



ESEG-1: Tectónica andina

Late Cretaceous to Paleogene magmatic evolution and its relation with the Farallon-Aluk spreading ridge along the Southern Central to North Patagonian Andes (32-42°S)

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By Late Cretaceous times (80Ma) the Farallon-Aluk spreading ridge started to subduct beneath the South American plate. The southward migration of this ridge would have influenced magmatism as seen by the contrasting signature of the magmatic units along the Southern Central Andes (32-40°S).

To the north (32°S) magmatism is represented by the Juncal Formation (~69Ma), which is described as typical arc-like rocks with medium to high-K andesitic to dacitic composition. In contrast, southern coeval magmatism (~35°30'S), Los Ángeles Unit (~67Ma), presents a basaltic to andesitic composition with a tholeiitic signature that enriched towards the younger magmatic pulses. Moreover, the Los Ángeles Unit presents lower arc-like signature and partial melting degrees than the Juncal Formation, as stated by their contrasting La/Ta, Nb/Y and Nb/Zr ratios. Late Cretaceous-early Paleocene magmatism continues southward (~37-38°S) represented by the stronger arc-like signature of Naunauco Group magmatism, which shows an increase in slab fluids contributions and partial melting degrees.

The variable geochemical signature seen in these magmatic units could be linked to the passage of the segmented Farallon-Aluk spreading ridge. The southward movement of Farallon-Aluk ridge and its continuous subduction beneath the Andean margin involved periods of highly dry ocean crust subduction associated with spreading centers. Thus, these spreading centers can be linked to the development of slab-windows and the input of a more enriched source as seen in the Los Ángeles Unit magmatism. At the same time, hydrated ocean crust subducting at other latitudes can provoke the development of typical arc-like magmatism represented by the Juncal Formation and the Naunauco Group.

The collision of Farallon-Aluk ridge could be also reflected in the contrasting geochemical features of Eocene arc-derived rocks outcropping further south, when Farallon-Aluk ridge reached Patagonian latitudes (~42°S). By this time, a calc-alkaline typical arc-like magmatism developed at 37°-38°S latitudes (~45-39Ma). In contrast, Pilcaniyeu Belt magmatism at 40°S (~44Ma) showed a more enriched and alkaline source with minor slab-fluid input.

In conclusion, the subduction and southward migration of Farallon-Aluk spreading ridge, together with its typical segmented geometry could explain the contrasting geochemical signatures of coetaneous magmatic units along the Andean margin since Latest Cretaceous to Eocene times.