

## Origin of Silicic volcanism in the North Patagonian Rear Arc

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We present a comprehensive geochemical study of Quaternary volcanism in the Loicas Trough, Neuquén, Argentina. We aim to determine the magma origin and differentiation of the volcanism here, as it deviates in composition and location from typical main and back arc magmatism. The trough is a NNW-SSE striking graben located in the fold and thrust belts 100 km east of the main Andean Arc from 36°S to 37.5°S. The graben was formed in response to transtension due to oblique subduction and slab roll-back since the Neogene. It hosts several large volcanic centers including the Tromen and Domuyo Volcanoes. The latter has the largest geothermal province in Patagonia and has shown signs of unrest over the past decade.

Our dataset contains major and trace element concentrations, bulk rock radiogenic isotope compositions for Sr, Nd, Pb and Hf and in situ Sr isotope compositions of plagioclases. The samples display a wide continuous compositional range, varying from alkali basalts to high-K rhyolites following a dominantly trachytic trend, unlike the trend and range of main and back arc volcanics. The trace element patterns indicate a mixed intraplate OIB-like and slab enriched mantle wedge source overprinted by assimilation, as the magmas transverse and stagnate in the crust. The isotope compositions become more enriched as differentiation progresses, indicating open system processes. Using the Magma Chamber Simulator [1][2], we model the magma differentiation of the Loicas Trough volcanic rocks. Our results indicate that assimilation and fractional crystallization processes involving partial melting of the host rock play a dominant role in producing the observed extremely silicic melt compositions and wide compositional variability. The tectonic and structural setting of the trough facilitates melting of a heterogeneous mantle, transport, storage and contamination of the magmas, leading to their unusual characteristics.

[1] Bohrsen, Spera, Heinonen, Brown, Scruggs, Adams, Takach, Zeff & Suikkanen (2020), *Contributions to Mineralogy and Petrology*, 175(11), 104.

[2] Heinonen, Bohrsen, Spera, Brown, Scruggs & Adams (2020), *Contributions to Mineralogy and Petrology*, 175(11), 105.