Geophysical Research Abstracts
Vol. 15, EGU2013-2832, 2013
EGU General Assembly 2013

Geometry, localization and timing of deformation: a case of study in the Malargüe fold and thrust belt, north Neuquén Basin, Argentina

Matthieu Branellec (1), Jean Paul Callot (1), Bertrand Nivière (1), and Jean Claude Ringenbach (2)
(1) LFC-R, UMR 5150 Total, Université de Pau et des Pays de l'Adour, Pau, France, (2) Total SA, CSTJF, Pau, France

This work aims to qualify and quantify the deformation, the importance of structural inheritance and its control in a fold and thrust belt (FTB) evolution. Today the question of growth and evolution of FTB is still a matter of debate. Over the last decades dynamics and structures of many FTB have been analyzed through critical taper theory. Nevertheless several works pointed out that, in some cases, this physical model failed to fit interpretative sections from field observations.

Two widely accepted and well-known end-members have been proposed to describe FTB evolution: either the classical critical taper model, generating in-sequence thrusting, or the model of stress transfer triggering (1) uplift via inversion/reactivation of extensional inherited structures and (2) individualization of intramontane basins. This strain transfer mechanism can even show in sequence propagation, likely depending on how crustal heterogeneities (sutures, accommodation zones, fault zones…) established with respect to the orientation of principal stress axes and resulting strain.

The Neuquén Basin is a wide intracratonic sag basin with complex and polyphased evolution. The Pacific subduction and south Atlantic opening controlled the large scale geodynamic framework. By late Triassic times, continental scale extension initiated fault-related narrow rift depocenters, which evolved toward a sag basin from middle Jurassic to late Cretaceous. At that time, the basin started to record the compressive stress regime from the Pacific subduction. Three pulses of compressive deformation (Cretaceous, Paleogene and Miocene) are recorded in this retro-arc foreland setting.

By combining field work, seismic and well data, and thermal data, a multi-scaled approach yield a set of interpreted sections, putting forward a kinematic model for the development of Andean orogeny in the Malargüe FTB. This model evolution is shown on balanced cross sections from the axis of the Cordillera toward the foreland. We argue that thrust location is controlled by the Triassic-Early Jurassic rifted structures and that inheritance is a key-parameter controlling evolution of Malargue FTB.