

## Seismic tomographic imaging of subsurface structure of Rabaul volcano

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We carried out a tomographic inversion to determine the three-dimensional P-wave velocity structure of Rabaul Caldera, Papua New Guinea. This is an active volcano that has had two eruptions during the 20th century, including the 1994 eruption that destroyed Rabaul Town. The three-dimensional velocity structure helps to identify the magma system that underlies the caldera.

We used 3756 P-wave arrival times from 455 earthquakes recorded at the Rabaul Volcanological Observatory (RVO) permanent network of 12 stations. Added to this, 1854 P-wave arrival times from marine seismic shots fired in the sea areas around Rabaul as part of the Rabaul Earthquake Location and Caldera Structure (RELACS) program were used. The grid intervals were 1.5km in the horizontal direction and 1km in the depth. Grids were selected to cover Rabaul caldera (total 10x10x6 nodes). Checkerboard tests showed a good resolution within the caldera to 4km depth.

A low- $V_p$  zone stretching from north to south at center of caldera was found at 1-3km depths. The location of this low- $V_p$  zone is consistent with ground uplift deformation area for the period 1973-1985. This suggests that the low- $V_p$  zone is a magma chamber. This low- $V_p$  zone is located at the center of the caldera (not beneath the active vents that produced recent eruptions). This implies there are narrow pathways from the large magma reservoir in the center of the caldera to the active vents on the outer ring fault.