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Evacuation: The Big Decision



DEVORA

Summary

Base surges pose the greatest threat to human life in an Auckland eruption. This study of a hypothetical eruption crisis shows that modelled base surge probabilities can be combined with cost-benefit analysis to decide when and where an evacuation should be called. Ultimately this method could be used to inform evacuation decisions and thus preserve human safety. This method was developed as part of the DETERmining VOLcanic Risk in Auckland (DEVORA) project.

Key Points

- Base surges (see photo, right) are fast-moving, sometimes hot ash and gas flows created when magma interacts with water. They pose the greatest threat to human life during an eruption in the Auckland Volcanic Field.
- The likely source and extent of these flows can be modelled using probabilistic hazard assessment.
- Combining this hazard assessment with a simple cost-benefit analysis can help guide decisions on where and when to evacuate.
- Results from a hypothetical eruption in Auckland showed an evacuation should have been called soon after volcanic unrest began, as potential losses outweighed the cost of an evacuation.
- The size of the evacuation area may change over time. As the certainty in eruption location increases, the area to be evacuated may get smaller. However, if the probability of eruption increases, the evacuation zone may expand.



Base surge

Capelinhos (1957). Photo by R.V. Fisher.

The probability of an area being affected by a hazard (such as a base surge) is modelled and this probability (P) is carried over into cost-benefit equations to help with evacuation decisions.

Cost-Benefit Analysis

<p>$P > C/L$ Evacuation called</p> <p>$P < C/L$ No evacuation called</p>

P = probability of being affected by hazard
 C = cost of an evacuation
 L = loss if evacuation not called and base surges are generated

The pros and cons of calling an evacuation are weighed. When the benefits outweigh the costs, an evacuation is called.

This DEVORA field note summarises the journal article: Combining long- and short-term probabilistic volcanic hazard assessment with cost-benefit analysis to support decision making in a volcanic crisis from the Auckland Volcanic Field, New Zealand. By Sandri, L., Jolly, G., Lindsay, J., Howe, T. & Marzocchi, W. (2012) Bulletin of Volcanology v. 74 (3): 705-723. DOI: 10.1007/s00445-011-056-y.

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