

## ERUPTIVE HISTORY OF THE PLIOCENE CAILLOMA CALDERA, HIGH PLATEAU PROVINCE OF SOUTHERN PERÚ

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The Cailloma caldera (15°15'S; 71°45'W), formed in Pliocene time immediately prior to inception of the presently active Plio-Quaternary frontal arc to the southwest. The caldera, which has an average diameter of about 30 km, is the result of three distinct episodes of large-scale pyroclastic eruption at about 4.4, 3.4 and 2.5 Ma. The resulting ash-flow sheets are exposed within the Cailloma quadrangle and also in parts of the adjacent Orcopampa, Chivay, Callalli, Condorama, Yauri and Velilli quadrangles. A number of names, including "formación Sennca" and "Fm. Ignimbrítica Acopata", have been applied to the Cailloma Tuff in different areas.

Ash flows that comprise the Cailloma Tuff were preferentially channeled through low portions of the caldera wall. The detailed distribution of the individual ash-flow sheets, which should be considered as informal members of the Cailloma Tuff, is poorly understood. However, a considerable part of the oldest ash-flow sheet passed to the NE and covers a large area in the vicinity of Yauri. This is corroborated by a sanidine age of  $4.4 \pm 0.1$  Ma on distal tuff exposed between Yauri and Tintaya. The middle ash-flow sheet has been dated NE of the caldera, and is undoubtedly present elsewhere. Tuffs of the upper ash-flow sheet are known and dated SE, W and SW of the caldera.

A large dome of phenocryst-poor to aphyric rhyolite, in places exhibiting spectacular gas cavities, was erupted along the northwestern part of the caldera margin near the Cailloma mine at  $4.0 \pm 0.1$  Ma. The southeastern part of this dome was subsequently truncated by collapse related to the middle or last episodes of eruption. Following the final collapse, the Cailloma caldera was partially filled with dark, generally phenocryst-poor lavas and associated pyroclastic rocks of intermediate composition. These were erupted from a number of vents situated well within the central part of the caldera (e.g., Cerro Cosana), along or near the ring-fracture system, and outside the caldera. A lake formed within the caldera in which volcanoclastic and epiclastic sediments and freshwater limestone were deposited. It probably overlapped with the period of post-collapse volcanism, and existed until the caldera wall was breached by headwater erosion of the Río Apurímac. There is no evidence for central resurgence nor of hydrothermal alteration or mineralization related to the magmatic system.

The tuffs of the Cailloma caldera differ petrochemically from tuffs erupted in the region during Miocene time. As discussed in a companion paper, tuff of the first ash-flow sheet has chemical characteristics of topaz rhyolite. The upper ash-flow sheet appears to be less evolved than the first sheet.

The Cailloma caldera was recognized by Noble (El Río Amazonas nace en una caldera de colapso – El emplazamiento geológico de las minas de plata de Cailloma y Sucuitambo, Priv. report, Cía. de Minas Buenaventura S.A., 1979). A similar interpretation was published in 1981 by Dávila (Bol. Soc. Geol. Perú, vol. 68).