



Diverse long Period tremors and their implications on degassing and heating inside Aso volcano

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Long-period tremors (LPTs) are frequently observed and documented in many active volcanoes around the world. Typically, LPTs are in the period range of 2-100 seconds and total duration of 300 seconds or less. In many instances, LPTs in different volcanic settings are repetitive, but time-invariant in their location, frequency content and waveform shape, suggesting a nondestructive source and providing critical insights into the fluid-dynamic processes operating inside a volcanic system. However, the diversities of LPTs in a single volcanic system are not necessarily well understood and they could potentially provide a clue on the interplay between volcanic degassing, magmatic heating and the style of upcoming eruption.

To explore possible diverse LPT behavior in a volcanic system, we investigate LPTs in Aso-san, one of the most well studied and active volcanoes in the southwest Kyushu, Japan. We carry out systematic analysis of continuous seismic data (2010-2016) operated at V-net by NIED and Japan Meteorological Agency (JMA) Volcanic Seismic Network, covering the interval where Aso-san experiences diverse behaviors, including long period of quiescence (2010-2013), phreatic eruption (2013-2014), Strombolian-type eruption (2014-2015) and phreatomagmatic eruption (2016).

We use LPT waveforms identified in previous studies as templates and cross-correlate them against the entire dataset in the wavelet domain to construct LPTs catalog. However, LPTs with different phase, but similar frequency content and location are also retained to examine possible temporal changes in the characteristics of LPTs. Through waveform cross-correlation and stacking, we identify four types of LPTs that are located in close proximity as those identified in prior studies, but they display diverse waveform polarity and shape. We will present waveform semblance analysis and moment tensor inversion of these LPTs and discuss how their frequency, amplitude and energetics may be indicative of the state of degassing and magmatic heating inside the Aso volcano.