

Petrology, geochemistry and magma source of shoshonitic and calc-alkaline magmatic series in the southeastern sector of the Michoacán Guanajuato volcanic field, México.

DANIEL ALBERTO GOMEZ-CALDERÓN¹, PEDRO CORONA-CHAVEZ² AND MARÍA DEL SOL HERNÁNDEZ-BERNAL¹

¹Universidad Nacional Autónoma de México - Escuela Nacional de Estudios Superiores unidad Morelia

²Universidad Michoacana de San Nicolás de Hidalgo, Instituto de Investigaciones en Ciencias de la Tierra

Presenting Author: dagcbeto@gmail.com

The Cahulote Graben (CG), located in the southeastern Michoacán Guanajuato Volcanic Field (MGVF), México, is characterized by the temporal and spatial occurrence of calc-alkaline and shoshonitic magmatic series. Based on new geochemical and thermobarometric data, we discuss the tectonic implications of magma sources within a magmatic arc environment.

The shoshonitic serie of the CG is composed of Cpx+Ol+Plg±Ox±Amp±Lct and groundmass of glass(>50%) + feldspar(35%) + oxides(<10%) ± Ol/Cpx(<5%) ± Ap(<1%), sometimes this serie shows Phl+Cpx+Ol+Plg+Amp mineral assemblage (e.g. Petembillo spatter). In comparison, the basaltic-andesitic calc-alkaline series are typically composed of Ol+Cpx+Plg±Opx (±Amp in low Mg lavas).

Shoshonitic rocks range in SiO₂ content from 50 to 61 wt%, MgO 2–10 wt%, and show high TiO₂ (1–1.5 wt%) and P₂O₅ (0.5–1 wt%) values. Trace elements exhibit enrichment in Large Ion Lithophile Elements (LILE) and Light Rare Earth Elements (LREE). The Y vs. Sr/Y ratios suggest a magmatic arc environment with relatively adakitic signatures, while the Nb /Ta ratio indicates a mantle trend (~17).

Clinopyroxene phenocryst profiles show Al^(VI) variations, and geothermobarometric calculations suggest variable depths with pressures of 6–8.2 kbar in the phenocrysts cores and <3 kbar in the microliths and rims, with a temperature range of 1215–1304 °C. The isotopic results of ⁸⁷Sr/⁸⁶Sr and ¹⁴³Nd/¹⁴⁴Nd show a similar trend to the different magmatic series of MGVF, probably related to NMEP (Northern Mexican Extensional Province) mantle source reported in lherzolite xenoliths. However, petrographic, geochemical, and thermobarometric data suggest that different reservoirs may stagnate at various depths due to recharge and/or magma mixing. These processes could transport antecrysts from deeper systems, perturbing the magmatic system and leading to the formation of mafic rims on phenocrysts in upper crustal batches.