



$\delta^{18}\text{O}$ evidence against crustal assimilation for the origin of Timanfaya tholeiitic basalts

The need for extensive mantle melting of a HIMU mantle component

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Introduction

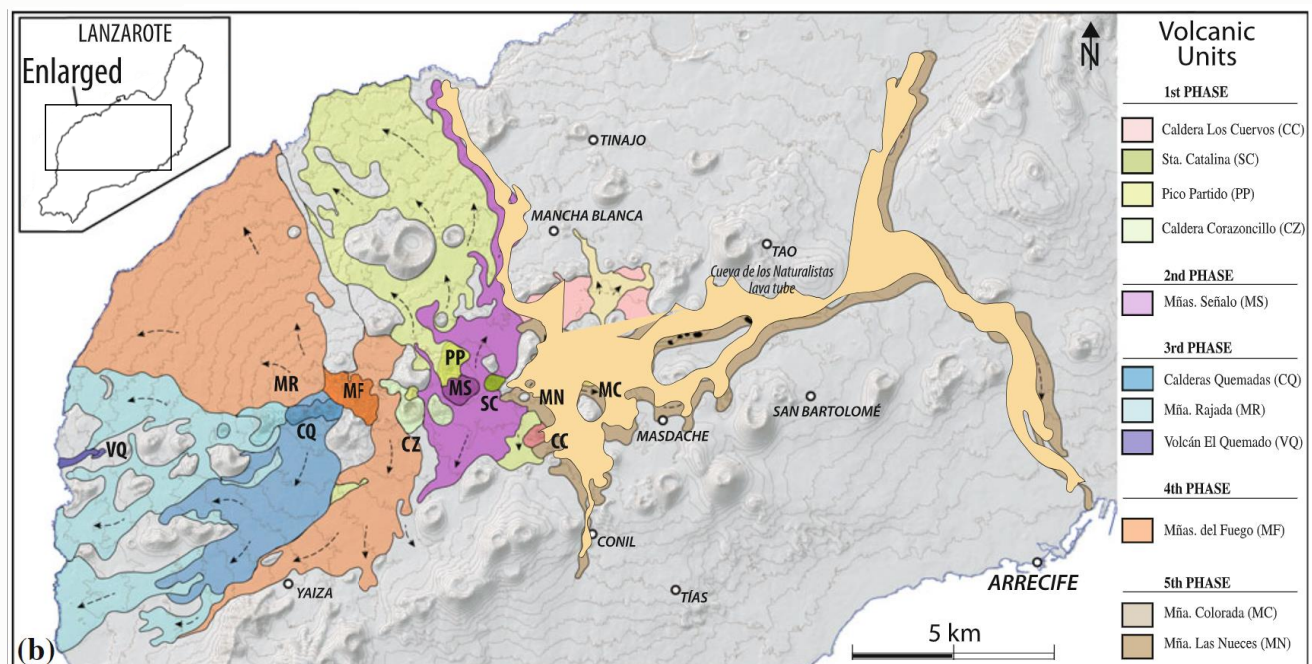
Lanzarote is one of the oldest islands in the Canary archipelago. The Timanfaya eruption (1730 -36) with its prolonged eruptive activity, large volume and composition of lava (alkali basalts evolving into tholeiites) is considered an anomaly in the volcanic record of the archipelago. The origin of these late-stage tholeiites have been interpreted in terms of two possible scenarios: partial melting of a mantle source or contamination through shallow-level crustal interaction.

The eruption can be divided into five phases. The map depicts the phases and their lava flow distributions. From Carracedo (2014)

Aim

The purpose of this thesis is to investigate if magma and sedimentary crust mixing could explain the late-stage tholeiites.

This was accomplished by conducting the first oxygen isotopic studies on sedimentary xenoliths found in the tholeiites, fieldwork, and petrographic studies.



Conclusions

- The late stage tholeiites produced during the Timanfaya eruption was not a direct cause of contamination, as shallow level contamination processes were not recognized.

- The low oxygen isotopic composition points toward a mantle source signal, in this case a HIMU plume source beneath Lanzarote.

- High degree melting of a lherzolite source could be a possible contributor to the formation of these tholeiites.

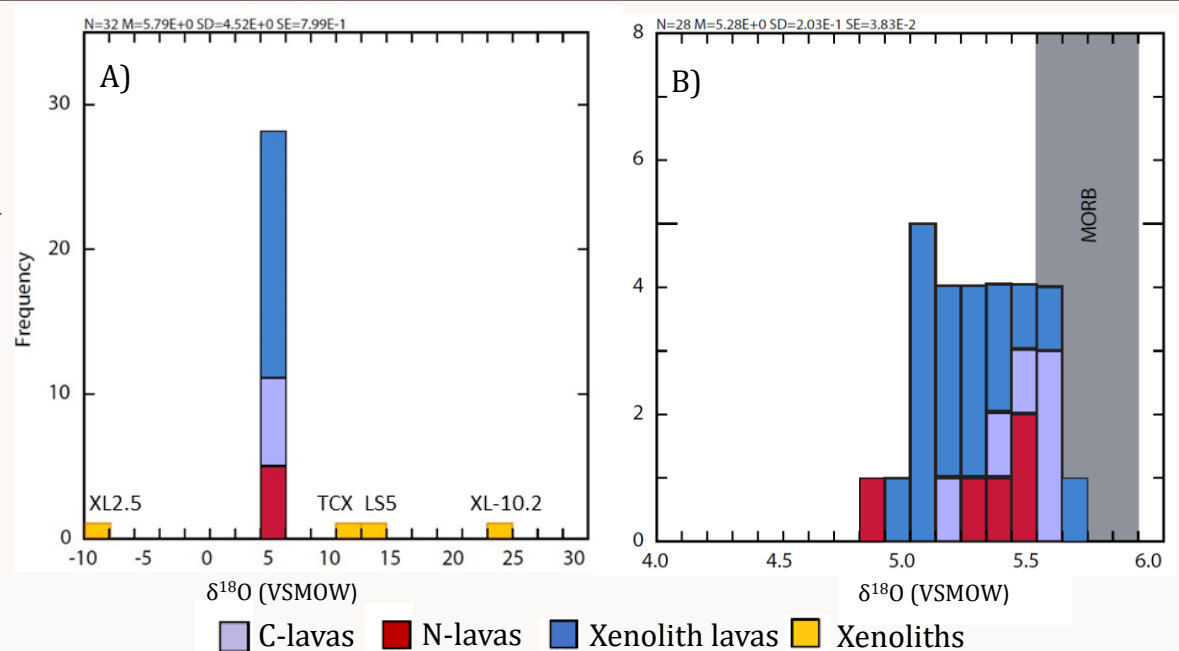


Diagram A shows the distribution of the isotopic ratio in all samples. In diagram B only the values of the lavas are depicted, compared to MORB values (5.5 ± 0.2 ‰). The lavas were divided into different groups based on which vent produced them (C + xenolith lavas + xenoliths = Mña Colorada, N = Mña Las Nueces).