

Seismo-traveling ionospheric disturbance observed by HF Doppler sounding system

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In this paper, networks and concurrent/co-located measurements of seismometers (BATS, K-net, KiK-net), HF Doppler Sounding Systems in Taiwan and Japan are used to study Seismo-traveling ionospheric disturbance (STIDs). It's shown that these infrasound wave packets triggered by seismic surface waves that was generated by strong earthquake. The infrasound wave packets were detected in the ionosphere at heights ~200 km about 9 min after the detection of corresponding wave packets on the ground. The individual wave packets recorded on the HF Doppler have different observed horizontal velocities and correspond to different type of seismic waves.

The Hilbert-Huang Transform (HHT) is applied to analyze Doppler frequency shifts (DFSs) detecting STIDs and estimated the amplification factor in vertical displacement of the ionosphere relative to the ground surface motion, while the time delay, circle, ray-tracing, and beam-forming methods are used to compute the origin of the detected STIDs.

Keywords: STIDs, Ionosphere