



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

J. Reyes (1) and L.E. Lara (2)

(1) Universidad de Chile, Santiago, Chile (jareyes@ing.uchile.cl), (2) Sernageomin, Volcano Hazards Program, Chile (lelara@sernageomin.cl)

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.

This research is supported by FONDECYT Project 1110966.