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**COMMUNICATING THE STATUS OF VOLCANIC ACTIVITY
IN NEW ZEALAND, WITH SPECIFIC APPLICATION TO
CALDERA UNREST**

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Sally Helen Potter

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ABSTRACT

Volcanic eruptions can negatively impact social, economic, built, and natural environments. Volcanic unrest is the key indicator of an impending eruption, enabling warnings to be disseminated, and risk to be reduced. This research focuses on recognising changes at a caldera volcano when it begins to show signs of unrest, and the communication of this information using the Volcanic Alert Level (VAL) system.

New Zealand's existing VAL system is explored, and influences on the determination of the VAL and potential foundations of VAL systems are identified. For the first time globally, a qualitative ethnographic methodology is used to develop a new VAL system, involving interviews, document analysis, and observations over three years at GNS Science (New Zealand's official provider of science advice for geological hazards). The new VAL system developed in this research is being actively used in New Zealand from July 2014.

To assist with distinguishing 'unrest' from 'background' activity at volcanoes, a new, innovative tool called the Volcanic Unrest Index (VUI) has been developed. The VUI integrates multi-parameter qualitative and quantitative data, enabling a world-first comparison of the intensity of unrest. It contributes towards probabilistic decision-making tools by defining unrest. The VUI provides a simple way to communicate the status of any volcano with non-scientists. The frequency and intensity of historical caldera unrest was investigated at Taupo Volcanic Centre (TVC), New Zealand. Through the use of the VUI, 16 episodes of unrest were identified, many more than had previously been recognised. Socio-economic impacts have resulted from several of these unrest episodes. The recurrence rate of unrest between 1872 and 2011 is one episode every nine years, and the median duration of unrest is slightly less than five months.

The findings suggest that the VAL could have been raised during past unrest at TVC, including in 2008–10. However, influences on the decision to change the VAL, including potential socio-economic impacts, may cause a delay in raising the VAL during future unrest. These findings contribute towards more effective communication of the status of volcanoes in New Zealand in the future, particularly at calderas.

DON'T PANIC

- Douglas Adams, *The Hitchhiker's Guide to the Galaxy*

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