

Dynamics of Hydrothermal Activities Implied from the Complex Frequencies of Long-Period Events at Papandayan Volcano, Indonesia

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A passive seismic monitoring study initiated in December 2009 with the deployment of one permanent broadband seismic station and 8 temporal short period seismic stations around the Papandayan Volcano. Papandayan is a composite andesitic volcano with numerous of solfataras emitting hot fumes and small vents within four large overlapping craters (Kawah Mas, Kawah Nangklak, Kawah Manuk, and Kawah Baru) located in approximately 20 km southwest of the nearest district Garut. Papandayan volcano produced a catastrophic debris avalanche during a violent eruption in 1772, there after several phreatic eruptions registered in 1923, 1924, 1925, 1926, 1927, 1942, 1993, and the most recent one in November 2002.

In order to improve the understanding of the state of fluids and physical processes beneath the volcano, we assess the dynamics of hydrothermal activities through the complex frequencies of long-period (LP) events. The observed complex frequencies of LP events can provide important information about the compositions of fluids beneath volcanoes (Kumagai et. al., 2002). We have analyzed long-period events at Papandayan volcano within the periods of 2010-2011 by using the Sompi method (Kumazawa et al., 1990; Hori et al., 1989). In the beginning of August 2011, seismic activities at Papandayan volcano were increased. Numerous of volcanic earthquakes were recorded and long-period events were also appeared. The alert level of the volcano was raised, despite no eruption occurred in the end. We found temporal variations of the complex frequencies (f and Q factors) of long period events suggesting the response of hydrothermal system to changes of heat pulse transferred by the flux of volcanic gases from the magma beneath the volcano.