

THE TRAVELING IONOSPHERIC DISTURBANCE CONCEIVABLY INITIATED BY A HIGH ALTITUDE EXPLOSION

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According to data from GPS stations located in Australia, an unusual traveling ionospheric disturbance (TID) was recorded, which seems likely to be initiated by a high altitude explosion with a 55 kg yield at an altitude of about 225 km during the testing of the US anti-missile system on July 15, 2001 at 3:09 UT in the middle part of the Pacific. A periodic disturbance of the total electron content (TEC) was represented by a wave packet with a duration of about 1 hour and the oscillation period from 10 to 18 min. The delay of the packet with respect to the time of the explosion at different GPS stations of the Australian network increased from southern stations (TIDB) to north-eastern stations (TOW2) from 0.2 to 2.0 hours. The largest amplitude of the packet varied from 0.14 to 1.2 TECU, which made up from 0.5 % to 4 % of the background TEC value or as much as 10 % of the background local electron density. An analysis of the geophysical situation showed that such a disturbance in a given region and in a given time interval is unlikely to be caused by other sources of natural or technogenic origin (geomagnetic disturbances, pulsations, solar flares, earthquakes, rocket launchings, and industrial explosions).

The traveling velocity of the wave packet of about 500–600 km/s approaches the sound velocity at ionospheric F-region heights; the propagation direction over Australia was northward - north-eastward. This means that the possible source of the disturbance was located between Australia and the Antarctic, which is inconsistent with the assumption that this disturbance was caused by atmospheric gravity waves (AGW) triggered by the high altitude explosion over the middle part of the Pacific. Thus the data obtained in this study only suggest that the unusual disturbance detected in GPS data occurred after the testing mentioned above. To identify the disturbance source requires additional information about the high altitude explosion as well as simultaneous measurements of the entire geophysical complex.