Geophysical Research Abstracts
Vol. 15, EGU2013-7716, 2013
EGU General Assembly 2013

Recent regional shortening in the interior of the orogenic Puna Plateau of the southern central Andes: New InSAR observations from the Salar de Pocitos, Salta, NW Argentina.

Felix Eckelmann (1,2), Mahdi Motagh (2), Bodo Bookhagen (3), Manfred Strecker (1), Jessica Freymark (1), Benjamin Bekeschus (1), and Ricardo Alonso (4)

(1) Erd- und Umweltwissenschaften, Universität Potsdam, Germany (eckelman@uni-potsdam.de)., (2) Deutsches GeoForschungsZentrum (GFZ), Sektion 1.4, Remote Sensing, Potsdam, Germany (motagh@gfz-potsdam.de)., (3) Geography Department, UC Santa Barbara, CA, United States., (4) Dept. de Geologica, UN Salta, Salta, Argentina.

The Altiplano-Puna Plateau of the southern central Andes, with an average elevation of about 3.5 km and an area of 500,000 km2, is the world′s second highest plateau after the Tibetan plateau. The southern sector of the plateau, the Argentine Puna, is characterized by a pattern of basement-cored ranges with the highest peaks above 6000 m asl and intervening Cenozoic sedimentary basins. Most of the ranges have a nearly N-S trend and enclose the sedimentary basins which exhibit internal drainage and several km-thick continental evaporate and clastic deposits. Like its Cenozoic counterparts this plateau is thought to be characterized by active extension, which superseded contractile deformation in the late Miocene. Often, extensional structures are associated with mafic volcanism. In contrast, the plateau flanks are subjected to sustained contraction and a migration of deformation toward the foreland. Here, we present new Interferometric Synthetic Aperture Radar (InSAR) measurements based on ENVISAT and ERS data to document that the southern central part of the Puna is still dominated by contraction, despite widespread evidence for extensional tectonism.

We report a time series of InSAR from the Salar de Pocitos basin spanning about seven years (ENVISAT from 2005 to 2009; ERS from 2002 to 2009). The basin is located at approximately 24.5° S, 67° W, with a minimum elevation of 3650 m asl. In this region, the transition from regional shortening to horizontal extension associated with mafic volcanism is generally assumed to have taken place quite rapidly between 7 and 5 Ma. The Pocitos basin forms a N-S orientated, salt-bearing, hydrologically-isolated basin with a surface area of 435 Km2. To the west, it is bounded by an anticline involving Tertiary and Quaternary sediments; to the east it is bounded by a reverse-faulted range. Late Miocene volcanic edifices delimit the basin to the north, whereas structural blocks close it to the south. The Tertiary and Quaternary sedimentary units in the western part of the basin are tilted eastward as part of the eastern flank of an anticline. Importantly, the Quaternary lacustrine shorelines along the margins of the basin document protracted tilting associated with an anticline. Our analysis of InSAR-measurements suggests the existence of two deformation signals. (1) As observed in other areas of the Puna there appears to be a seasonal change in elevation in the salt-basin center, which may be caused by volume changes related to the crystallization of evaporate minerals (e.g. Ruch et al., 2012); (2) to the west of the Salar de Pocitos the deformation signals point toward continued shortening associated with the growth of the anticline. This is compatible with observed shortening in the Chilean Salar de Atacama to the west. Combined with published data on the termination of shortening and the onset of extension in the orogen interior, our study emphasizes the diachronous evolution of crustal deformation on the Puna Plateau and the need to reconsider models that suggest coeval plateau-wide extension.