

Using Vhub to Apply Computational Models to Real-Case Scenarios for Volcanic Hazard Assessment

Eliza S Calder¹, Jose Luis Palma², Sylvain Charbonnier³, Leah Coutland³, Jorge Bajo⁶, Lucia Capra⁴, Nick Varley⁵, Martina Bettinez-hackert⁶, Mike Sheridan⁶

¹University of Edinburgh, UK, ²University of Concepcion, Chile, ³University of South Florida, USA, ⁴UNAM, Mexico, ⁵University of Colima, Mexico, ⁶University of Buffalo, USA

E-mail: ecalder@buffalo.edu

A 12-day workshop on applying computational models to real-case scenarios for volcanic hazard assessment was held at the University of Colima, Mexico between 8-21 January 2013. The rationale behind the workshop was to provide instruction on the undertaking of quantitative volcanic hazard assessments using the VHub cyber-infrastructure platform (<http://vhub.org>), through which users can access simulation tools, tutorials, and support networks. 48 international participants and instructors attended from all regions of South, Central, and North America and the Caribbean bringing together experts covering four major discipline groups (geology, geophysics, mathematics, and geography), and including several senior scientists from international government institutions responsible for the mitigation of volcanic hazards. The schedule combined 4 days of lecture-based instruction, 3 days of field-based instruction studying deposits around the flanks of Fuego de Colima Volcano and 4 days of hands-on computational modeling sessions held at the Faculty of Science at the University of Colima. Workshop modules stepped through the complete process, from collection of rudimentary information about the volcano's past activity to providing a hazard assessment based on computational modeling using a suit of up-to-date simulation tools. Participants completed 4 projects using the VHub cyber-infrastructure platform: A forward simulation using Tephra2 using input parameters collected from the Plinian eruption of Colima in 1913; A probabilistic assessment using Tephra2, to determine the exceedance probability of 10kg/m² or more of tephra fallout on the cities of Ciudad Guzman and Colima; A comparative analysis of pyroclastic density current runout at Colima using the energy cone model and Titan2D; And finally a sensitivity analysis of different input parameters for simulations of the Colima 2005 block-and-ash flows using Titan2D. The evaluation of learning outcomes has been assessed through analysis of the online entrance and exit surveys, as well by assessment of portfolio work undertaken by each group. A working group, set up on VHub, now provides a long-term available resource as well as an organizational and storage structure for data and dissemination of the results of all the workshop, including presentations, modeling exercises and tutorials, modeling data, and participant projects.