

TECTONICS OF THE SOUTHERN CENTRAL ANDES

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Integrated geophysical and geological studies provide new insights to the tectonic setting of the Andes (22°-39° SL). Cretaceous magnetic paleopoles in conjunction with hot-spot tracts show the true-polar-wandering path of South America. A major change in the absolute motion of South America-Africa in Aptian times (± 115 Ma) marks the end of the extensional regime characterized by a negative trench roll-back velocity. The positive velocity established since the Late Cretaceous produced the compressional regime that lasted up to the present. The Andean structure has a first order segmentation with a strong along-strike variation in topography, crustal roots, and orogenic shortening. This segmentation controlled by continental and oceanic features has also affected the magmatic and foreland basin histories. Basement rheology and Paleozoic sutures modified the structural style and the amount of orogenic shortening. Pre-Aptian normal faults define rift systems oblique to the Andean trend that regulated Cenozoic tectonic inversion. Mioclinical platform carbonates trapped between different terranes are the locus of thin-skinned thrust belts. Crustal thermal history associated with distribution and amount of volcanic activity played an important role in the structural style and the kinematics of foreland basin formation. Along-strike variations of the volcanic front as well as migration towards the foreland show a complex history with changes in the subduction geometry, lithospheric delaminations and volcanic gaps. The important orogenic shortening at 22°SL (more than 320 km) steadily decreases to the south to less than 45 km at 39°SL. Clockwise vertical-axis tectonic rotations detected by paleomagnetism confirm the shortening gradients north of 26°. Overimposed to these rotations, variations in tectonic shortening are also related to the younger age of the oceanic crust being subducted.