

Atmosphere-solid earth mode coupling observed in earth's background free oscillations

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Recently free oscillations of the earth has been reported to be continuously excited in the absence of great earthquakes with nano gal level. In these modes, there are two modes OS29 (3.7 mHz) and OS37 (4.4 mHz) that have exceptionally large amplitude and anomalous annual variation (Nishida et al. 2000). It is considered that these features could be constructed by mode coupling between solid earth and atmospheric normal modes. In this study, we thoroughly investigate these excess amplitude modes.

In the first, we searched other coupling modes theoretically using a new method of normal mode calculation (Kobayashi, 2006) with the earth model that has an atmosphere (PREM+NRLMSIS-00). Next, we thoroughly investigate these excess amplitude modes by analyzing 15 years seismic data from 1991 to 2005 recorded by noise-less 25 stations of IRIS/GSN, GESCOPE.

We obtained a consistent result from these two analyses. In the earth model, we found that OS28-29, OS36-37, OS41-42, OS44-45, OS56-57 are crossing over infrasound branches of the atmosphere. In the data analysis, we observed that OS28-29, OS36-38, OS42, OS44-46, OS53, OS55 have excess amplitude in earth's background free oscillations.