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Trace element composition of clinopyroxene in gabbros and dolerites of the Tortuga Ophiolitic Complex, southernmost Patagonia.

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During the Upper Jurassic-Lower Cretaceous times the western margin of Gondwana in southern Patagonia experienced extreme lithospheric extension and generation of rift and marginal back-arc basins. The ophiolitic complexes of the Rocas Verdes basin comprises incomplete ophiolite pseudostratigraphy lacking ultramafic rocks. The Tortuga Ophiolitic Complex, the southernmost seafloor remnant of the Rocas Verdes basin, record the most advanced evolutionary stage of the back-arc basin evolution in a mid-ocean ridge-type setting. The base of the Tortuga Complex consists of massive and layered gabbros, most of which are two pyroxene and olivine gabbros, leucogabbros, and clinopyroxene troctolites intruded by dikes of basalt and diabase with chilled margins. We present new major and trace element composition of clinopyroxene from the gabbros and sheeted dikes complexes to assess the geochemical affinity of parental basaltic magmas. Clinopyroxene in gabbros is mostly augite and have Al contents of 0.06-0.14 a.p.f.u. and Mg# of 80-92. Clinopyroxene in dolerites in the sheeted dike unit (augite and diopside) have Al content of 0.11-0.12 a.p.f.u. and Mg# of 85-92. Some immobile trace elements (e.g. Zr, Ti, Y) are sensitive to the degree of partial melting and mantle source composition, and can be used as a proxy for distinguishing tectonic environments. The Ti+Cr vs. Ca diagram, coupled with moderate-high TiO_2 content of clinopyroxene (0.4-1.4 wt.%) suggests their generation in mid-oceanic ridge-type environment (cf. Beccaluva et al., 1989). The high Ti/Zr ratios (of ~4-11) coupled with low Zr contents (~0.2-1.1) are expected for higher degrees of partial melting or for melting of more depleted mantle sources. Conversely, low Zr/Y ratios (0.05-0.13) plot between the range of arc basalts. Chondrite-normalized REE patterns in clinopyroxene display a strong depletion of LREE

compared to HREE and have an almost flat pattern in the MREE to HREE with a positive Eu (Eu*= 0.9-1.1) anomaly, indicating that clinopyroxene crystallized from a strongly depleted mid-ocean-ridge-type basalt, formed by extensive fractional melting of the mantle source and/or fractional crystallization and accumulation of anhydrous phases. The general trend of the incompatible trace elements patterns exhibit depletion in LILEs, minor HFSEs depletion, positive anomaly of Rb and negative anomalies in Ba, Zr, Ti and Nb, consistent with their generation from a refractory mantle source barely influenced by subduction components derived from the oceanic slab. This agrees with basalt generation in a back-arc basin located far away from the convergent margin. This study was supported by the Fondecyt grant 1161818 and the Anillo Project ACT-105.