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VOLCANISMO MIOCENO EN LOS ANDES CENTRALES DE CHILE CORDILLERA PRINCIPAL (31°30' – 34°30' L.S.).

MIOCENE VOLCANISM IN THE CENTRAL CHILEAN ANDES, CORDILLERA PRINCIPAL (31°30'–34°30' S).

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The Cenozoic evolution of the western south America Continental margin is characterized by episodes of volcanic activity that show differences from north to south. Within this Era, the Miocene is the epoch where the volcanic activity is more intense and continous. The Miocene volcanic rocks form thick and extensive outcrops along the Chilean-Argentinian High Andes.

In the investigated region, between 31°30' and 34°30' S. (Fig.1), the Miocene volcanism is mainly represented by the Farellones Formation, which forms a 400 km long and 24-65 km wide belt. These volcanic deposits are located to the east of an Oligocene-Lowermost Miocene volcanic belt and to the west of the present volcanic line. This distribution determines a polarity of the Cenozoic magmatic foci, which is also observed within the Miocene deposits. The Pliocene volcanic centers are emplaced within the Miocene volcanic belt, and are the generators of the important copper-molibdenum deposits known between 33°-35°S.

The Farellones Formation forms one of the youngest structural units of the Central Chile Andes. Its deformation occurred not later than 5 million years ago. It is characterized by gentle folds with limbs seldomly dipping more than 15° and wavelengths between 7 and 8 km and some west dipping thrusts. Deformation is attributed to compression. The Farellones Formation is intruded by granitoids of 13-7 Ma.

Between 31°30' to 32°30'S, the Miocene volcanic rocks consist of more than 1,000 meters of andesitic and rhyolitic calcalkaline continental lava flows, tuffs and volcanic breccias. The lower part of this section contains detritic sedimentary intercalations and is unconformably deposited over strongly folded formations. K-Ar dates of samples from this area range between 18 and 8.4 Ma.

Between 33° and 34° S these deposits are composed by approximately 1.500 m of continental andesitic flows in the upper levels and andesitic and rhyolitic tuffs, partially ignimbritic, in the lower levels. In this area they rest pseudoconcordantly over the volcanogenic Abanico Formation. K-Ar dates in this sector gave 22 Ma at the base of the sequence and 16.6 Ma at its top. The Colorado-La Parva Formation, with K-Ar ages of 4.9 to 3.9 Ma rests slightly unconformably over the Miocene volcanics. The Miocene volcanic centers were shifted 35 km to the east in 4 Ma.

Between 34-34°30'S the Miocene volcanic rocks are at least 2.400 meters thick. They consist of thick beds of calcalkaline andesitic and andesitic-basaltic lava flows and pyroclastic deposits of similar composition resting unconformably over the Coya-Machalí (= Abanico) Formation. K-Ar dates for this section range from 14 to 7.4 Ma.

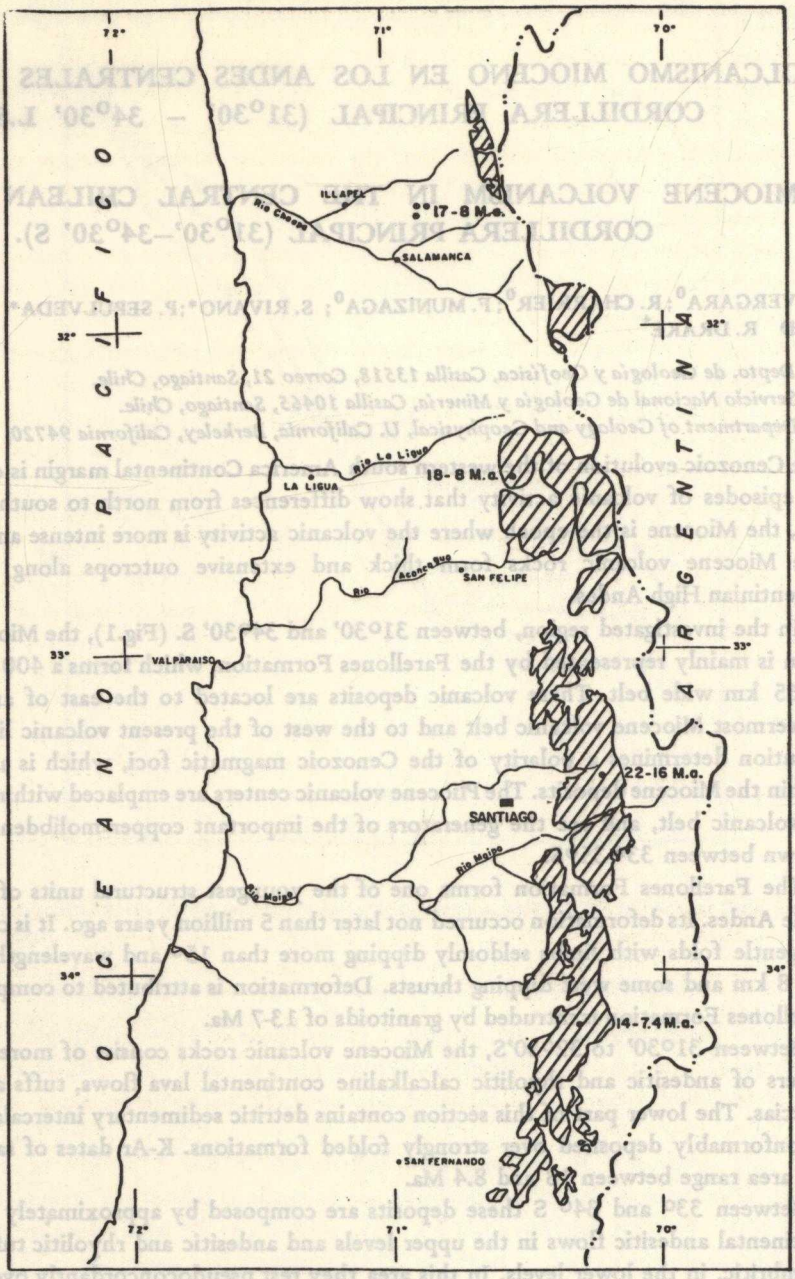

Fig. 1. Outcrops distribution of Miocene Volcanism.

● **Sample location — Lugar de muestreo**

Fig. 1. Distribución de afloramientos del volcanismo Mioceno.

It is concluded that the calcalkaline Farellones volcanic belt is continuous through out the entire studied region and that it developed between 22 Ma and 7.4 Ma ago. Its main activity occured between 18 and 7.4 Ma. This volcanic activity was not always simultaneous along the 400 km of the studied region. The Miocene volcanic activity started between 22 and 18 Ma ago between 31° to 33° S and lasted until 7.4 Ma ago. If we accept for the Miocenic volcanic belt the following minimun average values: 25 km width and 1.5 km thick, it is possible to estimate a volume of 15.000 km^3 of efussive material production.

The most intensive Miocene volcanic activity can be related to an increase of the normal convergence rate between the Nazca and Southamerican plates that occurred between 26 and 9.6 Ma ago (Pilger, 1983).

During the Paleogene the magmatic activity south of 33° S was low and consists mainly of epiclastic sequences (Drake et al. 1982). This low volcanic activity could be related to the low convergence velocity of the Farallon plate, which in turn results from N-S interplate stresses, previous to the rupture of the Farallon Plate that originated the Cocos and Nazca plates (Wortel and Cloetingh, 1981).

During the last 7-4Ma the volcanic activity has been comparatively low and has been reduced to the southern part of the studied area (33°-34°30'S). Between 31°-33°S there is absence of young volcanism, probably due to the subduction of the Juan Fernández Ridge under the continent as suggested by Vogt (1973) and Bonatti et al. (1977).

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