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'Understanding volcanoes and society: the key for risk mitigation'



Ice Volumes on Chilean Volcanoes

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One of the least known variables for modeling lahar flows is the quantification of ice and snow available for melting during an eruptive event. Glacier thickness is a basic input for modeling lahar generation, their magnitudes and potential flooded areas. In recent years, Chile's Dirección General de Aguas (DGA) has coordinated and funded several projects to update the glacier inventory and assess the ice thickness of glaciers. We report here the results of ice thickness and volume for eighteen glaciers obtained by airborne radar as part of a 2013-2014 DGA study. For cold glaciers, located above 5000 m a.s.l., a 50 MHz radar was used, whereas for temperate glaciers located at lower elevations, a 25 MHz radar was used. Of the eighteen glaciers the following eleven are located on active volcanoes according to the Global Volcanism Program, listed from north to south: Tupungatito, Tinguiririca 1, 3 and 4 in Central Chile; Callaqui, Llaima, Nevado de Sollipulli, Villarrica, Mocho-Choshuenco, Osorno and Tronador in South Chile. In each of these volcanoes an average of eight profiles (radial or alternatively transverse and longitudinal) were surveyed using airborne radar, including spiral-shaped profiles on Osorno volcano. In Tupungatito, Villarrica and Mocho-Choshuenco volcanoes ground radar information was used as well for validation of the airborne data. The ice thickness results were extrapolated to most of the area of the glaciers, where good data coverage was available. The results show a mean ice thickness of 74 m for the eleven volcanoes, with a maximum mean thickness of 324 m for Sollipulli Volcano and a minimum mean thickness of 17 m for Osorno Volcano. Major ice volumes exist on volcanoes that exhibit deep ice-filled calderas, such as Tupungatito, Sollipulli and Mocho-Choshuenco, whereas very shallow ice is present on more regular cone-shaped volcanoes such as Llaima and Osorno.