



Spatial and temporal evolution of a back-arc Plio-pleistocene magmatic series: an example of Auca Mahuida and El Tromen volcanoes from Payenia Basaltic Province, Argentina

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The Auca Mahuida and El Tromen volcanoes are located in southern Payenia Basaltic Province (PBP), within a back-arc zone. New K-Ar ages and geochemistry analysis confirm that during the Plio-pleistocene epoch they erupted mainly basaltic and andesitic lavas. Normative minerals (Ol: 17.61, Ne: 3.86 and Ab: 23.57) of shield Auca Mahuida lavas characterize these rocks in the boundary between alkali basalts and basanites. Compatible elements (Ni: 227.30 ppm, Co: 50.75 ppm) and MgO values (9.70 %) reveal their primitive origin (OIB type). On the contrary, major and trace elements data from El Tromen volcano expose typical characteristics of more evolved lavas.

The Auca Mahuida magmas plotted in incompatible multi-element diagram [normalised to the primitive mantle (MP) of Sun & McDonough, 1989] show moderately fractionated patterns (50 to 100 times the MP), a slight depletion in heavy REE and Y and a very slight depletion in Nb (signature of subduction?). However, the lavas of El Tromen show spidergrams similar to calc-alkaline or Low Silica Adakites patterns: moderate enrichment in the most incompatible elements, negative anomaly in Nb, positive anomalies in K, Pb, Sr and depletion in heavy REE and Y. Furthermore, the Ba/La and La/Ta ratios of El Tromen lavas confirm an arc signature (20 and 29 respectively).

The geochemical affinity of El Tromen volcano could be due to geographical proximity of the Andes arc. The very slight arc signature exposed by the shield Auca Mahuida volcano could be due to this volcano location (130 km SE of El Tromen) within an intersection between the PBP and Tromen-Domuyo belt, thus the alkaline source was only slightly modified. Finally, we think that in this region magmatic mantle sources were probably modified by subduction-related fluids; this metasomatism would generate the lavas of El Tromen volcano, while magmatic mantle sources of the shield Auca Mahuida were not considerably influenced by this metasomatism.

Finally, our new K-Ar ages obtained on separated phases using the Cassinot-Gillot technique provide strong constraints to reconstruct the eruptive sequences of each of these volcanoes.

Keywords: K-Ar ages, El Tromen volcano, Auca Mahuida volcano, OIB type, Low Silica Adakites, Calc-alkaline volcanism, Subduction, Metasomatism.