

Vertical resonance of acoustic waves between ground and ionosphere during total eclipses

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During the July 22, 2009 total eclipse, the effects of vertical acoustic resonance between the ground and thermosphere (ionosphere) were detected by the barometric, geomagnetic and HF-Doppler observations. At the two observation sites in Shanghai, the barometric data indicate an excitation of the internal gravity wave and the fundamental mode of the acoustic resonance having a period of 260 sec. On the other hand, the HF Doppler observations which indicate vertical movement of the ionosphere over the Tokara Islands and near Shanghai area show the oscillations having a spectral peak at 225 sec which corresponds to the first overtone of the acoustic resonance. Similar tendency have been seen in the cases of 2004 Sumatra earthquake and Mt. Pinatubo eruption in 1991, i.e., a clear spectral peak appears at the first overtone in geomagnetic data. These results suggest the altitude dependence of relative amplitude of oscillation on the mode of resonance as expected from theoretical calculation of acoustic resonance. We will compare these results with those observed in other cases of total eclipse and earthquakes.

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