

Observations of diverse long-period tremors at Aso Volcano, Japan

Jieming Niu¹, *Teh-Ru Alex Song¹

1. Seismological Laboratory, Department of Earth Sciences, University College London

Long-period tremors (LPTs) are frequently observed and documented at Aso volcano since the pioneering work by Sassa (1935). Previous efforts (e.g., Kaneshima et al., 1996; Kawakatsu et al., 2000) have characterized LPTs as repetitive and isolated events, with a resonance period of ~15 seconds and a duration of several tens of seconds. Since the initial waveform polarity of LPTs is typically negative, depressurization or/and degassing is commonly invoked as the triggering mechanism. However, it is also documented that, occasionally, especially during phreatic eruptions, the initial waveform polarity of LPTs is positive, suggesting a triggering mechanism linked to magmatic heating and vaporization in the hydrothermal reservoir. Since these diverse LPTs (DLPTs) have not been systematically investigated, especially during the active period, we attempt to characterise how DLPTs of different waveform shape, polarity, or/and resonance frequency vary between 2011 and 2016, during which Aso volcano became very active with frequent phreatic eruptions, intermittent Strombolian eruptions as well as occasional phreatomagmatic eruptions.

To explore DLPTs at Aso volcano, we carry out systematic analysis of continuous data at V-net and Japan Meteorological Agency (JMA) volcanic seismic network. After visually inspect LPT waveform across the networks, we devise a two-stage process to construct a catalog for DLPTs. Using the LPT waveform as a template, the first stage involves continuous wavelet transformation to search for LPTs with spectra features comparable to that of the template. Through waveform cross-correlation and stacking, we identify at least 2 types of LPTs with identical waveform shapes but opposite polarities. In the second stage, we use these identified LPTs as templates and apply match filter algorithm to conduct an extensive search.

In this presentation, we will present the DLPTs catalog, consist of ~ 200,000 events between 2011 and 2016. We will focus on similarities and differences among DLPTs and how their activities change over the 6 year period. In the subsequent presentation, Song and Niu (2018, this meeting) will detail how the DLPTs may provide a clue to possible deformation in the deep conduit or/and magma chamber.

Keywords: Aso volcano, diverse Long-period tremor (DLPT), DLPT catalog, Strombolian eruptions