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# Very Long-Period Tilt Polarisation and Monochromatic Signals at Aso Volcano, Japan

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Long period volcanic tremors (LPTs), typically termed as VLP, have been widely observed in many volcanic systems around the world. LPTs in different volcanic settings are often repetitive, suggesting a nondestructive source and providing critical insights into the fluid dynamic processes operating inside a volcanic system. Recently, a deep triggering source of LPT has also been discovered, located between the LPT source and the magma chamber. These diverse and rich signals not only help monitor the state of shallow volcanic conduit and its link to upcoming eruptions. it also helps understand causal triggering of LPT and potentially intra-crustal transport of magma.

Given diverse and rich signals within the Aso volcanic system, we further explore other possible sources in the tidal period. We analysed continuous data recorded at two borehole tiltmeters installed at Aso volcano, during the period of 2011-2016. We first perform a polarisation analysis of the ground tilt, filtering in the frequency bands matching the medium-long period tidal constituents, Mm, Mf and S1. The results evidence a well-defined direction of the tilting plane at both sites, with minor fluctuations occurring in 2012 and 2014. Moreover, we investigated the tilt time series the 1-8 hour band. There is a clear variation in azimuth orientation in at least one of the two tiltmeters and these azimuthal variations occur roughly from September 2013 at least until November 2014.

In the meantime, LPTs were strong and more active, ash eruption occurred at the end of August 2014, followed by a major Strombolian eruption episode starting at the end of November 2014. In this time interval between September 2013 and November 2014, we further discovered a sequence of nearly monochromatic signals, with repetitive waveforms, a typical period of about 2 hours and a duration of about 9 hours. We extracted these signals and will compare their timing against the LPT catalog we constructed previously. Moreover, we will perform waveform correlation in order to quantify the degree of similarity among these monochromatic signals. Finally, we will attempt to reconcile all these observations in terms of the volcano dynamics and of its different eruptive styles during the 2011-2016 eruption cycle.