

The glaciovolcanic evolution of the Copahue volcano, Andean Southern Volcanic Zone, Argentina-Chile

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Abstract

Glaciovolcanism produces distinctive features that are useful paleoclimate proxies for the distribution of past ice sheets and glacier extent. The Copahue volcano located in the Andean Southern Volcanic Zone, Argentina-Chile, is an active composite volcano known to have glaciovolcanic features such as lava bodies with glassy margins and anomalous cooling fractures. However, the emplacement conditions of these products and the influence of Pleistocene glaciations on the evolution of the Copahue volcano remains poorly understood. In this contribution, we propose a model for glaciovolcanic evolution of the Copahue volcano based on the analysis, interpretation, and mapping of its products. Ten lithofacies are described on the eastern flank of Copahue volcano exhibiting several examples of glaciovolcanism. The evolution of the Copahue volcano can be divided into two main sequences: the Ancient Sequence (S1) and the Young Sequence (S2), separated by a major erosive phase. The S1 (early-middle Pleistocene-late Pleistocene) consists of an initial subaerial effusive stage followed by a major glaciovolcanic stage, during which a thick ice cap existed and the edifice grew beneath an englacial lake with the eventual formation of a lava-fed delta. The S2 (late Pleistocene-Present) is defined by mainly effusive activity during periods of glacial advance and retreat recorded by an alternation of unconfined subaerial lavas and ice-confined lavas. The evolution of the Copahue volcano therefore indicates two glaciations in the Copahue-Caviahue area during the late Pleistocene, in contrast to a single glaciation. Based on the glacial history in the area we associate the first glaciation with the end of Marine Isotope Stage 3 (57-29 ka) and/or the Last Glacial Maximum period (26.5-19.0 ka), and the second less-extensive glacial period with the Antarctic Cold Reversal (14.5-12.9 ka). (C) 2020 Elsevier B.V. All rights reserved.

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