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# The 2011-2012 eruption of Cordón Caulle volcano (Southern Andes): Evolution, crisis management and current hazards

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A new kind of integrated approach was for first time achieved during the eruptive crisis of Cordón Caulle volcano (Southern Andes, 40.59ºS, 72.12ºW) in Chile. The monitoring network of SERNAGEOMIN around the volcano detected the increasing precursory seismicity, alerting the imminence of an eruption about 5 hours before its onset, on June 4, 2011. In addition, SERNAGEOMIN generated daily forecasts of tephra dispersal and fall (ASHFALL advection-diffusion model), and prepared simulations of areas affected by the possible occurrence of lahars and pyroclastic flows. Models were improved with observed effects on the field and satellite imagery, resulting in a good correlation. The information was timely supplied to the authorities as well as recommendations in order to better precise the vulnerable areas.

Eruption has initially occurred from a couple of overlapped cones located along the eastern fault scarp of the Pleistocene-Holocene extensional graben of Cordón Caulle. Eruptive products have virtually the same bulk composition as those of the historical 1921 and 1960 eruptions, corresponding to phenocryst-poor rhyodacites (67-70 % $SiO_2$). During the first eruptive stage, a ca. 15-km strong Plinian column lasting 27 hours emitted 0.2-0.4 km3 of magma (DRE). Thick tephra deposits have been accumulated in Chile and Argentina, whereas fine particles and aerosols dispersion disrupted air navigation across the Southern Hemisphere. The second ongoing eruptive stage, which started in mid-June, has been characterized by lava emission already covering a total area comparable to the 1960 lava flows with a total estimated volume <0.25 km3 (at the end of December 2011). Weak but persistent plumes have caused preventive flight suspensions in Chile and Argentina until the end of the year. Main current hazards at Cordón Caulle volcano are fine tephra fallout, secondary lahars, minor explosions and lava flow front collapse.

Even if this case can be considered successful from the point of view of eruption forecast and hazard assessment, a new protocol of volcanic alerts has been recently signed between SERNAGEOMIN and the National Emergency Agency (ONEMI) in order to improve the communication, information transfer and roles of those institutions during risky volcanic crises.