



Juan Fernández Ridge (Nazca Plate): petrology and thermochronology of a rejuvenated hot spot trail

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The Juan Fernández Ridge on the oceanic Nazca plate is thought to be a classic hot spot trail because of the apparent westward rejuvenation of the eruptive ages. However, geochronological data is still scarce and there are a few constraints to support this hypothesis like the ca. 9 Ma Ar-Ar age of the O'Higgins seamount (115 km from the Chile-Perú trench), some published K-Ar ages of ca. 3-4 Ma in Robinson Crusoe island (580 km from the trench) and ca. 1 Ma in Alejandro Selkirk (180 km further west). New reconnaissance K-Ar ages and specially the ongoing Ar-Ar dating effort in Robinson Crusoe define a ca. 1-4 Ma time span, which partially overlap with the age of Alejandro Selkirk, breaking the expected age progression given that the Nazca plate moves eastwards at ca. 6-8 cm/yr. In addition, new geological mapping shows a sharp unconformity between the older (ca. 4 Ma), strongly altered sequences and the more recent (ca. 1 Ma), post-erosional volcanic piles, where the proximal facies are still preserved.

Petrological evidence also supports this evolution pattern. In fact, the partially altered older sequence is tholeiitic (Ba/Yb=12.70; La/Yb=8.12; Ba/Y=6.51; Ba/Zr=0.89). The shield stage (ca. 1-3 Ma) is transitional from tholeiitic to alkaline (Ba/Yb=18.07-8.32; La/Yb=4.59-9.84; Ba/Y=4.24-8.18; Ba/Zr=0.73-1.09) and the younger (ca. 1 Ma) is mostly alkaline (Ba/Yb=38.15; La/Yb=15.66; Ba/Y=20.27; Ba/Zr=2.31).

A fixed deep-mantle plume origin for Pacific hot spots has been widely debated and concurrent phenomena arose as a possible explanation for non-linear age progressions and/or long-lived volcanic activity. In fact, intraplate regional tectonics, plume displacement, and mantle heterogeneities could be the main factor of the ridge architecture or the mask for a first-order linear trend. An ongoing mapping and dating effort is aimed to understand the evolution of the Juan Fernández Ridge, testing the main hypothesis.

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