

# Origin and evolution of <1 Ma rhyolitic crustal magmas within the Altiplano-Puna Volcanic Complex: Amphibole recycling at Chac-Inca Dome

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The late evolution of the Altiplano-Puna Volcanic Complex (APVC) is characterized by the effusive activity of volcanic centers, particularly, the eruption of numerous *torta*-type rhyolitic lava domes. Geochemical and petrological studies in these domes (La Torta [1], Chao Dacite [2]) have provided insight into the role of mafic input in the generation of these highly siliceous (>60% SiO<sub>2</sub>) crustal magmas and the unique processes of evolution involved, such as polybaric ascent, devolatilization, and rejuvenation of the mushes, markedly differing from the volcanoes in the area [1,3].

This work focuses on the pre-eruptive evolution of the Chac-Inca dome (66% SiO<sub>2</sub>), east of Azufre volcano, through a geochemical study of major and trace elements and volatiles in melt inclusions. Our work shows that the evolution of Chac-Inca is driven by mafic magma input that can act as process triggers as indicated by incomplete amphibole recycling, i.e., greater survival of old amphibole centers depleted in high field strength elements (HFSE) with no rim new rim growing. This differs from the case of Cerro La Torta (Figure 1, [1]), where the amphibole recycling process is completely seen, i.e., growth of HFSE-poor rims in amphibole. This confirms amphibole recycling as a mechanism for mush rejuvenation and magma decompression as the cause of such viscous magma being able to erupt effusively.

Our current work in Chao Dacite [2] and Chillahuita dome provides evidence that each rhyolitic dome experienced different evolution and ascent process and, therefore, they should be studied independently from each other and from the volcanoes which overlie them even though they all belong to the late evolution of the APVC.

Morata, Buscher (2023), Journal of South American Earth Sciences, 130, 104569

[2] Hernández Prat, Godoy, B, Cannatelli, Astudillo Manosalva, Castruccio, Elardo, Monteleone. The role of mafic input in highly evolved volcanism within the Altiplano-Puna Volcanic Complex: A geochemical study of Cerro Chao, Lithos. Under Review.

[3] Taussi, Godoy, Piscaglia, Morata, Agostini, Le Roux, González-Maurel, Gallmeyer, Menzies, Renzulli (2019), Journal of Volcanology and Geothermal Research, 373, 179-198.

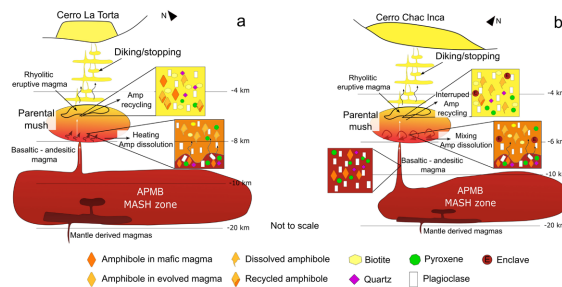


Figure 1. Schematic profile in depth of Cerro La Torta (a) and Cerro Chac-Inca (b) showing their pre-eruptive evolution and the different degrees of amphibole recycling, as well as the most probable ascent mechanism.