



ESEG-1: Tectónica andina

Surficial architecture of the Southern Central Andean structural lid: insights from balanced cross sections and palinspastic restorations (Principal Cordillera, ~34°15'S)

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The overall structure, vergence, and lithospheric scale-configuration of the Principal Cordillera (PC) at the Southern Central Andes has been subject of strong and ongoing controversy. Our working hypothesis is that the gross structure of the western Andean slope corresponds to the retro-side (structural lid) of a doubly-vergent orogenic wedge, generated by west-directed subduction of the South American lithosphere. At the PC, positive inversion of inherited structures of the syntectonic Oligocene-Miocene Abanico basin has been ascribed to explain deformation at the retro-side. The aim of this work is to provide additional structural evidence for testing our hypothesis, by means of balanced and palinspastically restored cross-sections for the Abanico Formation at ~34°15'S using previous studies in the area and new detailed structural mapping.

Forward kinematic modeling (Move2D-Midland Valley) was carried out using tri-shear folding, as fault-propagation of the inverted structures is interpreted to generate the tight overturned west-vergent folds of the western deformation front. Here, two east-dipping, high-angle blind reverse faults (former normal faults) account for c. 4.6 km of shortening. Eastwards, near the main Andean drainage divide (pro- and retro-sides limit), adjacent to the Malargüe fold-and-thrust belt (MFTB), east-vergent folding accommodated deformation by a combination between detachment and fault-propagation mechanisms, rooted into a shallow sub-horizontal, though likely folded, décollement. Presence of incompetent layers allowed fold hinge collapse, break-through, out-of-sequence and back thrusts, suggesting multi-detachment asymmetric folding in depth. In this area, shortening reaches a minimum of c. 4.3 km. Considering that shortening estimates in this western Andean region is relatively similar across-strike, overall shortening is mainly accommodated in the MFTB, and that timing of deformation shows eastward migration of the front, our results are in general agreement with previous shortening estimates and interpretations for the Principal Cordillera structure between 33°-36°S. This is consistent with an asymmetric doubly-vergent crustal wedge model related to main underthrusting processes involving westward intracontinental subduction, where the western Andean outcrops belong to the structural lid, passively uplifted due to distribution of material accreted to the MFTB after shortening in the western Andes (prior to the Late Miocene).