Geomorphic analysis and numerical flow simulations from the 2012 Te Maari eruption from Mt. Tongariro, New Zealand.

Jonathan Procter[1], Anke Zernack[1], Harry Keys[2], Matthew Irwin[1], Shane Cronin[1]

[1]Massey University, New Zealand, [2]Department of Conservation, New Zealand

E-mail: J.N.Procter@massey.ac.nz

Data from LiDAR and RTK GPS, remotely sensed data and numerical computer simulations have all been combined to determine geomorphic change and volcanic hazard from the 6th August 2012 eruption from the Te Maari Craters of Mt Tongariro, New Zealand. The small phreatic to phreatomagmatic eruption and resulting landslide/debris flow was not considered in the hazard analysis of the Tongariro Volcanic Centre. 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 current geomorphologic conditions from 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. 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, which is continually altered by the rapidly evolving landscape and the ever-changing geomorphic conditions. Computer simulations and their results can be combined with present topographic measurements to provide signals to predict landscape changes over time.