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LA SERIE CORDILLERANA PALEOGENA DE LA PROVINCIA VOLCANICA PATAGONICA

THE PALEOGENE CORDILLERAN SERIES OF THE PATAGONIAN VOLCANIC PROVINCE

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The Patagonian Volcanic Province (PVP) includes two main volcanic series, a Cordilleran Series (CS) to the west and a Plateau Basaltic Series (PBS) to the east. The proteacted volcanism of the CS (Paleocene–Present) is well documented along the Patagonian Andes and neighbouring areas between 40° and 43° South latitude.

Several episodes of volcanic activity whose products are arranged as shifting time-space belts have been detected in the CS. The oldest belt is located along the western edge of the Northpatagonian Massiff (Fig. 1) and developed from the Paleocene up to the Mid-Eocene. A second belt, of Oligocene age, occurs east of the Cretaceous Andean batholith. The following volcanic episode began after the intrusion of the Miocene Andean granites and occurred simultaneously with a Mid-Miocene to Pliocene shift of the volcanic arc towards the Pacific ocean.

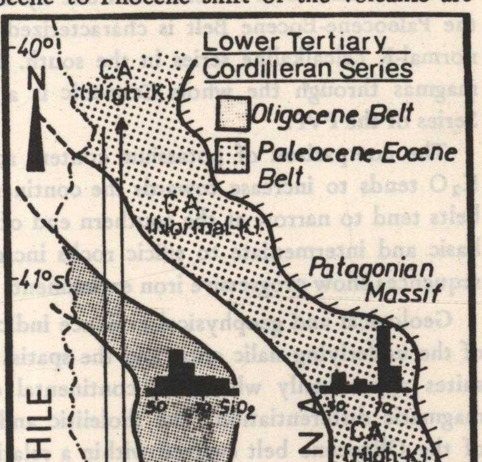

Fig.1. **CA – Calcalkaline Series.**
TH – Tholeiitic Series.

Fig.1. **CA – Serie Calcoalcalina**
TH – Serie Toleitica

The Lower Tertiary CS appears as two sub-parallell ensialic belts. In the southern sector (43-41° 30' S) they are oriented N-S, while north of 41° S they are strongly deflected towards the NW.

The southern and eastern parts of the Paleocene-Eocene (Eastern) Belt have a bimodal composition, but are dominated by a silicic volcanism. These volcanics occur as ignimbrite, plinian, obsidian, and subvolcanic facies. Their field arrangement suggests that they are related to calderas. The composition of the silicic volcanism is mainly rhyolitic. The silicic eruptions were followed by a more restricted basic volcanism which ranges in composition from basalt to basaltic andesite.

Lavic-pyroclastic and lava-flow facies are typically defined in the northwestern part of the Paleocene-Eocene Belt. The lavic-pyroclastic facies range in composition from basalt to ryholite, while the lava-flow facies varies from basalt to andesite.

A widespread andesitic volcanism characterizes the Oligocene (Central) Belt. Exposures of these volcanics are remnants of eroded composite stratovolcanoes and associated fissural eruptions. Dacitic flows and plinian facies are developed towards the base of some Oligocene volcanic successions.

Significant variations in rock associations, defined by average silica content as well as by variations in the alkali and iron have been detected along and across the Lower Tertiary CS Belts. Along both belts K_2O decreases as FeO_t increases southward for a given silica content. There are gentle variations from high-K calcalkaline (transitional to alkaline) series in the north (~ 40° S) towards normal-K calcalkaline (41° and 42° S) and tholeiitic normal-K series (42°30' S) in the Oligocene Belt (Figure 1). The transition from calcalkaline to mildly tholeiitic affinities is similar to that described for the Pliocene-Recent volcanism at the same latitude by Lopez Escobar (1984). The silicic volcanism of the Paleocene-Eocene Belt is characterized by a transition from high-K in the north to normal-K calcalkaline series in the south. The generation of iron enriched calcalkaline magmas through the whole Cenozoic is a significant characteristic of the Cordilleran Series of the PVP.

The comparison of potassium content across the belts at a given latitude shows that K_2O tends to increase towards the continent. Differences in K_2O content between the belts tend to narrow at the southern end of the Lower Tertiary CS. The volume ratio of basic and intermediate to silicic rocks increases with decreasing relative age, while the sequences show progressive iron enrichment.

Geological and geophysical evidence indicate a link between the nature and thickness of the underlying sialic crust and the spatial distribution of rock associations. Ignimbrite suites appear only where the continental crust was thick enough to allow complex magmatic differentiation. The tholeiitic andesites and dacites of the southernmost part of the Oligocene belt evolved within a relative thin crust, mean-while andesitic magmas became more potassic northward as the crust thickened.

The temporal evolution of the CS seems to be related to recurrent variations of the tectonic regime during the Cenozoic. The subduction geometry and the convergence rate are the main factors controlling the tectonic regime (Rapela et al., 1983, 1984).

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