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Seasonal morphology of MHD-nature MSTIDs excited by the evening solar terminator

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We have obtained first experimental evidence in favour of the magnetohydrodynamic (MHD) nature of night-time medium-scale travelling ionospheric disturbances (MSTIDs). We used total electron content (TEC) measurement data from the dense GPS networks in California (CORS and SOPAC) and in Japan (GEONET) for 2008-2009. There were selected days of low geomagnetic activity. It was found that the spectral MSTID characteristics are determined by the solar terminator (ST) dynamics. In summer, MSTIDs are detected 1.5-3 hours before the evening ST at 100 km above the point of observations, but at the moment of the evening ST passage through the magnetoconjugate point. At the equinox MSTIDs are registered at once after ST appearance. In winter, MSTIDs are observed 1.5—3 hours after the evening ST occurrence at the point of observations, but at the moment of the evening ST passage in the magnetoconjugate point. The MSTID occurring synchronously with the ST passage through the magnetoconjugate area suggest that the ST-excited MSTIDs are of MHD nature. Model of slow magnetic sound [Leonovich et al, AnnGeo, 24(8), 2006] could be applied for explanation of these oscillations. Periods of observed variations correspond to calculated ones of first harmonics of SMS-wave. Our results are in agreement with simulation results obtained by [Huba et al., 2000]. Our results are also in agreement with simultaneous observations of TEC variations and variations of ion velocity at 700km by DEMETER [Onishi et al., 2009, doi:10.1029/2009GL038156].