

RELATIONSHIPS BETWEEN THE STRUCTURE AND THE FORELAND BASIN IN THE HIGH ANDES NEAR 32°S, ARGENTINA

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The Cenozoic structural evolution of the High Andes of San Juan, Argentina, near 32°00'S and 70°00'W along the international border with Chile is the result of three deformation stages (Cristallini et al., 1994) (see figure 1). The first one started with NNW trending structures detached in upper Jurassic gypsum, and is typical of a thin-skinned fold and thrust belt. In the second stage the basement is involved by the tectonic inversion of Triassic normal faults producing a thick-skinned fold and thrust belt characterized by the refolding of the old structure, and consequently a passive and ductile deformation of post Jurassic deposits took place. The deformation of the basement with high angle reverse faults at the Ramada-Espinacito Massif, produced a sticking point in the foreland propagation of the thrust belt (see figure 1). This is responsible for the third stage, characterized by NNW out-of-sequence-thrusts developed in the westernmost sector. These three stages contribute to the development of La Ramada fold and thrust belt (Ramos et al., 1995).

The erosion of these cordilleras provide the fill of the Manantiales foreland basin located to the east (Pérez, 1995) (see figure 1). Unroofing studies made in this basin constitute the main constrains to establish the timing of the structural evolution. These deposits are represented by the Chinchas Formation (Mirre, 1966) consisting of seven different members (TC0-TC6) (Pérez, 1995). In each one is possible to correlate different composition with the lithology of the Mesozoic sequences that outcrop in La Ramada fold and thrust belt. These Tertiary deposits can be divided in three sections. The lower one is composed of red sandstones and conglomerates with clasts of rhyolites, carbonates and piroxene bearing andesites indicative of the Cordillera del Limite uplift. The middle of the sequence is represented by shales, sandstones and conglomerates composed of clasts of limestones and red sandstones and it is indicative of the Cordillera del Medio uplift. These two sequences represent the first deformation stage of the fold and thrust belt. The top of the Tertiary foreland sequence is represented by conglomerates and breccias bearing big blocks of rhyolitic composition that indicate the beginning of the basement uplift (Cordillera de Santa Cruz, Cordón del Espinacito). This latter represents the second stage of deformation developed in the western part of the region. Quaternary deposits unconformably overlying the Chinchas Formation are composed by granitic and rhyolitic blocks in the conglomerates, that represent the final uplift of the basement, and may be related with the last stage of the fold and thrust belt development.

The unroofing studies of the Tertiary sequences have proved that the clasts have been derived from the main Cordillera. Combining the information of Tertiary sequences and structural relationships it was possible to established the timing of the deformation in the High Andes at this latitude. The base of the Tertiary deposit can be dated about 20 Ma (Pérez, 1995). This suggests that the deformation begun in the area at the Lower Miocene. Andesitic lavas dated in 9.2 ± 0.3 (Cristallini and Cangini, 1993) to 10.7 ± 0.7 - 12.7 ± 0.7 (Pérez, 1994, 1995) unconformably overlaid the structure of La Ramada fold and thrust belt. These constrain the High Andes uplift among 20 and 10 Ma at this latitude. The unconformity between Tertiary and Quaternary deposits, suggest the a find uplift at Pliocene-Pleistocene.

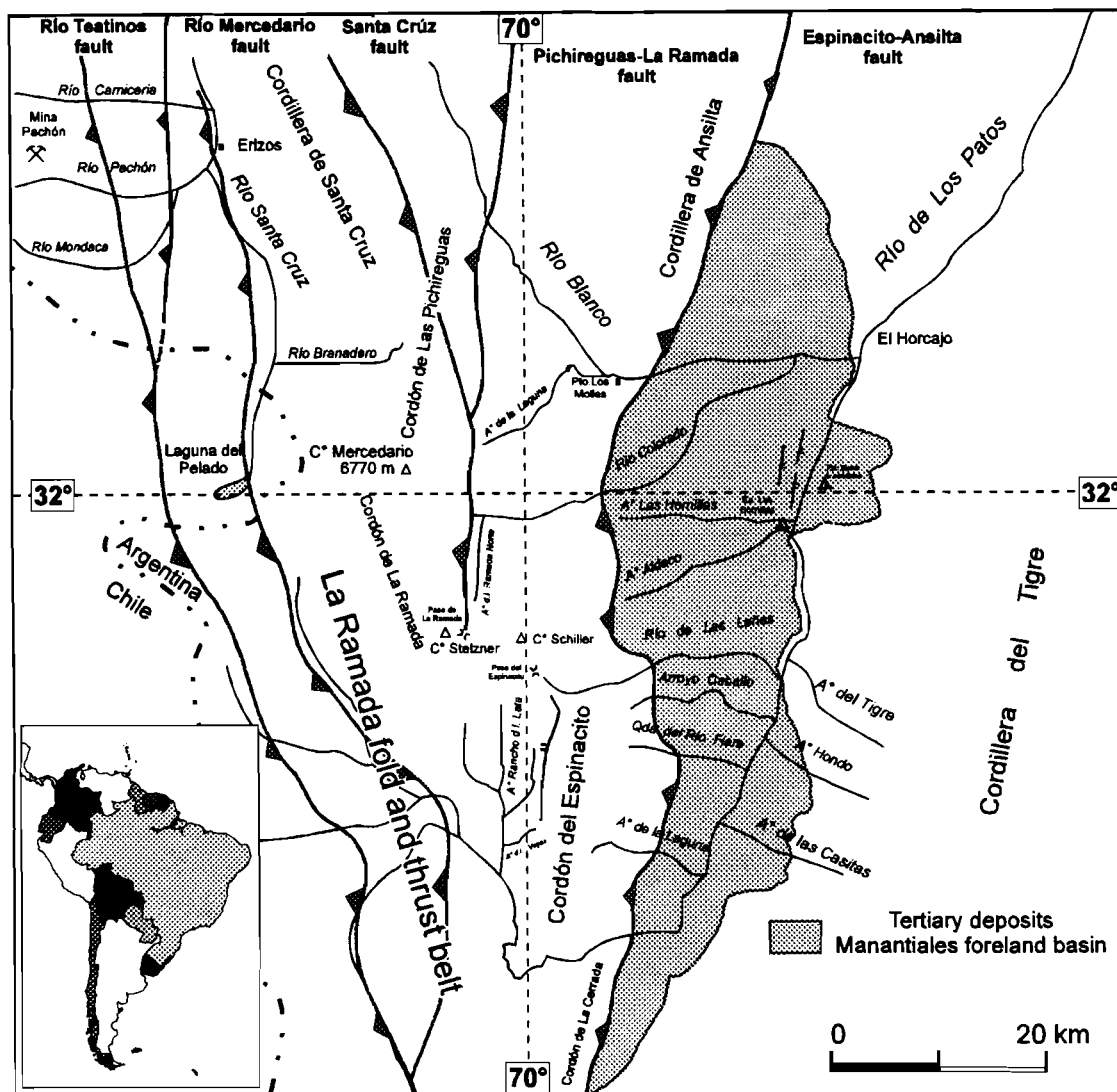


Figure 1: Geological map of the location the Chinchas Formation and the main structure of the La Ramada and fold and thrust belt.

REFERENCES

- CRISTALLINI, E.O., A. MOSQUERA, V. A. RAMOS, 1994. Estructura de la Alta Cordillera de San Juan. *Revista de la Asociación Geológica Argentina*, 49 (1-2): 165-183.
- CRISTALLINI, E. O. and A. H. CANGINI, 1993. Estratigrafía y estructura de las nacientes del río Volcán, Alta Cordillera de San Juan. XII Congreso Geológico Argentino y II Congreso de Exploración de Hidrocarburos, Actas. 3:85-92, Buenos Aires.
- MIRRE, J. C., 1966. Geología del valle del río Los Patos entre Barreal y las Hornillas. *Revista de la Asociación Geológica Argentina*, Tomo 21, No. 4, p.211.

PEREZ, D.J., 1994. Estratigrafía y estructura del paso de las Pichireguas, Alta Cordillera de San Juan. 7° Congreso Geológico Chileno. Actas 1: 514-518. Concepción

PEREZ, D.P., 1995. Evolución geológica de la región del cordón del Espinacito, provincia de San Juan, Argentina. Universidad de Buenos Aires, Facultad de Ciencias Exacta y Naturales, Tesis Doctoral, 262p, (inédito) Buenos Aires.

RAMOS, V.A, M. CEGARRA, E.O. CRISTALLINI, 1995. Cenozoic Tectonics of the High Andes of West- Central Argentina (30°-36° S latitude). Tectonophysics, in press.