

Generation of secondary waves due to intensive large-scale AGW traveling

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By using data from GPS receivers located in North America and in Eurasia we detected huge-amplitude solitary large-scale traveling acoustic-gravity waves (LS AGW). During the strong magnetic storms on 29-30 October 2003 the perturbations of total electron content (TEC) of a duration of about 40 min appeared at mid-latitudes after significant alterations of geomagnetic field intensity. Originated in the auroral area, LS disturbances propagated with the azimuth of about 235° over North America and of about 190° over Eurasia, with a velocity about 1400 m/s and 1000 m/s, respectively. Relative amplitude of observed irregularities amounted to 30-40 %. The propagation of these LS AGW caused generation of small-scale (SS) waves with time period of 2-10 min. This process was promoted by steep gradients in an environment of "vertical" TEC. The TEC gradients were enhanced by the rapid propagation of LS AGW, so a probability of small-scale waves generation became stronger.

We noticed increasing of amplitude of SS TEC variations at the moment of maximal amplitude of LS TEC variations. Moreover, SS structure propagated following the solitary intensive AGW at a distance more than 4000 km. Definitely, the displacement of SS ionosphere structure through the distance more than 2-3 wavelength (about 100 km) was caused by the intensive LS disturbance propagation.

Propagating of the huge-amplitude LS AGW with the velocity exceeded or about the sonic speed caused augmentation of entire TEC variations power spectra by a factor of 100 and of the TEC variations spectra within periods 2-10 min by a factor of 1000.