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



Chronology and impact of the 2011 Puyehue-Cordón Caulle eruption, Chile

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We present a detailed chronological reconstruction of the 2011 eruption of Puyehue-Cordón Caulle volcano (Chile) based on information derived from newspapers, scientific reports and satellite images. Chronology of associated volcanic processes and their local and regional effects (i.e. precursory activity, tephra fallout, lahars, pyroclastic density currents, lava flows) are also presented. The eruption had a severe impact on the ecosystem and on various economic sectors, including aviation, tourism, agriculture, and fishing industry. Urban areas and critical infrastructures, such as airports, hospitals and roads, were also impacted. The concentration of PM₁₀ (Particulate Matter >10 microns) was measured during and after the eruption, showing that maximum safety threshold levels of daily and annual exposures were surpassed in several occasions. Probabilistic analyses showed that this combination of atmospheric and eruptive conditions has a probability of occurrence of about 1%. The management of the crisis, including evacuation of people, is discussed, as well as the comparison with the impact associated with other recent eruptions located in similar areas and having similar characteristics (i.e., Quizapu, Hudson, and Chaitén volcanoes). This comparison shows that the regions downwind and very close to the erupting volcanoes suffered very similar problems, without a clear relation with the intensity of the eruption (e.g. health problems, damage to vegetation, death of animals, roof collapse, air traffic disruptions, road closure, lahars and flooding). This suggests that a detailed collection of impact data can be largely beneficial for the development of plans for the management of an eruptive crisis and the mitigation of associated risk of the Andean region.