



Location of multi-phase volcanic events from a temporary dense seismic array at White Island, New Zealand

Arthur Jolly (1), Ivan Lokmer (2), Johannes Thun (2), Jerome Salichon (1), Nico Fournier (3), and Bill Fry (1)

(1) GNS Science, 1 Fairway Ave, Avalon, Lower Hutt, New Zealand (a.jolly@gns.cri.nz), (2) School of Geological Sciences, University College Dublin, Belfield, Dublin 4, Ireland (ivan.lokmer@ucd.ie), (3) GNS Science, Wairakei Research Centre, Taupo, New Zealand

The August 2012 to October 2013 White Island eruption sequence included an increase in gas flux and RSAM seismic tremor beginning in late 2011. Prior to this unrest, a small swarm of 25 events was observed on 19-21 August 2011. The events were captured on a temporary dense seismic array including 12 broadband sensors that were deployed between June and November 2011. Each event comprised coupled earthquakes having distinct high frequency (HF = >1 s), long-period (LP = 2-4 s) and very long period (VLP = 10-30 s) pulses.

For each coupled HF, LP and VLP event, we compute the source locations, origin times and related uncertainties by application of standard arrival time locations for the HF events and waveform back-projection for the LP and VLP events. Preliminary results suggest that the events are centred beneath active vent at depths generally less than 2 km. The HF earthquakes have diffuse locations (<2 km), while LP events are constrained to generally shallower source depths (< 1km) and VLP events have slightly deeper source locations (1 to 2 km). The arrival-time locations have been constrained using a realistic shallow velocity model while the waveform back-projection locations have been constrained by thorough synthetic testing. Emergent onsets for LP and VLP sources make an analysis of the absolute origin times problematic but waveform matching of VLP to LP components suggests relative time variations of less than a second or two.

We will discuss the location and relative timing for the three event types in context with possible hydrothermal and magmatic processes at White Island volcano.