Geophysical Research Abstracts
Vol. 15, EGU2013-13229, 2013
EGU General Assembly 2013
© Author(s) 2013. CC Attribution 3.0 License.

# Titan2d Computer simulation and geomorphic analysis of the eruptive vents, landslide and debris flows of the 2012 Te Maari eruption from Mt. Tongariro, New Zealand.

Jonathan Procter (1), Anke Zernack (1), Karoly Nemeth (1), Shane Cronin (1), Abani Patra (2), Graham Leonard (4), Gill Jolly (4), Harry Keys (5), and Michael Sheridan (3)

(1) Massey University, Institute of Natural Resources, Palmerston North, New Zealand (j.n.procter@massey.ac.nz, +64 6 350 5632), (2) Department of Mechanical and Aerospace Engineering, SUNY Buffalo, Buffalo, NY, USA., (3) Center for GeoHazards Studies, Department of Geology, SUNY Buffalo, Buffalo, NY, USA., (4) GNS Science, Wairakei Research Centre, Private Bag 2000, Taupo, New Zealand, (5) Department of Conservation, Turangi, New Zealand.

Mt. Tongariro erupted on the 6th August 2012 from the northern Te Maari Craters. The small phreatic to phreatomagmatic eruption was not considered as apresent day hazardof the Tongariro Volcanic Centre. While scarce historic reports describe similar events occurring during the last eruptive episode at Te Maari craters from 1869-1896, they lack any information on geomorphic changes to the crater configuration. Similarly the products of these historic eruptions, such as debris flows or pyroclastic flows, are not preserved in the geologic record. Due to the lack of accurate historic information, the location of possible vents, volumes and flow rheologies were complete unknowns. The Titan2D computational flow model was applied to scenarios developed around historic eruptive centres to create a mass flow hazard zone for public hazard maps. Titan2D model parameters were determined from the geomorphologic conditions of the Te Maari Craters and from past experiences in hindcasting expected mass flow products from this complex. With no validation available from past events, hazards analysis of the simulations focused on maximum run-outs and maximum inundations areas. These were used to inform the production of a series of hazard maps. The subsequent 6th August phreatic to phreatomagmatic explosions altered the landscape, with newly established volcanic vents and potentially unstable craters. This eruption also displaced 320,000 m3 of material from the flanks of the vent area in the form of a landslide, generating a small debris flow that flowed 2.5 km from source and blocked a valley system. These geomorphic changes were characterised by RTK-GPS surveys and LiDAR. The damming of the valley and the formation of a lake behind the dam presented a changing hazardscape. This rapidly evolving landscape and the ever-changing geomorphic conditions continually alters the hazardscape, requiring further scenario development and computer simulations providing challenges for hazard analysis and emergency management.