

The inversion of inherited extensional faults during the Upper Cretaceous compressional event: geometry and evolution of the deformation in the Candeleros Range, Domeyko Cordillera, northern Chile

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The shortening related to the Andean mountain building and the exhumation of the Domeyko Cordillera in the northern Chile have been active since the middle to Late Cretaceous (ca. 120–70 Ma), after the Jurassic-Early Cretaceous backarc extension (Schellart et al., 2017; Henríquez et al., 2019). The compressional deformation of the Cordillera de Domeyko fold-and-thrust belt linked with the tectonic inversion of the Domeyko Basin (Mesozoic extensional basin; Espinoza et al., 2018) had been related with the Late Cretaceous compressional period (Peruvian Phase; Bascuñán et al., 2016; Amilibia et al., 2008). However, the style, geometry and evolution of the upper Cretaceous deformation in the Domeyko Cordillera is partially known. We studied the deformation on the western margin of the Domeyko Cordillera at 25°30' (Candeleros Range) through structural mapping, kinematic faults analysis, stereographic folds analysis and tectonomagmatic relations of syntectonic intrusions. Our results show the geometry of deformation is mainly associated with fault-related folding during the inversion of inherited extensional faults in the Upper Cretaceous in the western margin of the Domeyko Cordillera. Two main deformation events are recorded in the Candeleros Range: 1) Middle Jurassic synsedimentary extensional event and 2) Upper Cretaceous contractional event. In particular, the Upper Cretaceous contractional event has two stages: 1) an early contractional stage that inverted the inherited Mesozoic normal faults synchronous to magmatism at 86 Ma; and 2) a late contractional stage that folded the volcanic rocks of the Upper Cretaceous before 65 Ma. In addition, our results suggest that the Upper Cretaceous contraction event would have provoked the building of a Proto-Candeleros Range (part of the Domeyko Cordillera) before 73 Ma. Finally, the rocks of the Candeleros range were also affected by (Incaic) strike-slip faults that do not modify the morphogenetic structure of the mountain range.

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