E206-001 **Room: 202** **Time: May 21 9:00-9:15**

Seismic and acoustic wave excitations in a single system of solid earth and atmosphere: the 2008 Iwate-Miyagi Nairiku Earthquake

Hiromichi Nagao[1]; Naoki Kobayashi[2]; Yoshio Fukao[3]; Yasushi Ishihara[4]; Seiji Tsuboi[5]

[1] JAMSTEC/IFREE; [2] Earth and Planetary Sci, Tokyo Tech; [3] IFREE/JAMSTEC; [4] IFREE, JAMSTEC; [5] IFREE

Infrasound observations have a large potential to clarify interactions between each layer of the earth, and many infrasound variations excited by earthquakes or volcanic eruptions have been observed indicating the coupling between the solid earth, the atmosphere, the ocean, and sometimes up to the ionosphere. An infrasound monitoring station IS30 operated by the Comprehensive Test-Ban Treaty Organization (CTBTO) recorded clearly air pressure variations excited by the 2008 Iwate-Miyagi Nairiku Earthquake (Mw ˜7.1), which occurred in the northeast Japan at 23:43:45 on June 13, 2008 UTC. The epicenter (39.0283ˆoN, 140.8800ˆoE, and 6km in depth) locates at a distance of 417km in the direction of N7ˆoE from IS30. This seismoacoustic signal has two clear wave packets. The earlier wave packet appearing ˜1 minute after the main shock is a ground-wired wave related to the seismic body and surface waves. The later arriving wave packet appearing ˜25 minutes after the main shock corresponds to acoustic waves propagated through the atmosphere directly from the rupture zone. In particular, three pulses can be seen in this acoustic wave packet in periodic band longer than 30 seconds.

We simulate numerically these seismoacoustic variations by a technique to calculate normal modes developed by Kobayashi [2007] assuming a realistic fault mechanism and a one-dimensional coupled model of the solid earth and the atmosphere from the surface to the altitude of 1000km. The rupture history is assumed to consist of nine subevents along the fault with a rupture velocity of ˜2.8km/sec. The resulting synthetic infrasound variation explains successfully, for the first time in the relevant discipline, the observed seismoacoustic signal, i.e., the two wave packets and the three pulses in the secondary wave packet. This consistency indicates that a source of seismoacoustic waves is to be treated as an internal force within the crust at the source region rather than a crustal displacement, and that different observation quantity, i.e., ground motions and air pressure variations, can be treated in the same manner.