# CENOZOIC EVOLUTION OF THE ANDEAN FORELAND BASIN BETWEEN 15°30' AND 22°00'S

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## INTRODUCTION

The Andes mountain belt began its main uplift during the Cenozoic through several deformational phases (Röeder, 1988; Sempere et al., 1990; Herail et al., 1990; Baby et al. 1992). Along the eastern external border of the orogen developed the Andean foreland basin, hosting thousands of meters of clastic sediments, most of them continental. Foreland basins such as those of the Andes are characterized by an asymmetrical geometry with a greater thickness of sediments deposited closer to the deformational front, and important lateral facies changes within the sequences due to the diminution of depositional energy (Flemings and Jordan, 1989). During the Late Oligocene, Miocene and Pliocene, the Central Andean foreland basin was filled with clastic supply from the west. Tectonic pulses at different time intervals alternate with periods of tectonic quiescence reflected in the changes of depositional style from aluvial fans to fluvial and lacustrine environments.

This work presents the preliminary results of a study of part of the basin occupying the Subandean deformational belt and the Beni and Chaco plains, between 15°30' and 22°00'S. The objective is to identify the distribution and lateral facies changes of the sedimentary sequences that filled the basin from the Late Oligocene to present times, as well as thickness variations and their relation with tectonic events and deformation during the Cenozoic.

## BASIN DEVELOPMENT

As the deformation in the Eastern Cordillera advanced eastwards and the Subandean belt began to develop, the basin received an important clastic supply from the west. It is at the front of the active thrust belt where the bulk transport direction is toward the evolving basin (Allen et al., 1986). Along the proximal margin of the basin, the base of the sequence is represented by the sandstones and conglomerates of the Petaca and Bala Formations of Late Oligocene-Middle Miocene age (Sempere et al., 1990; Marshall and Sempere, 1993). Along the distal edge of the basin, this unit unconformably onlaps sediments of alleged Maastrichtian-Paleocene? age (Zubieta Rossetti and Sandi, 1994). Over these units, a period of relative tectonic quiescence of Middle Miocene age is represented in the distal part of the basin by the fluvial and lacustrine sequence of the Yecua Formation, which includes evidence for marine influence (Marshall and Sempere, 1993). The model for deposition of fine-grained sediment as an indicator of tectonic reactivation in foreland basins (Blair and Bilodeau, 1988) may be applied to this sequence (Yecua-Tariquía and Quendeque Formations), which presents an overall thickening and coarsening trend. The transition to the Tariquía Fm. is marked by fluvial deposits representing relative tectonic quiescence and progradation as a result of the erosion of reliefs. A tectonic reactivation began in the Late Miocene, with

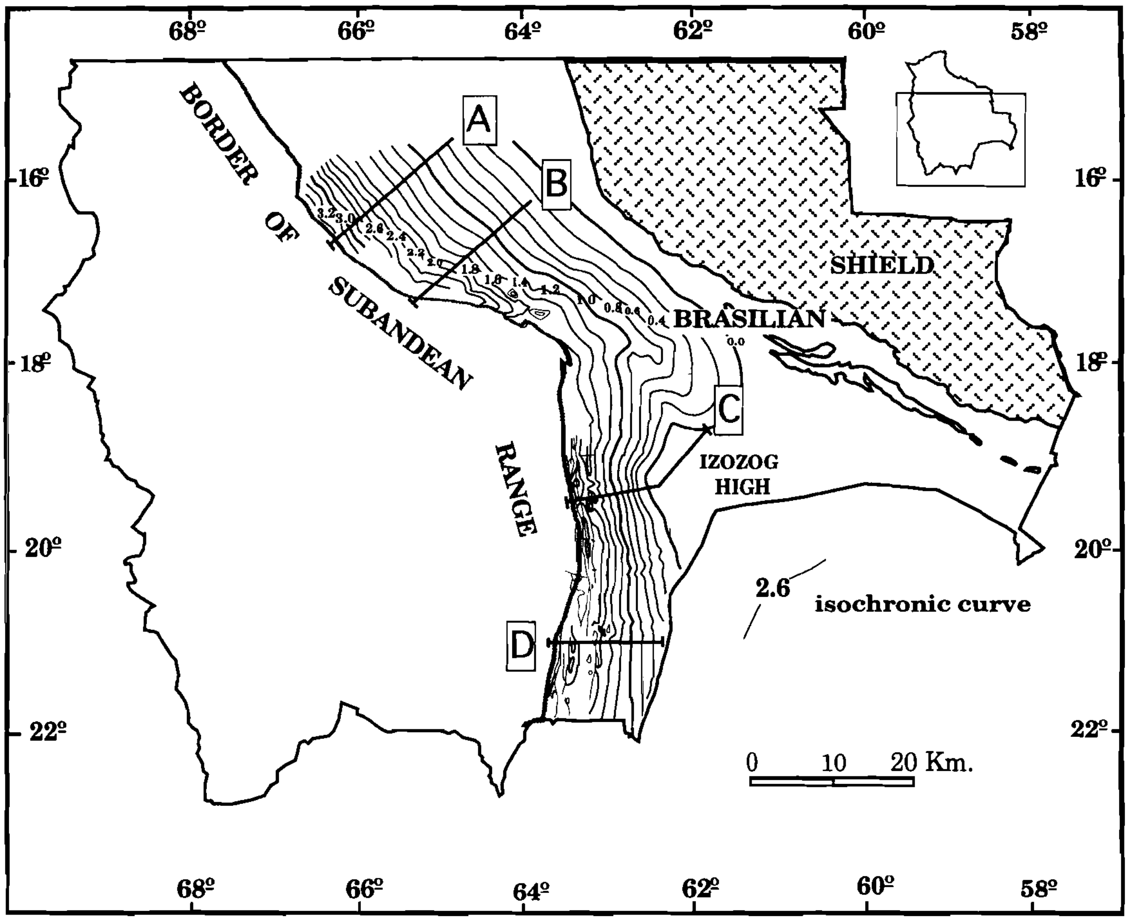


Figure 1: Isochrone map of depth to base of Tertiary in the Bolivian Andean foreland (Chaco and Beni plains). Sections represent seismic lines of Figure 2. Isochrones are in seconds. Western limit is the external border of the Andean deformational front.

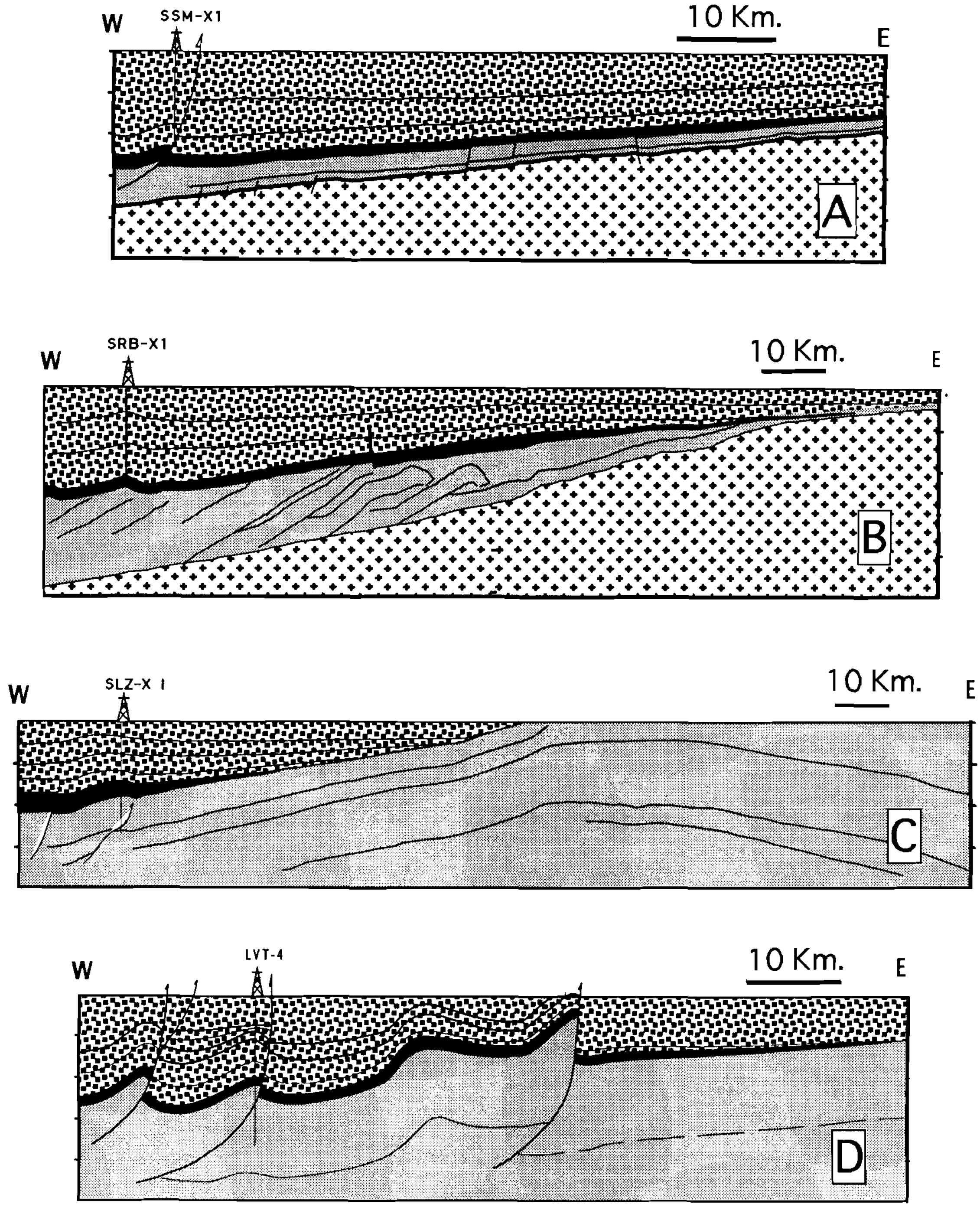


Figure 2: Interpreted seismic sections showing the geometry of the Cenozoic sedimentary fill of the Andean foreland basin, and the structural style of the Andean deformational front at different latitudes. See location in Figure 1. Note the different horizontal scales. Vertical scale is in seconds. Dotted: Cenozoic; black: Mesozoic; gray: Paleozoic; crosses: basement.

renewed coarse-grained sedimentation interpreted as a result of the migration of the deformation front towards the east, and leading to synorogenic deposition of the Guandacay and Charqui Formations. The deposition of the Emborozú and Tutumo Formations in the Pliocene correspond to the last most intense tectonic phase of Andean deformation in the Subandean region.

## CONCLUSIONS

Clastic sediments deposited in the Central Andean foreland basin during the last 27 Ma have a direct genetic relationship with the uplift of the Eastern Cordillera and Subandean ranges. The isochrone map of the base of the Cenozoic (Figure 1) shows the geometry of the sediments accummulated in the basin as they relate with the interactive processes of deformation, erosion, transport and deposition. Seismic sections at different latitudes (Figure 2) show that the structural style is related with the geodynamic evolution of the deformational front, and with the presence of pre-Andean structural elements, such as the Madidi, Chapare and Izozog highs.

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