

Radiogenic isotope (Pb, Sr, Nd) compositions of mafic minerals from Quaternary volcanic rocks of Ecuador

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Context

The Ecuadorian volcanic arc is characterized by the occurrence of three trench-parallel volcano chains. Systematic isotopic changes of whole volcanic rocks occur both across- and along-arc. However, it is difficult to disentangle the roles played by crustal assimilation and mantle heterogeneity in causing these systematic changes. In order to do this, it is planned to analyze for their radiogenic (Pb, Sr, Nd) isotopic compositions mafic minerals (preferentially olivine and secondarily pyroxenes) that should provide a signature that is closer to that of the mantle source for these magmatic rocks. This should allow us to reconstruct a first approximate isotopic map of the mantle wedge beneath Ecuador. Because whole rock geochemical and isotopic data on hundreds of rocks are already available, the determination of isotopic compositions of mafic minerals within the same rocks will also allow us to establish open versus closed system behavior during magmatic evolution of the investigated samples.

Objectives and Methods

The objective of this project is to determine the radiogenic (Pb, Sr, Nd) isotopic composition of mafic minerals (olivine ± pyroxenes) of volcanic rocks of Ecuador with the aim to check for along and across-arc variations in the isotopic composition of the mantle wedge beneath Ecuador.

Two transects (one east-west, across arc, and one north-south, along arc) each one consisting of 5-6 volcanic centers will be investigated. Whole rock samples are available and have been already characterized petrographically, geochemically and isotopically. It will be needed to carry out mineral separation and isotopic analyses of the mafic mineral separates. Additional microprobe work (and eventually LA-ICPMS) to characterize the major (and trace) element chemistry of minerals will also be carried out.

Literature

Chiaradia, M., Müntener, O., Beate, B., Fontignie, D. (2009) Adakite-like volcanism of Ecuador: lower crust magmatic evolution and recycling. *Contributions to Mineralogy and Petrology*, v. 158, p. 563–588.

Chiaradia, M., Müntener, O., Beate, B. (2014) Quaternary sanukitoid-like andesites generated from intracrustal processes (Chacana Caldera Complex, Ecuador): implications for Archean sanukitoids. *J. Pet.*, 55, no. 4, p. 769-802.



Olivine-clinopyroxene cluster in Chacana andesitic flow

WEB sites

<http://www.unige.ch/sciences/terre/en/research/isotope-geochemistry-geochronology-and-thermochronology/>

<http://www.unige.ch/sciences/terre/en/research/mineral-resources-and-geofluids/>

Choice of orientation:

1) Geochemistry, Ore Deposits