

Paper Number: 4187

Late Cretaceous Arc Volcanism in the Central Chilean Andes (~35°S): Characteristics and Tectonic Implications

Persico, M.^{1,2}, Muñoz, M.², Tapia, F.³, Farías, M.¹ and Arellano, P.^{1,2}

¹Departamento de Geología, Universidad de Chile, Santiago, Chile, mcaa.mario07@gmail.com

²Advanced Mining and Technology Center (AMTC), Universidad de Chile, Santiago, Chile

³Departamento de Ciencias Geológicas, Universidad de Buenos Aires, Buenos Aires, Argentina

In this contribution we present the preliminary results from the study of the Guanaco Unit, a mainly volcanic series of Late Cretaceous age exposed in the high Andes of Central Chile (~35°S). Based on geological field work and whole rock chemical and Sr-Nd isotopic analysis of igneous rocks, we aim to characterize the Andean magmatic evolution throughout this period and the paleogeographic configuration of the continental margin. Being previously assigned to the cenozoic deposits that overly it, the Guanaco Unit has only recently been recognized in this part of the Andes from geochronological determinations [1,2]. This represents the first record of volcanic activity of Late Cretaceous age in the area.

The Guanaco Unit is exposed in the high Andes along a section of the upper Tinguiririca river (~34° 55'S-70°29'W). It is composed by at least 2.200 m of lava flows, tuffs and volcanic breccias, with minor sedimentary intercalations [3], with ages ranging from 63 to 75 Ma [1,2]. Its basal contact is not exposed and it is unconformably overlaid by cenozoic rocks and modern volcanics. The presence of syndepositional normal faults in this unit indicates extensional conditions, at least locally, throughout this period [1,2].

According to field work and petrographic studies, volcanism of the Guanaco unit is apparently bimodal as seen in the common occurrence of basaltic andesite lava flows intercalated with dacitic pyroclastic rocks. This is also supported by geochemical results that show SiO₂ contents varying between 51-58 wt.% for lava flows and over 70% for the one tuff analysed. All analysed samples show the typical characteristics of arc-like magmas, represented by the enrichment of LILE over HFSE elements and a Nb-Ta trough in normalized multielement diagrams, in addition to such classification according to tectonic discrimination diagrams based on trace element ratios. In terms of isotopic composition, these rocks show a moderately unradiogenic signature with ⁸⁷Sr/⁸⁶Sr_i ratios between 0.7038-0.7039 and εNd_i values around ~4, which indicates a mostly juvenile input.

The mentioned characteristics of the Guanaco Unit indicate accumulation of its deposits in a basin near eruptive centers under at least local extensional conditions. They probably represent the evolution in an intra-arc late cretaceous basin. Based on the mainly volcanic nature of these deposits, the Guanaco Unit can be correlated with similar series of Late Cretaceous age present between ~100-200 km to the NW (north of ~34°S; Lo Valle Formation and Estratos del Cordón de Los Ratones). The latter are exposed in the Chilean Central Depression, which limits the Andean range to the west, and are recognized as representing the volcanic arc front of this period [4]. This correlation indicates an oblique distribution of the volcanic arc respect to the margin during Late Cretaceous-early Paleocene, an observation also supported by the lack of volcanic units of this age in the Central Depression south of 34°S.

This work has been funded by CONICYT (Chile) through the research grant Fondecyt 11140012.

References:

- [1] Mosolf J (2013) Ph.D. Thesis, University of California: 279 p.
- [2] Tapia F (2015) Ph.D. Thesis, Universidad de Chile: 340 p.
- [3] Persico et al. (2015) In: *XIV Congreso Geológico Chileno*, Digital Proceedings
- [4] Charrier R et al. (2007) In: *The Geology of Chile*: The Geological Society, 21-114

