Petrology and geochemistry of the San Félix-San Ambrosio islands, Eastern Pacific

Oliver Cooper Percker (1) and Luis E. Lara (2)
(1) Departamento de Geología, Universidad de Chile, Santiago, Chile (ocooper@ing.uchile.cl), (2) Volcano Hazards Program, SERNAGEOMIN, Chile (luis.lara@sernageomin.cl)

The San Félix-San Ambrosio (SF-SA) islands, Eastern Pacific, are fragments of two volcanic sequences 20 km apart. Both represent the top of an eroded large shield-volcano which rises over the Nazca Plate. Here, new geochemical and 40Ar/39Ar geochronological data are presented in order to understand magmatic evolution and source features. Two units are recognized on the SF island: (1) the Cerro Amarillo unit (CAU) (190 ± 30 ka) formed by a hyaloclastic-tuff cone and basanitic lavas (Ba/Yb=519; Ba/Zr=2.19; La/Yb=49.88; Nb/Ta=17.96; Nb/Y=3.78; Nb/Zr=0.25) with absent or scarce modal content of plagioclase (<5%); and (2) Plateau unit (PU) (210 ± 60 ka) formed by a basanitic lava succession with high modal content of plagioclase (>20%). The hyaloclastic-tuff cone of the CAU contains aphanitic-trachytic lithic fragments of Na-augite and kaersutite, which correspond to the final product of fractional crystallization of olivine+clinopyroxene+Fe-Ti oxides+apatite±plagioclase from alkaline primitive liquids similar to SF-SA lavas. The geochemical data suggest that the islands represent different evolutionary stages of a same volcanic intraplate complex. The alkaline to transitional SA lavas (Ba/Yb=249; Ba/Zr=1.60; La/Yb=24.62; Nb/Ta=16.55; Nb/Y=2.22; Nb/Zr=0.19) would represent the shield stage (ca 2.9 Ma), while the basanitic SF lavas the post-erosional stage (ca 0.2 Ma). Considering the Sr-Nd-Pb isotopic data of the SF-SA lavas, previous works have ruled out a genetic relationship between SF-SA islands and the nearby Nazca Ridge. An heterogeneous mantle plume with mantelic metasomatized recycled lithologies is hypothesized as a possible magmatic source capable of explaining the petrologic differences between the SF-SA islands and between the CAU and PU, in SF island.

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