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Orogenic front propagation in the basement involved Malargüe fold and thrust belt, Neuquén Basin, (Argentina)

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The Malargüe fold and thrust belt (MFTB) and the San Rafael Block (SRB) are located in the northern termination of the Neuquén basin in Argentina. This basin is a wide inverted intracratonic sag basin with polyphased evolution controlled at large scale by the dynamic of the Pacific subduction. By late Triassic times, narrow rift basins developed and evolved toward a sag basin from middle Jurassic to late Cretaceous. From that time on, compression at the trench resulted in various shortening pulses in the back-arc area. Here we aim to analyze the Andean system at 35°S by comparing the Miocene structuration in the MFTB and the current deformation along the oriental border or the San Rafael Block.

The main structuration stage in the MFTB occurred by Miocene times (15 to 10 Ma) producing the principal uplift of the Andean Cordillera. As shown by new structural cross sections, Triassic-early Jurassic rift border faults localized the Miocene compressive tectonics. Deformation is compartmentalized and does not exhibit a classical propagation of homogeneous deformation sequence expected from the critical taper theory. Several intramontane basins in the hangingwall of the main thrusts progressively disconnected from the foreland. In addition, active tectonics has been described in the front of the MFTB attesting for the on-going compression in this area.

100 km farther to the east, The San Rafael Block, is separated from the MFTB by the Rio Grande basin. The SRB is mostly composed of Paleozoic terranes and Triassic rift-related rocks, overlain by late Miocene synorogenic deposits. The SRB is currently uplifted along its oriental border along several active faults. These faults have clear morphologic signatures in Quaternary alluvial terraces and folded Pleistocene lavas. As in the MFTB, the active deformation localization remains localized by structural inheritance.

The Andean system is thus evolving as an atypical orogenic wedge partly by frontal accretion at the front of the belt and by migration and localization of strain far from the front leading to crustal block reactivation.