

Quaternary propagation of the western mountain front of the Barreal block, Precordillera of Argentina (31°30`-32°00` S)

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Abstract. The N-S-trending Barreal block on the western edge of the Precordillera Sur of Argentina shows topographic, structural and geomorphologic along-strike variations. Differences in the degree of exhumation are the result of how Neogene and Quaternary deformation progressed along this mountainous front, propagating from its central portion to its northern and southern borders. To the north the oldest Quaternary alluvial deposits are faulted showing a migration of the deformation to the hinterland. Furthermore, youngest Quaternary deformation is concentrated at the southern edge, from where it propagates southwards into the piedmont area and links to an oblique sinistral deformation zone. This deformation is interpreted as controlled by pre Cenozoic mechanical anisotropies of the basement. Thus, anisotropies seem to play a key role in the location, progression and kinematics of the Late-Cenozoic deformation of the area.

Keywords: Barreal block, Precordillera Sur, Neotectonics

1 Introduction

The N-S trending Barreal block extends ~50 km from Tamberías (to the north) to Del Inca hills (to the south, 31°26`-31°53` S) in the San Juan province of Argentina. From a structural point of view, it is located in the northwestern edge of the Barreal – Las Peñas belt, which was defined as a neotectonic left-stepping transpressive deformation zone in the Precordillera Sur (Cortés et al., 2005 a y b). Furthermore, the Barreal block is controlled by the Ciénaga del Medio fault to the east and by the Barreal fault to the west. With the aim of understanding the Late-Cenozoic behavior of the block, we studied different geological features along the mountainous sector and its adjacent piedmont area.

2 Barreal block mountainous front

The Barreal fault controls the uplift of the homonymous block along its western edge as well as it separates the

mountainous sector from the piedmont area. The 40°-50° east-dipping fault plane can be observed in a natural trench carved by the Cabeceras stream (Figure 1) where Paleozoic rocks overlay Miocene and Quaternary units.

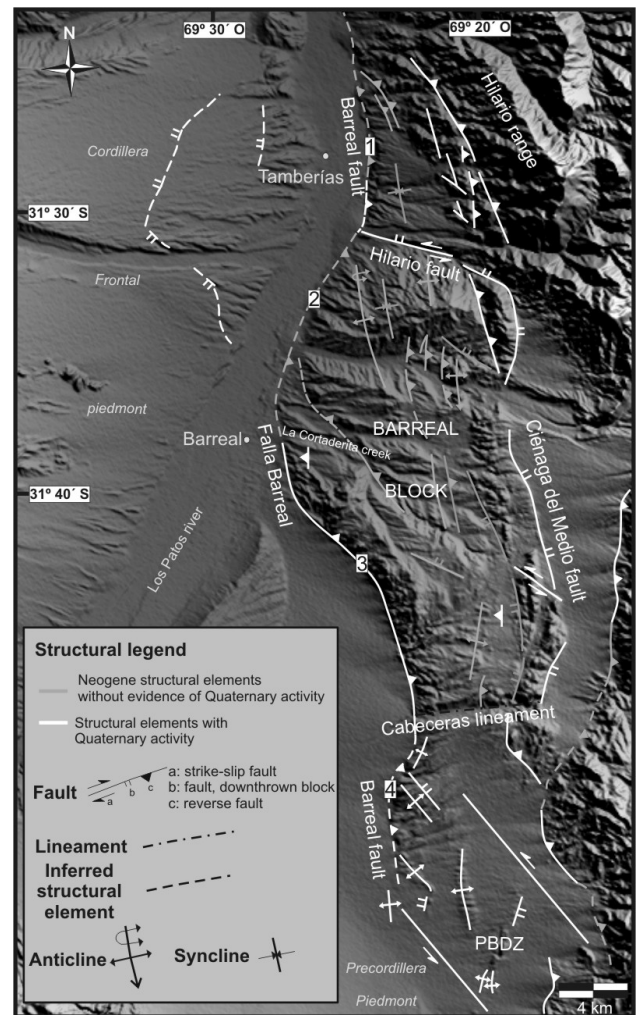


Figure 1. Late Cenozoic structure of the Barreal block, northwestern edge of the Precordillera Sur. Recognized sections are indicated (1-4). PBDZ: Pampa de los Burros deformation zone.

Based on topographic and lithological variations of the block, its along-strike bending, some geomorphic and structural elements, morphometric parameters and the presence of pre-Cenozoic mechanical anisotropies, it was possible to recognize four sections of different behavior along the Barreal block mountainous front (enumerated from 1 to 4 in Figure 1). They are bounded, from north to south, by the Hilario fault, the La Cortaderita creek and the Cabeceras lineament.

The major topographic expression of the block is observed in the NNW-trending Section 3 which is characterized by a west-verging fault-propagation fold. Due to a greater fault throw, this section shows a deeper structural level in which Paleozoic rock are exposed.

N-S trending Sections 1, 2 and 4 show lower relative altitudes and a shallower structural level. In fact, evidence of Quaternary deformation becomes more numerous to the northern and southern edges of the mountainous front. To the north (Section 1), piedmont fault scarps that affect the oldest aggradation level of the region as well as seismic lines analysis allowed us to interpret a westward migration of the deformation (Yamin 2007). To the south (Section 4), structural and geomorphologic features, represented by fault scarps, folds, wind gaps, convex longitudinal valley-profiles and, in the piedmont area, segmented alluvial fans and drainage anomalies, indicate a clear Quaternary activity which even affect the youngest aggradation level (Vallejo, 2004; Basile, 2004; Terrizzano, 2010). In the piedmont area located to the south of the Barreal block, a group of Quaternary contractional structural highs in a left-stepping arrangement are recognized. They form a ~15 km long, NW-trending deformation zone, the Pampa de los Burros zone (PBDZ in Figure 1), interpreted as a transpressive sinistral deformation zone controlled by the reactivation of mechanical anisotropies in the substratum (Cortés and Cegarra 2004, Terrizzano et al. 2009).

3 Concluding remarks

The analysis of the Neogene and Quaternary deformation along the Barreal block mountainous front indicates the propagation from its central region (Section 3), with a major relative uplift, to its northern and southern edges. Besides, its northern edge (Section 1) shows evidence of

Quaternary migration to the hinterland. Furthermore, youngest deformation evidence was recognized in its southern edge (Section 4). Deformational features observed in the piedmont further south correspond to an oblique sinistral deformation zone, the Pampa de los Burros zone. This deformation zone is interpreted as controlled by pre-Cenozoic mechanical anisotropies. Thus, basement anisotropies seem to modify the kinematics of the Late-Cenozoic deformation along the Barreal block mountainous front as well as its southward morphotectonic development.

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