

Sr-Nd isotopic composition of gabbro-norites from the Miocene Punta Camden Sill in southern Patagonia: petrogenetic and tectonic implications

Cristóbal Alfonso Ramírez de Arellano Melo¹, Mauricio Calderón², Francisco Hervé^{1,3}, Diego Rojo^{4,5}, Marly Babinski⁶

(1) Carrera de Geología, Facultad de Ingeniería, Universidad Andres Bello, República 220, Santiago, Chile.

(2) Centro C+, Facultad de Ingeniería, Universidad del Desarrollo, Av. Plaza 680, Las Condes, Chile.

(3) Departamento de Geología, Universidad de Chile, Plaza Ercilla 803, Santiago, Chile.

(4) Facultad de Ingeniería y Arquitectura, Universidad Arturo Prat, Av. Arturo Prat 2120, Iquique, Chile.

(5) Instituto de Estudios Andinos IDEAN, (Universidad de Buenos Aires - CONICET), Buenos Aires, Argentina.

(6) Instituto de Geociências, Universidade de São Paulo, Rua do Lago 562, Cidade Universitária, São Paulo CEP 05508-080, Brasil

The Punta Camden Sill (53°13'S - 71°40'W) is a tabular body of ca. 4x3 km², which intrudes the Paleogene sedimentary successions of the Magallanes foreland basin in the southernmost South America. It is located ca. 60 km to the NE from the eastern limit of the South Patagonian Batholith (SPB) and about 250 km from the trench (present-day coordinates). Their mafic members correspond to medium-grained porphyritic olivine-gabbro-norites, with late hornblende and biotite. A whole-rock K-Ar age of ca. 20 Ma was reported in Morello et al. (1) and emplacement depth of about 2 km have been proposed (1). Rocks with SiO₂ contents of ca. 55 wt% and relatively high contents of K₂O+Na₂O (ca. 7 wt%) show low (La/Yb)_n values (ca. 8.0 – 8.2), (Dy/Yb)_n values (ca. 1.2) and subtle Eu anomalies (Eu/Eu* ca. 0.8). These features and a marked depletion of Nb when is normalized to primitive mantle, indicate the influence of subduction processes during its formation, as is also reported in the Neogene plutonic rocks of the SPB. Initial Sr and Nd isotopic ratios (calculated at 20 Ma) yielded (⁸⁷Sr/⁸⁶Sr)_i values of ca. 0.7041 and εNd_i values of +2.2 to +2.5. A similar isotopic signature with relatively high alkalis was reported for coeval plutonic rocks to East in the SPB (2) and Miocene plutonic rocks from Torres del Paine (51°S), dated at ca. 12.5 Ma ((3),(4)). It is thus considered that primitive basaltic magmas were generated over a wide zone in the mantle wedge (>60 km), at relatively low degrees of partial melting, diachronously precluding the opening of the slab window related to the incoming Chile spreading ridge during Miocene times.

(1) Morello et al. (2001). Anales del Instituto de la Patagonia, Serie Ciencias Humanas 29: 129-148.

(2) Hurtado, (2018). Memoria de Título, Universidad Andrés Bello, 118 p.

(3) Ramírez de Arellano et al. (2021). JSAMES, 110, 103238.

(4) Leuthold, et al. (2012). EPSL, 325-326, 85-92.

(5) Leuthold, et al. (2013). J.Petrol. 54(2), 273-303.

Financing: This contribution was funded by Fondecyt grants 1161818 and 1211906.