Using textural data and fractal analysis to infer crystallization of dacites from Qorveh (W-Iran)

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Polybaric crystallization in a volcano feeding system generally produces concave-up trends in diagrams of crystal size distribution (CSD) of the related emitted products, a feature testified both in natural and experimental studies [1,2]. In the present work, CSD technique has been applied to plagioclase crystals in plio-quaternary dacitic lavas of Qorveh volcano (Western Iran).

Crystal size distributions of more than 9000 plagioclases of the six collected samples were plotted in natural logarithmic scale (Ln) as the number of crystals per unit length and per unit volume (n(L); mm-4) vs. crystal lengths (L; mm). According to textural and CSD data, three distinct populations of crystals were identified: 1) phenocrysts (L>0.6) with coarse sieve texture and complex zoning patterns; 2) micro-phenocrysts (0.2<L<0.6) and 3) microlites (L<0.2). Furthermore, CSDs show a fractal behavior, with fractal dimension ranging 2.44-2.75. In addition, based on the box counting method, also distribution patterns of plagioclase crystals present fractal dimensions.

Our study suggests a strong control on size and spatial distribution of plagioclase crystals by complex processes of crystallization related to decompression and degassing, different rates of ascent velocity and depth of crystals nucleation and growth.

[1] Armienti *et al*. (1994) *Contrib*. *Mineral*. *Petrol* **115**, 402–414. [2] Brugger, C, R. Hammer, J.E (2010) *EPSL* **300**, 246–254

Temporal evolution of subduction signatures in a continental back-arc

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The Andino-Cuyana Basaltic Province (ACBP) constitutes part of the Quaternary continental back arc in southern Mendoza, Argentina. This basaltic province is divided into the Llancanelo Volcanic Field (LLVF) to the north and the Payunia Volcanic Field (PVF) to the south. The younger basalts are from the PVF and they range from <10 ka to approximately 50 ka [1], while the flows from LLVF are older Pleistocene basalts [1] lacking any Holocene volcanism. The ACBP presents a range of basaltic flows providing an appropriate setting to investigate changes in back-arc geochemistry during the late Quaternary.

In this setting, this study aims (i) to quantify the relative influence of the Andean arc and subducting slab in the back-arc, and thus (ii) to identify types and timescales of processes controlling back-arc volcanism in the ACBP. For this purpose, we present a suite of geochemical data (major and trace elemental analyses, REE, $^{87}Sr/^{86}Sr$, $^{226}Ra/^{230}Th$, $^{238}U/^{230}Th$) from the two volcanic fields and relate them to existing data from Andean arc basalts.

Our results show that basalts from the LLVF and the PVF have intraplate and arc related signatures with enrichment in LILE, HFSE and REE compared with basalts from the Andean arc. The older basalts from the LLVF and PVF have stronger arc signatures. In the PVF we observed a decrease in arc signatures from approximately 100 ka to 10 ka with a strong enrichment in LILE, HFSE and REE in the young basalts which could be related to metasomatised mantle or continental lithospheric mantle.

[1] Ramos & Folguera (2010), Journal of Volcanology and Geothermal Research **201**, 53-64.

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