



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

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



Volcanic Risk Assessment Methodology on the Chilean Road

Network using HAZUS-MH System

Joaquín Dagá¹, Alondra Chamorro¹ and Hernán de Solminihac¹

¹Pontificia Universidad Católica de Chile

Keywords: Road Network, Lahars, Risk Assessment, Fragility Curves, HAZUS-MH.

In the last decades, several volcanic events have interrupted, deteriorated or destroyed the Chilean road infrastructure, affecting the national connectivity which in turn influence the country in social, political and economic aspects. Specifically, lahars have destroyed more public or private property than any volcanic process, impacting mainly bridges and culvert (Vallance, 2001; Soto and Sjöbohm, 2005). Therefore, the important consequences and implications leading to this natural hazard on the Chilean network and connectivity make a risk assessment and its mitigation vital in the national road development.

This volcanic risk assessment methodology of the road network is supported by the application of HAZUS-MH, a standardized system developed by the Federal Emergency Management Agency (FEMA), based on the use of Geographic Information System (GIS), that estimates the risks and losses associated with natural events through an analysis of fragility curves and damage functions, which are generated with information about the threat and the demographic exposure of the selected area.

The current version of HAZUS-MH estimates the risk of the critical natural hazards to the United States identified by FEMA: earthquakes, floods and hurricanes (FEMA, 2011). Considering that the lahar flows and the debris flows have a similar hydraulic behavior (Iverson *et al.*, 1998), an adjustment methodology of the fragility curves of the Flood Model is proposed to estimate the risk of lahars on the national road infrastructure. The adjustment method is based on an hybrid approach, using an empirical and analytical model to quantify the damage of lahars on bridges, the element that is considered critical in HAZUS-MH assessment. Through this methodology, it is possible to model the risk of the volcanic hazard on the Chilean interurban roads. This assessment helps the highways agencies identify the most vulnerable roads to the volcanic hazard in this country and then prioritize or focus their management including its mitigation.