GEOCHEMISTRY OF EARLY TERTIARY BACK-ARC BASALTS FROM AYSÉN, SOUTHERN CHILE (44-46° S): GEODYNAMIC IMPLICATIONS.

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KEY WORDS: Chile, Patagonia, Tertiary basalts, extension, geochemistry, geodynamic

INTRODUCTION

The geology of the Aysén region (44-47° S) is dominated by the presence of a huge calc-alkaline batholite, the North Patagonian Batholite (NPB), which constitute the spine of the chain. This 200 km wide plutonic complex intruded to the west the Chonos Late Paleozoic metamorphic complex, and to the east, Paleozoic and Mesozoic volcanic and sedimentary units (Pankhurst and Hervé, 1994). The Mesozoic stratigraphy comprises two main subduction-related volcanic episodes, the Middle to Upper Jurassic Ibañez Formation and the Middle Cretaceous Divisadero Formation. The Lower Cretaceous marine Coyhaique Group, deposited in a back-arc basin, provides a useful stratigraphic marker between the volcanic successions (Bell et al., 1994; De la Cruz et al., 1994). Volcanic activity resumed after a period of quiescence in Eocene time. Mesa basalts, situated in a back-arc position, crop out in the Balmaceda and Río Cisnes regions. Pliocene and Quaternary andesitic stratovolcanoes and monogenetic basaltic centres of the volcanic arc are located westward, near the Liquiñe-Ofqui fault zone (LOFZ), a 1000 km long, trench parallel, dextral strike-slip duplex, which has been active at least since the mid-Tertiary (Cembrano and Hervé, 1993).

GEOLOGICAL SETTING

A basaltic succession, approximately 150 m thick, composed of subhorizontal lava flows with frequent columnar jointing, outcrops in the Balmaceda basin. The flows tend to be thicker toward the top (up to 10 m). The first eruptions occurred in a subaqueous environment as revealed by the presence of pillow lavas with interstitial hyaloclastites and sediments, or finely stratified surtseyian-type surge deposits exposed in the Río Oscuro valley. In this last locality, the basaltic sequence lies above poorly-welded tuffs which are probably also Tertiary (Suárez et al., 1994). The Balmaceda basalts were overlaid by Miocene to Pliocene continental sediments with intercalated acidic pyroclastic units. Base upon a whole rock K/Ar radiometric age (46 ± 2 Ma; Baker et al., 1981), an Eocene age can be assigned to the Balmaceda basalts. Some zeolites are visible in hand specimen, and were identified as heulandite clinoptilolite in the pillows, and chabazite in the massive flows. Two basaltic plugs with abundant fresh

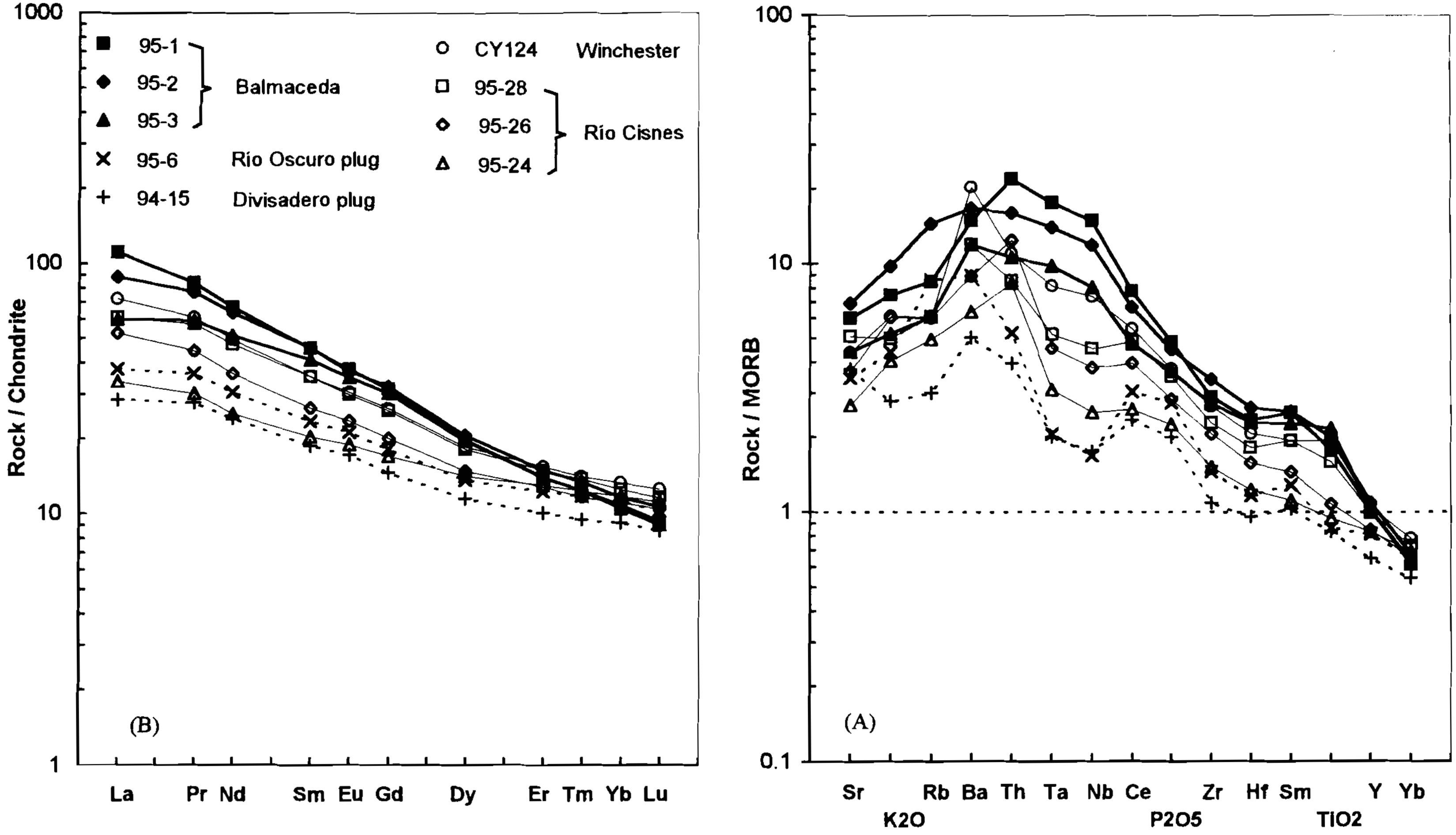

Fig. 1 : MORB-normalised element abundances (B) and Chondrite normalised rare-earth patterns (A) of Early Tertiary basalts from the northern Patagonian Andes. The following observations can be enhanced: (1) progressive fading of the Ta-Nb anomaly for the Río Cisnes and Río Winchester basalts; (2) absence of this anomaly, typical of OIB, for the Balmaceda basalts; (3) progressive enrichment in light-REE and (La/Yb)n ratios (B) from the basaltic plugs through the Río Cisnes and Balmaceda basalts.