward-moving and northward-moving TID structures observed over Japan in the simultaneous ground-satellite observations by GPS-TEC and CHAMP, and identify the source of the daytime TIDs at middle latitudes.

Keywords: MSTID, CHAMP, GPS-TEC

