

Sarah E Ogburn, Sue C Loughlin, Eliza S Calder, Natalie Ortiz

Dome forming eruptions: a global hazards database

Lava dome-forming volcanic eruptions are common throughout the world. They can be dangerous as nearly all dome-forming eruptions have been associated with explosive activity (Newhall and Melson, 1983). Most explosions are vulcanian with eruption plumes reaching less than 15 km with a Volcanic Explosivity Index (VEI) < 3 (for a definition of VEI see Newhall and Self, 1982). Nevertheless, large Plinian explosions with a VEI ≥ 4 do sometimes occur in association with dome-forming eruptions and most significant volcanic events of recent history are in this category. The 1902-1905 eruption of Mt. Pelée (Martinique), the 1980-1986 eruption of Mount St. Helens (USA) and the 1991 eruption of Mt. Pinatubo (Philippines) all demonstrate the destructive power of VEI ≥ 4 dome-forming eruptions. Hazards related to dome-forming eruptions are numerous and include dome-collapse and column-collapse pyroclastic flows and surges, tephra fall, directed blasts, lahars, and landslides.

Global historical analysis is a powerful tool for decision-making as well as for scientific discovery. In the absence of monitoring data or knowledge of a volcano's eruptive history, global analysis can provide a method of understanding what might be expected based on similar eruptions. Important scientific information has been gleaned from disparate collections of dome-forming eruption hazard information, and modeling of volcanic phenomena often requires extensive data for development and calibration.

This study investigates the relationship between large explosive eruptions (VEI ≥ 4) and lava dome-growth from 1000 BCE to present and develops a world-wide database of all relevant

information, including dome growth duration, pauses between episodes of dome growth, and extrusion rates. Data sources include the database of volcanic activity maintained by the Smithsonian Institute (Global Volcanism Program) and all relevant published review papers, research papers and reports. Analysis of the databases has provided useful information regarding the relationship between extrusion rates and large explosions, the identification of patterns in eruptive frequency between different volcanoes, and the timing of large explosions in relation to dome growth. Relational databases will be compiled to allow users to query the database, and additional dome-forming eruption hazard data is requested from any interested parties.