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Coupled geohazards at Southern Andes (Copahue-Lanín volcanoes): Chile's GEO supersite proposal

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Southern Andes are a young and active mountain belt where volcanism and tectonic processes (and those related to the hydrometeorological conditions controlled by this geological setting) pose a significant threat to the growing communities nearby. This proposal focus on a ca. 200 km long segment of the Southern Andes where 9 stratovolcanoes and 2 distributed volcanic fields are located, just along a tectonic corridor defined by the northern segment of the Liquiñe-Ofqui Faul System (LOFS), a long-lived active strike-slip fault running for 1200 km. Volcanoes in this area take part of the central province of the Andean Southern Volcanic Zone (37-41ºS), particularly the northermost portion that is limited at the south by an Andean tranverse fault (Lanalhue Fault, which define the Villarrica-Lanin volcanic chain) and run along the horse-tail array of the LOFS to the north. Most of the stravolcanoes are atop of the LOFS main branch with only 3 exceptions (Callaqui, Tolhuaca and Lanín) 15-20 km away, but related to transverse faults.
Hazards in the segment derive from the activity of some of the most active volcanoes in South America (e.g., Villarrica, Llaima), others with long-lasting weak activity (e.g., Copahue) or some volcanoes with low frequency but high magnitude eruptions in the geological record. Only since the beggining of the 20th century 80 eruptions have been recorded in this area. In addition, activity of the LOFS has been detected prior to some eruptions and coeval with some others (e.g., Lonquimay 1989). A strong two-way coupling between tectonics and volcanism has been proposed for the segment but only recently detected by geophysical techniques or numerical modelling. Tectonic triggered landslides are frequent in this region together with debris flows at erupting ice-covered volcanoes or stream headed at high altitude basins. The latter scenario seems to be worst at present because of global climate change.
Ground-based monitoring networks for both volcanism (the so-called Red Nacional de Vigilancia Volcánica at Sernageomin) and tectonics (Centro Sismólogico Nacional at Universidad de Chile) allow a good complement with space-borne data (e.g., we observed deformation by GPS and InSAR at Villarrica volcano related to the March 3, 2015 eruption) in order to promote basic and applied research for a successful national strategy of disaster risk reduction. In addition, at least 3 active national research grants focus in this area and a number of young scientists are working there.
Thus, we propose the Copahue-Lanín (37.5-39.5ºS) segment of the Southern Volcanic Zone as a Geohazards Supersite and look forward for an enhanced engagement of the scientific community in this area.