



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

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



Approaches and difficulties in lahar risk assessment

Stuart Mead¹ and Christina Magill¹

¹Risk Frontiers, Faculty of Science, Macquarie University, Australia

Key words: lahar risk; hazard; vulnerability; rain-triggered lahar;

Common definitions of the term 'lahar' encompasses a broad range of initiation mechanisms (e.g. rainfall vs. scour and melting of glaciers by pyroclastic density currents) and flow compositions (e.g. hyper-concentrated, grain-supported and matrix supported flows). As a consequence, lahar flow behaviour, debris entrainment and volume vary greatly which affects robust estimations of lahar hazard and destructive effects. Typically, qualitative and semi-quantitative hazard estimates rely on geologic and historic records to prescribe lahar volume, type and frequency. This is an important limitation on hazard estimates as historic data is often incomplete and can be irrelevant under different environmental conditions (e.g. land usage) or when eruptions alter topography and hydrology of volcanic slopes. Additionally, lahar sediment transport can alter channel drainage characteristics, further increasing uncertainty or requiring frequent updating of lahar hazard assessments. Lahar risk assessment, which relies on a quantification of lahar hazard and damage is therefore affected and difficult to estimate. In this presentation we discuss approaches to quantify the hazard and vulnerability components of lahar risk. In terms of lahar hazard assessment, the frequency, composition and inundation area of rain-triggered lahars is obtained through models to determine the spatial and temporal probability of lahar initiation. These probabilities can then be combined with lahar inundation models to determine the specific hazard. To consider vulnerability, results of detailed modelling of lahar flow in urban areas is used to identify primary causes of building damage in conjunction with a variable rheology vulnerability model. The methods presented here, while limited at times by scarce input data, demonstrate a possible approach to quantifying lahar risk and guide areas of further research in order to develop a greater understanding of lahar risk.