



## **Paleogene (Eocene?- Oligocene) sedimentation and associated tectonic setting in the Coastal Cordillera of northern Chile (21°-21°30' S)**

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Currently there are no reports of Paleogene sedimentation in the Coastal Cordillera of northern Chile. Paleogene deposits crop out in the Central Depression, Precordillera and in the Western Cordillera.

The Cañón del Loa Beds (CLB) is a pre-Upper Oligocene continental sedimentary unit which crops out in the Coastal Cordillera of the Tarapacá Region, near the mouth of the Loa River. This unit has a maximum thickness of 300 m, unconformably overlies Paleozoic-Mesozoic basement, and is covered by Upper Oligocene-Miocene alluvial deposits. A conspicuous, well-developed gypsic paleosol is present between the CLB and the alluvial deposits.

The CLB is composed of cobble conglomerates with rounded to well-rounded clasts (6 to 25 cm), mainly clast-supported, with poor to moderate selection, and minor sandstone intercalations. In general the thickness of the layers is decimetric, with incipient to well-developed bedding. The degree of compactation and consolidation of the unit varies with the thickness of the overlying unit. Clast imbrication indicates sediment supply mainly from the east. The predominance of local sources in the clast population of this unit indicates denudation and exhumation within the Coastal Cordillera.

The CLB deposits accumulated in hemigrabens generated by normal faults associated with the Atacama Fault System (AFS). The faults that developed to the west of the main trace of the AFS dip to the west, while the faults that developed to the east of the main trace dip to the east. This structural arrangement generated, on a large scale, a N-S oriented topographic high (horst), with extensional basins on each flank. Growth strata associated with the normal faults demonstrate syntectonic sedimentation of the CLB. Locally, activity of the normal faults continued after deposition of the unit.

There is no direct radiometric dating of the CLB. Its minimum age is determined by the age of the overlying alluvial unit, which base has been dated at ca. 25 Ma ( $^{40}\text{Ar}/^{39}\text{Ar}$  biotite) on an intercalated volcanic ash layer. This data together with the sedimentation hiatus indicated by the paleosol developed on top of the CLB, show a Late Oligocene minimum age for this unit. On the other hand, U/Th-(He) thermochronology in the Coastal Cordillera of the region set limits on the maximum age of the CLB, indicating a period of cooling (exhumation) of the Coastal Cordillera between 50 and 40 Ma (Eocene), which is contemporaneous with the Incaic Tectonic Phase and magmatic activity in the Precordillera. This exhumation probably led to basement erosion and subsequent sedimentation of the CLB.

Sedimentation of the CLB took place in an alluvial and fluvial environment under semi-arid conditions, which contrasts with increasingly arid and hyperarid conditions in younger units.

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