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A multi-isotopic study of the central sector of one of the most voluminous monogenetic fields in the Central Andes: El Negrillar volcanic field, Chile

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The El Negrillar monogenetic field (24.18°S, 68.25°W) is located in the southern segment of the Central Volcanic Zone (CVZ) which encompasses the volcanoes of southern Peru, Bolivia, northern Argentina and northern Chile. This monogenetic lava field comprises 35 eruptive centers that erupted a total magma volume of 6.8 km^3 (DRE) in more than 80 eruptive phases, reaching the maximum volume erupted by a monogenetic field in the CVZ [1]. El Negrillar is composed of three main clusters: Northern, Central and Southern El Negrillar, named according to their distribution relative to the Socompa volcano debris avalanche deposit (DAD). Physical and chemical characterization (i.e., major and trace element abundances) of the eruptive phases reveal a compositional variation correlated with a change in the morphometrical and rheological parameters, implying the existence of a south to north local trend within the monogenetic lava field [1].

A multi-isotopic study of El Negrillar was carried out to stablish the nature of the magma source and to analyze its isotopic evolution within the eruptive sequence. For this purpose, new Sr-Nd-Pb isotope data were obtained for a selection of 30 representative lavas from 27 eruptive phases of the Central El Negrillar (CEN) cluster. The $^{143}Nd/^{144}Nd$ (0.51241-0.51247), $^{87}Sr/^{86}Sr$ (0.70638-0.70696), $^{206}Pb/^{204}Pb$ (18.681-18.754), $^{207}Pb/^{204}Pb$ (15.624-15.641) and $^{208}Pb/^{204}Pb$ (38.55-38.77) values obtained are interpreted as arc-magmatic signatures, and lie within the isotopic range of volcanoes from the southern segment of the CVZ, where crustal contamination processes have a less significant role compared to volcanoes located to the north. Furthermore, data from CEN seem to complete a geochemical gap identified in the small eruptive monogenetic centers located in the Salar de Atacama Region (i.e., Cerro Overo, Tilocálar and Cerro Tujle). We are currently pursuing additional major and trace element modeling, together with these isotopic data, to determine and quantify the magmatic processes that could be involved in the evolution of the CEN cluster lavas.

[1] Parra-Encalada et al. (in rev.). Physical and chemical evolution of the largest monogenetic lava field in the Central Andes: El Negrillar Volcanic Field, Chile. J. Volcanol. Geotherm. Res.