

CHRONOLOGY OF FORELAND DEFORMATION IN THE PRECORDILLERA - SIERRAS
PAMPEANAS REGION OF ARGENTINA (28-33°S)

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Resume

Se determinaron las edades de la deformación de la corteza en la zona de los Andes centrales por debajo de la cual existe la subducción de bajo ángulo. En estratos en las cuencas de antepaís se han medido edades por magnetoestratigrafía y por trazas de fisión en tobos. Deformación en la Precordillera comenzó hace 16 millones de años, y esta deformación y la deformación de las Sierras Pampeanas eran activos juntos en los últimos 8 millones de años.

Key Words: foreland basins, fission-track ages, magnetostratigraphy, Precordillera, Sierras Pampeanas, flat subduction

Methods

Recent investigations result in a chronology of deformation in the Central Andean foreland above the zone of flat subduction of the Nazca Plate in northern Argentina. The chronology is based on a relatively precise chronostratigraphy in Neogene detrital strata in several parts of the Precordillera-Sierras Pampeanas region. The data allow minimum rates of uplift to be assigned to some ranges in the area. The new data reveal a rapid evolution of the Central Andes which was not discernible from traditional regional lithostratigraphy.

The foreland basin strata are dated using magnetic polarity stratigraphy and fission-track dating of zircons retrieved from interbedded volcanic airfall beds. Tectonic events are constrained either directly by dating cross-cutting relations or minimum ages are determined from changes in conglomerate and sandstone clast lithologies. Some events are dated, with less precision, using indirect methods such as dating fluctuations in sediment accumulation rates and/or changes in depositional environments. Additional chronologic information is available from the rare Neogene volcanic centers located in the study area.

Results

The data reveal that after the initial uplift of the Cordillera Frontal prior to ~18 Ma, the upper crustal locus of overthrusting migrated in a systematic west to east progression from ~16 Ma to the present in the Precordillera fold and thrust belt. At some time prior to ~8.2 Ma, crystalline basement blocks began to rise along moderately dipping reverse faults in the northwestern Sierras Pampeanas. Uplift of these ranges was less systematic; there is as yet no suggestion of a preferred direction for the migration of tectonic activity in the basement uplift region. Considerable young uplift (< 4.3 Ma) appears to have been focused on the western side of this tectonic province.

Minimum uplift rates (based on topographic relief) of several Pampean ranges are calculated to be between 0.5-0.8 mm/a, over the past 4-7 million years. These numbers indicate a rapid rise of the Laramide-style block uplifts contemporaneous with low-angle thrusting in the eastern part of the Precordillera. The data suggest that foreland deformation is closely synchronized with the initiation (~16 Ma) and propagation of flat subduction in the region.