ESEG-1: Tectónica andina

Geometric relationships of the Abanico Basin first-order faults: an integration of balanced structural cross sections of the Chilean Principal Cordillera between 32°-36 ° S

Rodrigo Adolfo Quiroga[1], Sebastian Herrera[2], Verónica Mardones[2], Iván Gómez Shulz[2], Juan Armando Castro Rivas[2].
(1) IANIGLA CCT-Mendoza
(2) Departamento de Geología, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, Santiago, Chile

Tectonostratigraphic, structural, and geochemical approaches suggest that tectonic inversion of the Abanico basin and subsequent east-vergent propagation of deformation in Principal Cordillera (PC), is the prime mechanism for Andean mountain building. This process deforms the late Eocene-late Oligocene Abanico Formation and, during a subsequent compressive phase, the Miocene Farellones Formation, when major inherited extensional fault systems were positively reactivated. East of this mid-late Cenozoic swath, Mesozoic rocks of the northernmost Neuquén basin, are exposed conforming the Aconcagua and Malargüe fold-and-thrust belts. Several studies have focused on the structural characterization and cinematic modeling at different latitudes of the PC, shedding light on the possible in-depth geometry of the structures that controlled deformation during Andean orogeny. However, the geometric relationship and time-space evolution between different first-order structures are not fully understood, and the tectonostratigraphic relationship between Mesozoic and Cenozoic rocks is still a matter of discussion. In this review, we integrate several balanced cross sections to elucidate the structural mechanisms responsible for late Andean orogeny at the western slope of the Southern Central Andes (32°-36°S).

The cross-sections we integrated along the PC show subtle differences between 32°-36°S, mainly regarding interpretations on the in-depth structure and style of surficial deformation. The western segment of the swath presents high-angle, west-vergent reverse faults that are responsible for folding. Furthermore, folds show wavelengths from c. 5 to c. 10 km and they are interpreted as fault-propagation and fault-bend folds associated with listric fault geometries. The eastern segment usually shows east-vergent structures, rooted at a detachment shallower than the one at the western front, suggesting a westward tilting of the main detachment. Tectonic shortening across strike varies from 15% to 30%, and similar values have been estimated for the eastern and western PC. The general structural configuration that we observe along the PC is coherent with crustal scale models for orogeny that involve initial inversion of the Abanico basin, and eastward migration of deformation after reaching a critical state, generating the east-vergent fold-and-thrust belts of the eastern side of the range.