



## Superimposed degassing cycles at active basaltic volcanoes

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We present high-time resolution thermal image data sets recorded at three active volcanoes: Etna, Stromboli and Kīlauea. At the time of observations, all three exhibited pulsed degassing and Strombolian activity. Signal processing of temperature time-series identifies four broad classes of cyclic temperature changes at the three volcanoes spanning from a few seconds to more than one hour. Integrating these cycles with qualitative visible and thermal observations and, in case of Kīlauea, also with SO<sub>2</sub> column amounts in the plume, we infer that 'short cycles' relate mainly to bursting of overpressured gas bubbles at the magma surface, while 'longer cycles' are associated with mechanisms of gas slug formation and ascent. At Kīlauea, the 'very long fluctuations' detected in both temperature and SO<sub>2</sub> column amounts are likely associated with emplacement and drainage of lava ponds, as proposed previously for Pu'u 'Ō'ō Crater. Despite the differences in eruptive style and conduit size and geometry between the three volcanoes, we find comparable magma transport and gas release processes, suggestive of control by magma composition and rheology.