



Cities on Volcanoes 9
November 20-25, 2016
Puerto Varas, Chile

'Understanding volcanoes and society: the key for risk mitigation'



Using paleomagnetic techniques to investigate mass flow emplacement history at stratovolcanoes

Lerner, Geoffrey A. ¹; Cronin, Shane J. ¹; Turner, Gillian M. ²

¹School of Environment, University of Auckland, Auckland, New Zealand

²School of Chemical and Physical Sciences, Victoria University of Wellington, Wellington, New Zealand

Keywords: paleomagnetism, volcanic mass flow, lahar, block-and-ash flow, Taranaki

A detailed understanding of the timing and emplacement conditions of mass flow deposits surrounding an active volcano is critical for forecasting future hazards during both periods of activity and quiescence. Paleomagnetic analyses, particularly focussing on thermal remanent magnetism, may provide valuable information on the emplacement temperatures of pyroclastic density current (PDC) deposits. Furthermore, if reliable secular paleomagnetic age curves are available, magnetic studies can help to improve age determination and hazard frequency estimates. These techniques were applied to Taranaki Volcano in New Zealand to examine the mass flow hazards on the most recently active North-Western sector. Paleomagnetic techniques were successfully applied to clast and matrix material to differentiate between hot and cold deposits from a sequence of PDC and associated reworked deposits from ~12 eruptions over the last ~900 years B.P. In addition, distal deposits from enigmatic older eruptive periods were studied to better understand the potential limits of larger PDC-forming eruptions. During progressive thermal and alternating field demagnetization, the consistency of the different components of magnetization is the key to distinguish block-and-ash flows from lahars. Five from the initial six sampled <900 yrs. B.P. mass flow deposits were emplaced above curie point temperatures, while one of the units was either emplaced cold, or it was remobilized after original PDC emplacement. Attempts to determine emplacement conditions of the older, more distal units was more difficult due to lack of availability of suitable large-clasts for drilling, presence of non-thermal remanences, and logistics of paleomagnetic sampling of matrix material.