THRUST FRONTS IN THE LERMA VALLEY (SALTA, ARGENTINA) DURING THE PIQUETE FORMATION DEPOSITION (PLIOCENE-PLEISTOCENE)

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INTRODUCTION

Once the stages of mechanical and thermal subsidence that controlled the accumulations in the rift basin of the Salta Group (Cretaceous-Eocene) had finished, compressional episodes took place in succession, which resulted in the inversion of the basin. At the same time, they set the structural framework of accumulation for the post-Eocene sequences.
The East migration of the thrust front is described here, together with the progressive incorporation of the Tertiary foreland basin deposits to the fold and thrust belt.

THRUST FRONT MIGRATION

Even though precise chronology of the different compressional episodes and post-Eocene Tertiary units is not yet available, it is inferred that the first compressional stage started in the Eocene (Incaic Phase), while the Lumbrera Formation deposited (Vergani and Stack 1989, Monaldi et al. 1993).
This episode originated low structural relief, which was probably linked to blind thrusting.
Later on, a new compressional episode (Lower-Middle Miocene), more intense than the previous one, resulted in a fold and thrust belt whose deformation front was located West of the present Calchaqui valley, whereas a foreland basin was generated on the East (Figure 1a). In the fold belt (present Puna), the Pastos Grandes Group deposited in intermontane basins (of piggy-back type?), whereas in the foreland basin the accumulations of the Oran Group and equivalent ones succeeded (Monaldi et al. 1993).
In the region of the Lerma valley, the Oran Group is formed, from base to top, by the Metán Subgroup (Río Seco, Anta and Jesus María Formations) and by the Jujuy Subgroup (Guanaco and Piquete Formations). These units deposited in eolian, ephemeral and braided fluvial, lacustrine and alluvial fans environments (Vergani and Starck 1989; Gonzalez et al. 1995).
When the deformation spread towards the East, the sedimentary wedge of the foreland basin was progressively incorporated to the fold belt and began to be a supply source for the syntectonic deposits that accumulated in its front. The presence of small limestone clasts from the Yacoraite Formation in the conglomerates of the Guanaco Formation (Upper Miocene), suggests that some positive structures had already generated in the foreland basin during the deposition of the Guanaco Formation and that erosion levels got to affect its substratum constituted by the Salta Group.
During the deposition of the Piquete Formation (Pliocene-Pleistocene), two conspicuous thrust fronts existed already in the foreland basin, as inferred from the mapping analysis carried out in the Lerma valley and adjacent regions. One of them was located in the western flank of the Lerma valley, whereas the remaining one was situated on the western border of the Metán valley (Figure 1b and 2).
The synorogenic deposits of the Piquete Formation show, towards the thrust fronts mentioned above,

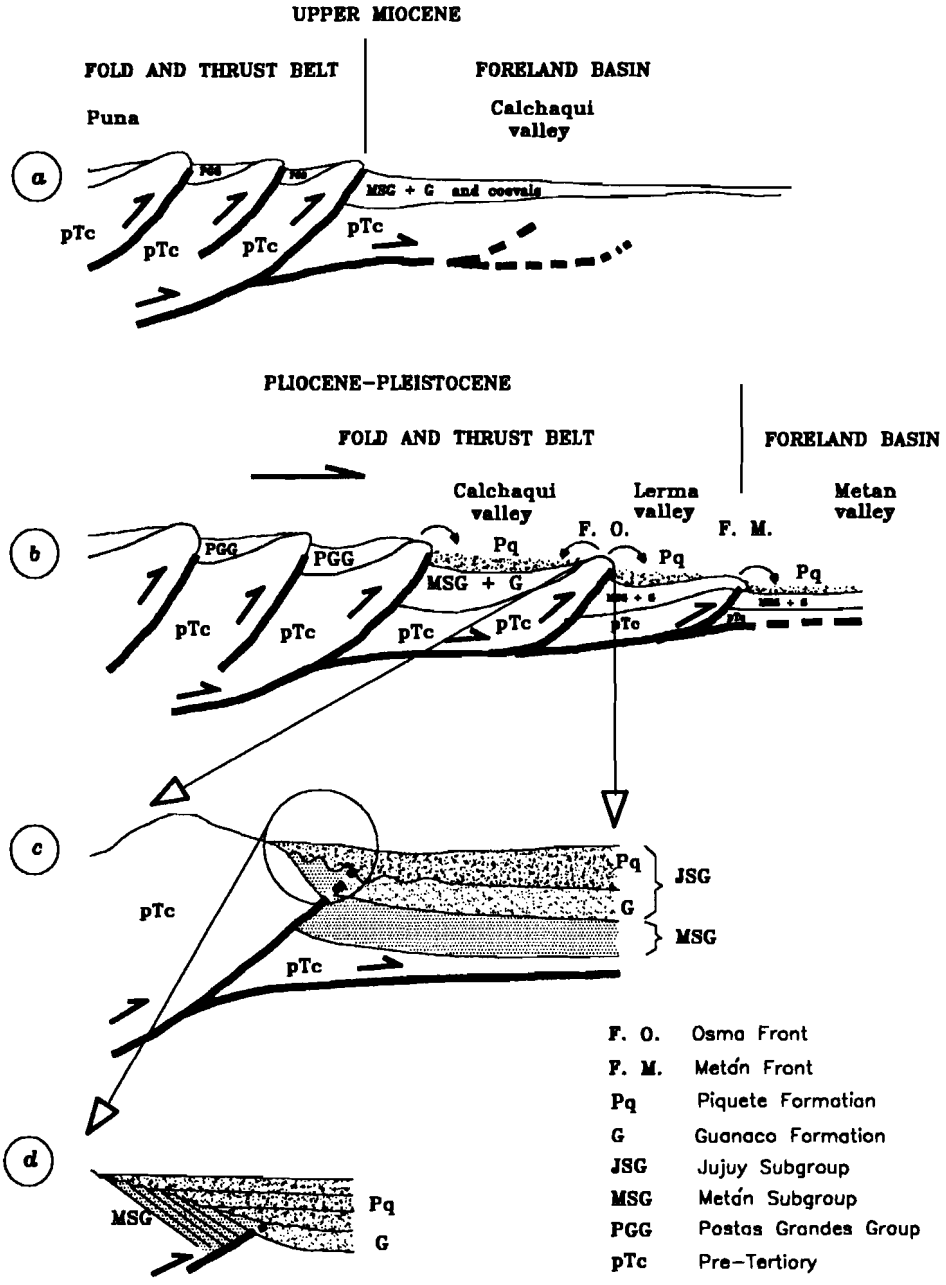

Figure 1: Schematic cross sections (not to scale)

typical geometry of growth strata, with onlap arrangement on the different underlying units, which in turn are affected by erosive truncations of its strata (Figure 1c and 1d). Far away from the fronts, the Piquete Formation lies in apparent concordance on the underlying Guanaco Formation. The structural and topographic relief of deformation fronts was a factor that controlled the preservation of the Oran Group units deposited before the Piquete Formation (Metan Subgroup and Guanaco Formation). In this way, units mentioned above were, in some cases, eroded against the frontal ramps of the thrusts that constitute

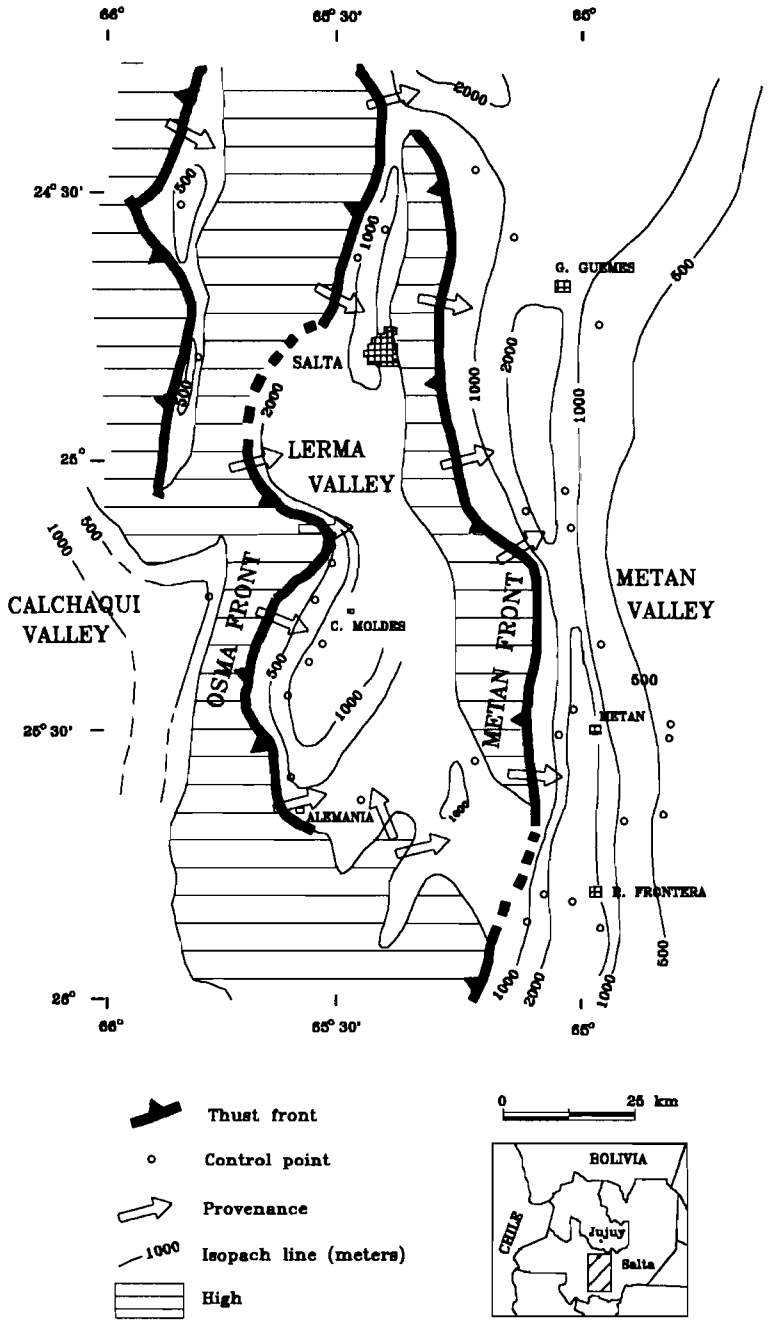

Figure 2: Piquete Formation and coevals (Upper Pliocene-Pleistocene). Isopach map.

the deformation fronts. Thus the Piquete Formation deposited on stratigraphic terms belonging to the Salta Group. There was more preservation in areas with lower structural relief or against lateral or oblique ramps. The composition of synorogenic deposits of the Piquete Formation shows the unroofing of the deformation fronts, with clasts originating from the Salta Group in the lower levels and progressive increase of detritus originating from the basement in the upper levels. On the other hand, their thicknesses are much greater towards the thrust fronts (Figure 2).

Locally, the thrust fronts provided greater quantities of sediments as compared to the higher hinterland. However, the erosion products of the latter might have reached the basin (or basins) of the Piquete Formation, either crossing the deformation fronts or laterally surrounding them, following structural depressions along them.
Finally, a new deformation episode (Diaguita phase) folded the synorogenic deposits of the Piquete Formation, originating the morphology that, without major changes, can be observed at present. This episode ocurred after 1,3 Ma (González et al 1995, Malamud et al. 1995) and might still be active, if the seismicity of the region is taken into consideration.

CONCLUSIONS

In the Valle de Lerma Region, the East migration of the thrust fronts during Late Pliocene-Pleistocene incorporated the deposits of the Neogene foreland basin (Metan Subgroup and Guanaco Formation) to the fold and thrust belt. At the same time, the new thrust fronts exerted control on the composition, geometry and thickness of the Piquete Formation synorogenic deposits.
After 1.3 Ma, the deposits of the Piquete Formation were faulted and folded, thus originating the morphology that can be observed at present.

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