Geophysical Research Abstracts
Vol. 14, EGU2012-10448, 2012
EGU General Assembly 2012

Reconciling opposite strike-slip kinematics in the transpressional belt of the Sierras Pampeanas (Argentina)

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In northwest Argentina, the Sierras Pampeanas consists of a basement-involved thrust system resulting from the Andean-phase shortening active since the Miocene in relation with an episode of shallow subduction of the Nazca plate under the South-American one (Jordan et al., 1983, Episodes). The thrust belt is characterized by N-S trending ranges of Precambrian-Early Paleozoic crystalline basement rocks separated by broad depressions infilled by thick Cenozoic sedimentary deposits. Various Paleozoic granitoids intruded within metamorphic schists and gneisses constitute hard cores around which deformation has been continuously focussed. The kinematics of the N-S faults bounding the ranges has been object of hot scientific debates, since both dextral and sinistral strike-slip activity has been found throughout central Andes. Most previous works relate this opposite strike-slip component to the evolution of the relative motions between plates. However, several evidences suggest a coeval opposite kinematics along different faults with the same trend, explained by alternating kinematic excursions during the late Cenozoic reorganization of relative plate motions (Marrett and Strecker, 2000, Tectonics).
In this work we present new findings of Miocene-Present opposite transcurrence along faults enclosing a N-S elongated intrusive body (Achala batholith) in the Córdoba Range. In particular, to the west of the batholith a 6 km-wide sigmoidal basin, infilled by Pliocene to Quaternary deformed deposits, point to a sinistral shear along a major N-S fault with a prominent left bend. On the contrary, on the east side a similar pull-apart basin infilled by Pliocene deposits is consistent with a right lateral strike-slip component along a N-S fault showing a dextral bend. This suggests a moderate northwards escape of the granitoid block enveloped by a basement characterized by a penetrative and steeply dipping foliation, N-S oriented. Hence, we propose a partitioning of the deformation in which simple shear is dominant at the batholith boundaries and within the foliated basement, whereas pure shear is mainly accommodated by the rigid granitoid block, which is also forced to laterally escape. This model may explain coeval opposite strike-slip kinematics observed in transpressional belts with a strong shortening component affecting tectonic units with highly contrasting rheological properties.