

Lahar modeling at Mocho-Choshuenco Volcano

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Mocho-Choshuenco volcanic complex, located upon Liquiñe-Ofqui fault zone, hosts a high potential lahar hazard based on its geological history. A large glacier fills a caldera built up before ca. 14 ka. As part of Tier 2 of Estrategia Nacional de Glaciares from Chile's Dirección General de Aguas (DGA), we modelled lahar flooded areas at 9 river basins with LaharZ and MSF. Volumes were estimated based on ice, snow and water storage at the volcano as well as by means of a DEM generated from official cartography of Instituto Geográfico Militar. In order to estimate the amount of snow we used ten years of glacier monitoring measurements from Mocho Glacier, located on its southeast slope. The glacier's volume can be assessed by means of radio-echo sounding to derive ice thickness, in combination with surface geometry data. We used 6 airborne radar radial profiles (25 MHz) and 2 ground radar profiles (9 MHz) from DGA's project "Estimación de volúmenes de hielo mediante sondajes de radar en zonas Norte, Central y Sur". The mean estimated glacier thickness for the whole volcanic complex is 68 m and the maximum measured is 262 m for the caldera. Five streams were explored for ancient deposits to establish the rheology of Mocho-Choshuenco lahar flows. Based on the nature of these deposits the lahar behaviour can be considered mainly as hyperconcentrated flows. Three different melt scenarios produced by eruptive events were considered as an input for modelling, resembling three past eruptions in the volcano: 1864, ca. 1550 and Enco ignimbrite eruption (ca. 1700 B.P.). For each scenario two subscenarios were modelled, both including glacier ice melt, the first one with minimum water equivalent, without snow over the volcano as commonly occurs at the end of the summer; and the second one with maximum water storage (largest snow accumulation in the measurement record).