

IONOSPHERE WAVE PACKETS EXCITED BY THE SOLAR TERMINATOR: AGW OR MHD ORIGIN?

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We analyzed the dynamic and spectral characteristics of the medium-scale travelling ionospheric disturbances (MS TID) in the form of travelling wave packets (MS TWP). We used total electron content (TEC) measurements from the global network of GPS receivers (up to 1500 stations) in 1998-2007 and the dense Japanese network GPS/GEONET (1220 stations) in 2008-2009. Diurnal, seasonal, spectral and spatial-temporal MS TWP characteristics are determined by the solar terminator (ST) dynamics and do not depend on the solar or geomagnetic activity. In the time field, TWPs are narrow-band TEC oscillations of duration of about 1-2 hours with oscillation periods of 10-20 minutes. In winter, TWPs in the northern hemisphere are observed 3-4 hours after the morning ST passage, when the TEC time derivative achieves his maximum. In summer, TWPs are recorded 1.5-2 hours before the evening ST occurrence at the point of observations, but at the moment of the evening ST passage in the magneto-conjugate area. The TWP spatial structure is of a high degree of anisotropy and coherence at the distance of more than 10 wavelengths; the TWP wavelength is about 100-300 km. Both the high Q-factor of oscillatory system and synchronization of TWP occurrence with solar terminator passage at the point of observations and in the magneto-conjugate area testify the MHD nature of ST-excited TWP generation. The obtained results are the first experimental evidence for the hypothesis for the ST-generated ion sound waves (Huba et al., GRL, 2000, 27, 19, 3181).

Solar terminator, total electron content, ion sound waves

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