

STRUCTURAL ANALYSIS OF THE EASTERN BORDER OF CORDILLERA ORIENTAL BETWEEN 24° 50' AND 26° 50' SOUTH LATITUDE-ARGENTINA

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Resumen:

Se analiza la geometría estructural en la faja del antepaís andino sobre el frente E de Cordillera Oriental (FECO), allí se observa un cambio del estilo en sentido N-S coincidiendo con alteraciones en la paleogeografía del antepaís. Se determinan dos eventos importantes en la compresión con reactivación de fallas normales del graben Cretácico.

Key Words: Andine compression, Thrust front, Cordillera Oriental

Introduction

In this paper we summarized several observations about the Andean tertiary deformation in the fold thrust belt between 24°50' and 26°50'. The work is focused on the activity of the compressive front of the eastern border of the Cordillera Oriental (FECO) in a region of Hydrocarbon interest.

The Cordillera Oriental, is a region characterized by relatively steep faults, with antagonistic vergences of the fault planes.

North of the Juramento river are exposed Paleozoic and Cenozoic rocks units in the mountain nucleus, south of them, are only Precambrian. As yet this work give a coherent solutions in the style and structural geometry, there are still many unanswered questions, in our opinion treatment of the following questions are still needed: 1- Influence of basement foliation, 2-vertical uplift vs. lateral displacement, 3-timing of evolution. The present geometry is the product of several events or phases of development during the Neogene.

Stratigraphy

Rock units exposed in the studied area range from the Precambrian to the Cenozoic. Older rock units built the nucleus from the uplifted blocks at the mountain front.

Precambrian. These units are exposed in the nucleus of the Metán and Cumbres Calchaquías ranges. They are monotonous lithologies from marine sequences, dominated by alternating shale and sandstone in lower metamorphic and twofold phases.

Cambrian Meson Group overlay in angular unconformity the Precambrian, consists in pink quartzite, or bedded sandstone and less conglomerate this units are only exposed in the Mojotoro ranges. Skolithos is the

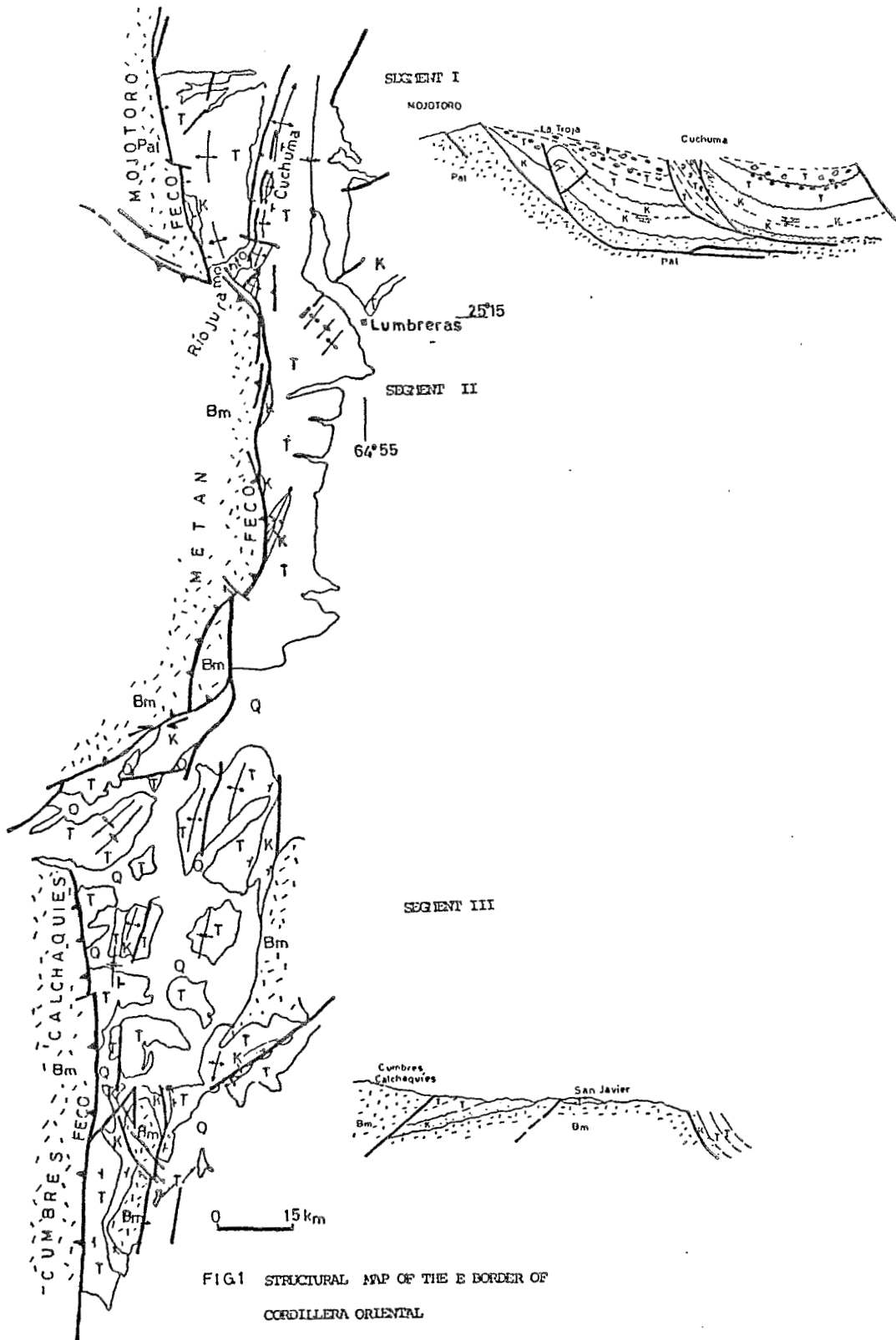


FIG1 STRUCTURAL MAP OF THE E BORDER OF CORDILLERA ORIENTAL

Bm Basement-Pal Paleozoic-K Cretaceous
T Tertiary

common bioturbation.

Ordovician rock overlay in angular unconformity the Precambrian and conformable the Meson Group, consists in fossiliferous siltstone with trilobites and brachiopods.

Cretaceous-Eocene; Salta Group. The Balbuena reds beds with calcareous intercalations outcrops direct at the principal front. From the Santa Bárbara upper red beds only the Lumbreira Fm was found in the core of the Cuchuma anticline, consisting mainly of a succession of red mudstones with layer of nodular gypsum, a basal contact is not observed. Depositional environment was characterized as shallow lakes.

The Mio-Pliocene Oran Group is a synorogenic continental sequence divided into five formations. The lower Río Seco Fm, overlays in angular unconformity the Lumbreiras Fm. It consists of reddish fine grained sandstones thick-cross bedded. The features define an eolian environment. The Anta Fm consists of lacustrine strata, lithologically is composed by red and green mud-siltstone, on the top interbedded with nodular gypsum of considerable lateral continuity. The Jesús María Fm comprises fine-medium grained sandstones lenticular stratified with intercalations of brown shales exhibiting parallel lamination. The Río Guanaco Fm is basically a polymictic conglomerate, supported in a calcareous matrix with well clasts ephericity. Thickness is greater in the synclines (structural controlled subsidence). The Piquete Fm overlay unconformable the Río Guanaco Fm, consists in conglomerates and breccias with large clasts poorly consolidate, distal intercalations of lenticular sandstones. As the distance from the front is greater, the angular unconformity is less important.

Structure

Eastward of the (FECO), a large and irregular fold fault belt was built due to an effort of the Cenozoic compression, the structural geometry is variable along the N-S trend.

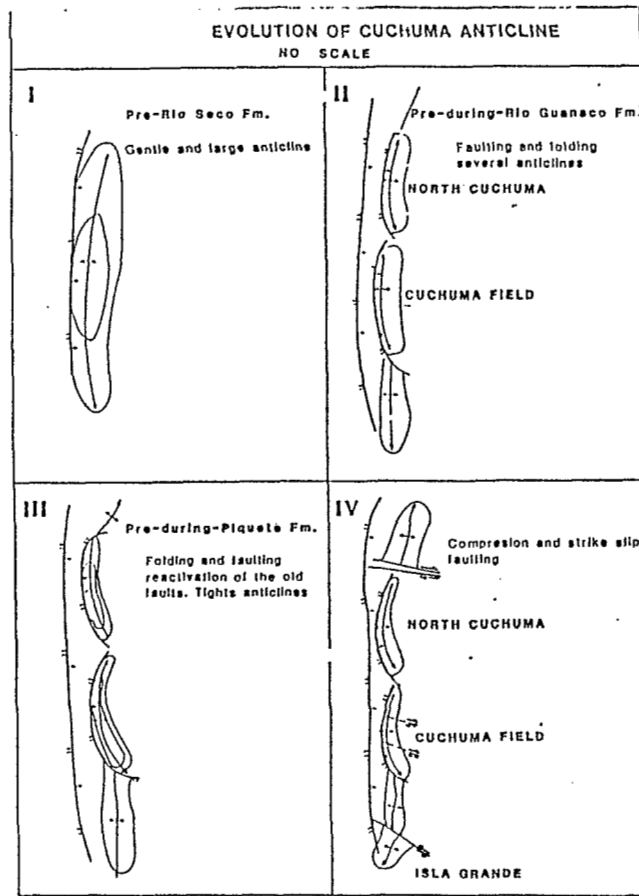


FIG 2

Fig. 1 shows the geological features, by which the FECO is divided into three segments. In the first segment, the frontal ramp of the Mojotoro sheet is W-vergent as the other eastward fault planes in the Tertiary-Cretaceous cover. One of the exhumated fault planes created the Cuchuma anticline; at the W limb of Cuchuma, a blind thrust built "La Troja" anticline. In this segment all fault planes may be defined as backthrust. Two angular unconformities are observed here; Fm Lumbreira-Río Seco and Fm Guanaco-Piquete; the first represents an older compressive event with the beginning of the inversion of the Cretaceous graben, the evolution of folds and faults is progressive as is interpreted in the fig. 2.

The step into the south segment is coincident with a lateral ramp probably associated with the Lineamiento del Toro (Mon, 1979; Sosa Gómez 1984) it is a left strike-slip fault with a reversal component whose hanging wall lies at the S. Lateral displacing is 8 km, similar in magnitude as in the Quebrada del Toro K. Schwab (pers. commun.)

The Metán sheet shows a progressive migration of the thrust front eastward; the older sequences in the block are Precambrian. It is the easternmost migrates sheet in the FECO overthrusts folds structures near the front ramp fig. 1. As we can deduce from the position of the folds axis trend, the compression axis in this segment has changed from NW-SE at the earlier deformation to W-E in the latest. Thrust planes direct on the thrust front are covered by a variable thickness of conglomerate.

The southernmost segment is the Cumbres Calchaquies sheet, the transition between them and Metán is also a lateral ramp with right strike-slip and a reversal component with hanging wall lie at the N; NE-trending folds have already developed. The uplifted sheet exhumated Precambrian sequences, with E-vergent fault plane. The folds train ends at S at a transverse structure "Lineamiento de Tucumán" (Mon 1979). At this front the conglomeratic sequences are not developed as the other two; the contact between Eocene-Miocene is an erosive unconformity.

Two schematic cross sections show the strong structural differences between the N and S sections (fig. 1).

Conclusions

The tectonic activity of the FECO is heterogeneous and not fully understood; more detailed studies are necessary. The assumption generally admitted is that the shortening in this area began in the Pliocene-Pleistocene, but the angular unconformity (Fm Lumbreira-Río Seco), suggest a compressive event in the Upper Eocene-Lower Miocene, at least in the N segment.

The development of the Cuchuma anticline and the progressive migration of the Metán sheet reveal polystage events in the compressive regime. The sedimentation of younger conglomerate sequences at the E border of the FECO are even indicators for a repeat activity of the thrust front.

Recent movements of the FECO are expressed in reversal faults that cut off the conglomerate sequences.

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