

The 23 September 1995 Surtseyan Explosions Through Ruapehu Crater Lake, New Zealand

BF Houghton Geology & Geophysics, University of Hawaii, POST 617C, Honolulu, HI 96822, USA; ph. 808 956-2561; fax 808 956-5512; e-mail: bhought@soest.hawaii.edu)

A spectacular series of three explosions over a 15 second time interval at 4:57 pm on Saturday 23 September. These events typified the behavior of the volcano during early stages of the 1995-96 eruptions, when a significant volume of water remained in Crater Lake, and liquid water was a key component of the transporting and depositing systems. These explosions ejected a very heterogeneous assemblage of vesiculated juvenile bombs, lake sediments and liquid sulfur, lake water and steam. The liquid water precluded most of the ash sized material from rising high into a convective plume and much of the particulate material was ejected as a series of spectacular vertical and inclined jets. Meter-sized blocks detached from the eruption slug and followed independent parabolic paths delineated by vapor trails. Deposits of the September eruptions had three components. The first were thin, narrowly confined ash fall tongues. Although the convective plume from this eruption rose to 12 km elevation it contained little ash and the resulting deposit extended only a few kilometers beyond the cone. Inclined jets from the 3rd explosion followed trajectories that brought them into contact with 3 summit glaciers. The jetted ejecta mixed with snow and ice to form lahars. The lahars froze on deposition-probably as they came to rest. There was no evidence at all from the snow, below or surrounding the deposits, that interstitial fluid phase had drained from the flows either during or after deposition. Thus they preserved a frozen record of the complete lahar, in itself a mixture of the assemblage of water and clasts ejected through the lake and admixed snow. This fortuitous situation permits us to make a unique analysis of the components ejected in the explosions including the liquid water phase.