

Temporal Change of Spectra of Volcanic Earthquakes at Kuchinoerabujima Volcano:  
- Corner Frequency of HF events -

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Kuchinoerabujima volcano is located at Ryukyu Islands, south off Kyushu, Japan. There are three craters at the volcano, which the active one is Shindake crater. Historical records of eruption at Kuchinoerabujima started in 1841. Since then, several eruptions occurred in Shindake crater such as in 1931-1934, 1945 and 1966. The eruptions were dominated by phreatic eruptions. Last eruption occurred at the fissure east of the summit crater in 1980. Seismicity of the volcano kept the high level from 1999 until now, which high-frequency (HF) events dominated the seismicity.

In August 2006, volcanic crisis at Kuchinoerabujima started, which was remarked by 115 monochromatic events recorded. Then, it was followed by the increased number of Low-frequency (LF) events in October and finally the number of HF events reached 450 events in November.

Volcanic earthquakes are distributed beneath the Shindake crater with the depth of HF events 0-600 meter, LF events 0-300 meter and monochromatic events 0-400 meter.

Applying FFT method on the waveform, spectra were calculated. Corner frequency of HF events were calculated, due to their spectra have a wide spectrum. From August to December, frequencies were getting decrease, from about 24 Hz into 10 Hz (Figure 1).

LF events spectra have some peaks with the dominant frequency in range of 1-4 Hz. From August to November, frequencies tend to increase. Monochromatic events spectra also reveal some peaks

of frequency and temporal change during August to December is divided into 4 periods. In first period, frequencies of monochromatic were shifting to the lower frequency and tend to be stable. Frequencies were getting increase during the second period from the middle of September to the beginning of November. After that, no monochromatic events occurred in third period of November to the beginning of December. In the 4<sup>th</sup> period, frequencies show no unique distribution.

Temporal change of spectra of volcanic earthquakes in Kuchinoerabujima is associated with inflation ground deformation during the period of September to December. Decrease of corner frequencies of HF events suggests that size of crack changed. Meanwhile, increase of frequencies of monochromatic event may be caused by reduction of crack size and/or increase sound velocity of fluid.

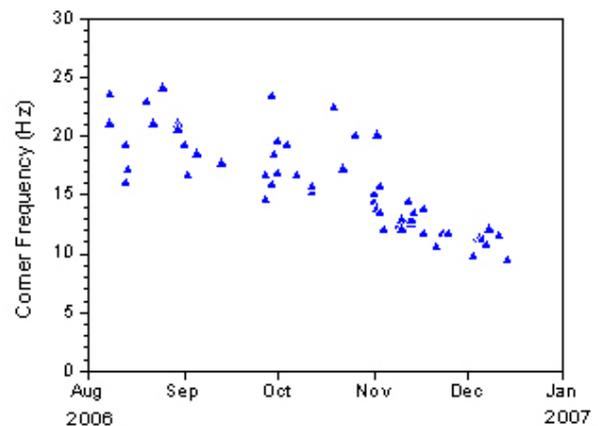


Figure 1. Corner frequency of HF event