



## **Sampling the acoustic wavefield for volcanic eruptions at Yasur Volcano, Tanna Vanuatu, with airborne sensors on tethered weather balloons (aerostats)**

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We obtain an unprecedented view of the energy directivity of strombolian volcanic eruptions at Yasur volcano, Vanuatu from acoustic sensors on-board a tethered weather balloon. The experiment occurred as part of a wider seismo-acoustic experiment from 27 July-2 August 2016. Over 3000 volcanic eruptions from two active craters are recorded on both the airborne array and stationary ground based acoustic sensors. The balloons had helium capacity of 7 m<sup>3</sup> and a payload capacity of >2 kg. The payload comprised a single Omnirecs CUBE 3 channel digitizers (200 Hz sampling) with on-board GPS and a vertical string of InfraBSU type pressure transducers. To maximize the coverage of the eruption focal sphere, we positioned the balloon at 38 tethered loiter positions and computed the back-azimuth and incidence angle for repeating eruptions. The experiment yielded several thousand observations over an azimuthal range of >200 degrees and an incidence angle range of >40 degrees. Simultaneous video observations confirmed the range of eruptive activity and source vent positions. Measurement of the peak amplitude of the balloon sensors normalized by summit ground sensors, suggest moderate eastward amplitude directivity for the repeating eruptive activity which is generally consistent with the observed ballistic spray pattern. The observed radiation pattern may be associated with eruption directivity and/or topographic effects.