

Tectosedimentary evolution of the Coastal Cordillera of south-central Chile during the Neogene

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Coastal cordilleras are mountain chains parallel to the trench that are a common feature in convergent margins and are generally located between an accretionary prism and a forearc basin. A Coastal Cordillera extends along most of the Chilean margin and it is separated from the Andean Cordillera by the Central Depression. The origin of the Coastal Cordillera and the Central Depression has been attributed to different causes and has been assigned to different ages. Some authors consider that the Central Depression originated as a large graben during the late Oligocene-early Miocene as a consequence of regional extension. Other authors proposed that it formed as differential erosion of an uplifted peneplain during the Neogene. For other workers, the Coastal Cordillera was uplifted during the Plio-Pleistocene as a consequence of underplating of subducted sediments.

We carried out stratigraphic, geochronologic, structural, and geomorphologic studies in the forearc of south-central Chile between ~37° and 42°S. Our studies indicate a Plio-Pleistocene origin for the Coastal Cordillera and Central Depression at these latitudes. Uplift of the Coastal Cordillera was caused by compressive tectonics. The most important evidences include 1) the occurrence of lower Miocene marine deposits that, after their deposition, were deformed and uplifted to altitudes of ~400 m.a.s.l. 2) The presence of Pliocene fluvial deposits that fill most of the Central Depression in some areas of the Coastal Cordillera at altitudes up to 650 m.a.s.l. 3) The occurrence of similar deposits, which contain abundant volcanic clasts derived from Andean Cordillera sources, in coastal areas where, at present, all rivers drain from metamorphic and plutonic rocks of the Coastal Cordillera. 4) The presence of reverse faults in the limit between the Coastal Cordillera and the Central Depression. 5) The occurrence of well-preserved planar surfaces in the highest parts of the Coastal Cordillera. These surfaces, presumably formed are or near to sea-level, must have been uplifted during the Neogene as the rainy climate that characterize this area would have probably impede their preservation if they were older.