G8: Tertiary evolution of the Chaco foreland basin, southern Bolivia: Poster 2

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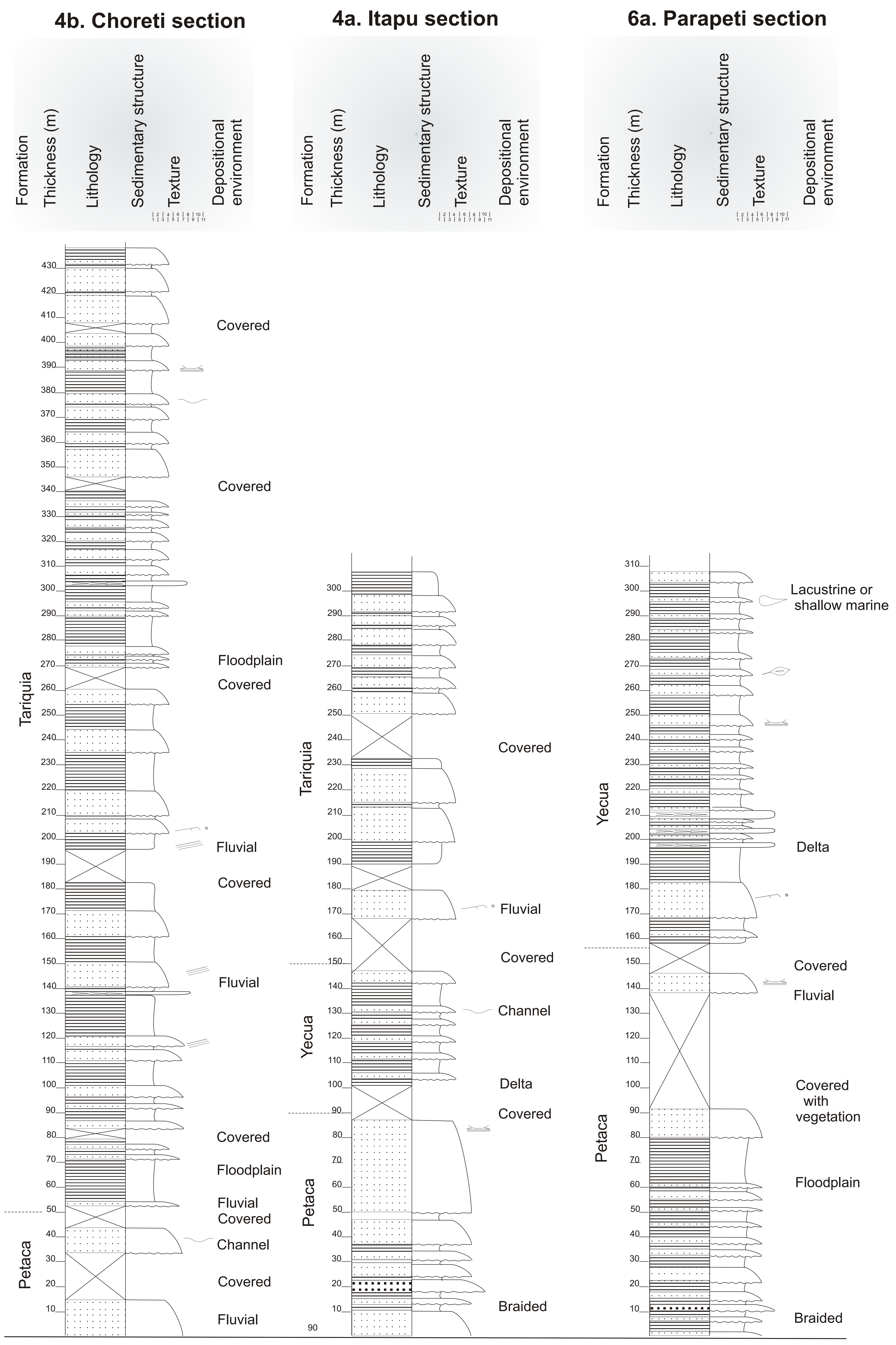

Figure 5: Stratigraphic columns (scale: 1:1000) of the sections along the Rio Parapeti in the south of the central Chaco Foreland Basin (see Fig. 3). The columns are ordered from the westermost outcrop to the easternmost outcrop: Choreti, Itapu and Parapeti.

Figure 11: Overview of Tariquia Fm. exposed in section 4a-Itapu.

Figure 12: Overview of Yecua Fm. exposed in section 6-Rio Parapeti.

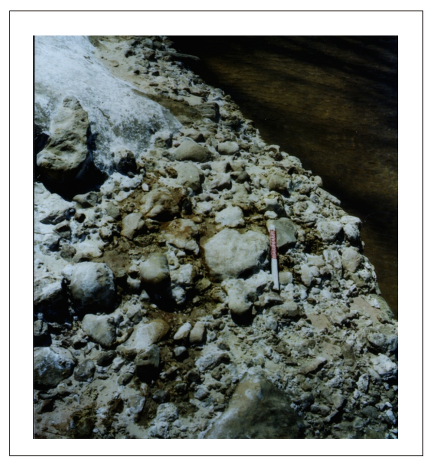

Figure 13: Reworked silcretes of Petaca Fm.,section 6a-Itapu.

Sediment distribution of the central Chaco Foreland Basin

- **Tariquia Formation**: This up to 600 m-thick formation is dominated by interbedded fine-grained channeled sandbodies and mudstones and represents a mixed meandering-braided fluvial system. Upsection, channels thicken and mudstone proportion decrease. At the top, nested channels can be observed.
- **Yecua Formation**: The up to 40 m-thick basal Yecua Formation is represented by greenish sandstone beds and shale. The sandstone beds contain shell debris including ostracodes with an affinity to a Miocene family indicating lacustrine and brackish water facies. Gypsum is present as well but ahs been remobilised as veins and fracturefills. The top is dominated by red shale interbedded with thin greenish shale, thin sandstone and gypsum beds. The upper part represents a terrigenous, marginal marine depositional system. Base Yecua is missing in the western study area.
- **Petaca Formation**: This 50 - 85 m-thick fluvial formation overlies unconformably the Cretaceous sedimentary rocks. The basal Petaca Fm. consists of a coarse-grained paleo-calcrete /-silcrete with large, abundant calcite and chert concretions. It is overlain by fluvial deposits which partially rework the concretions. The top Petaca is a poorly sorted, coarse-grained quartzose sandstone.

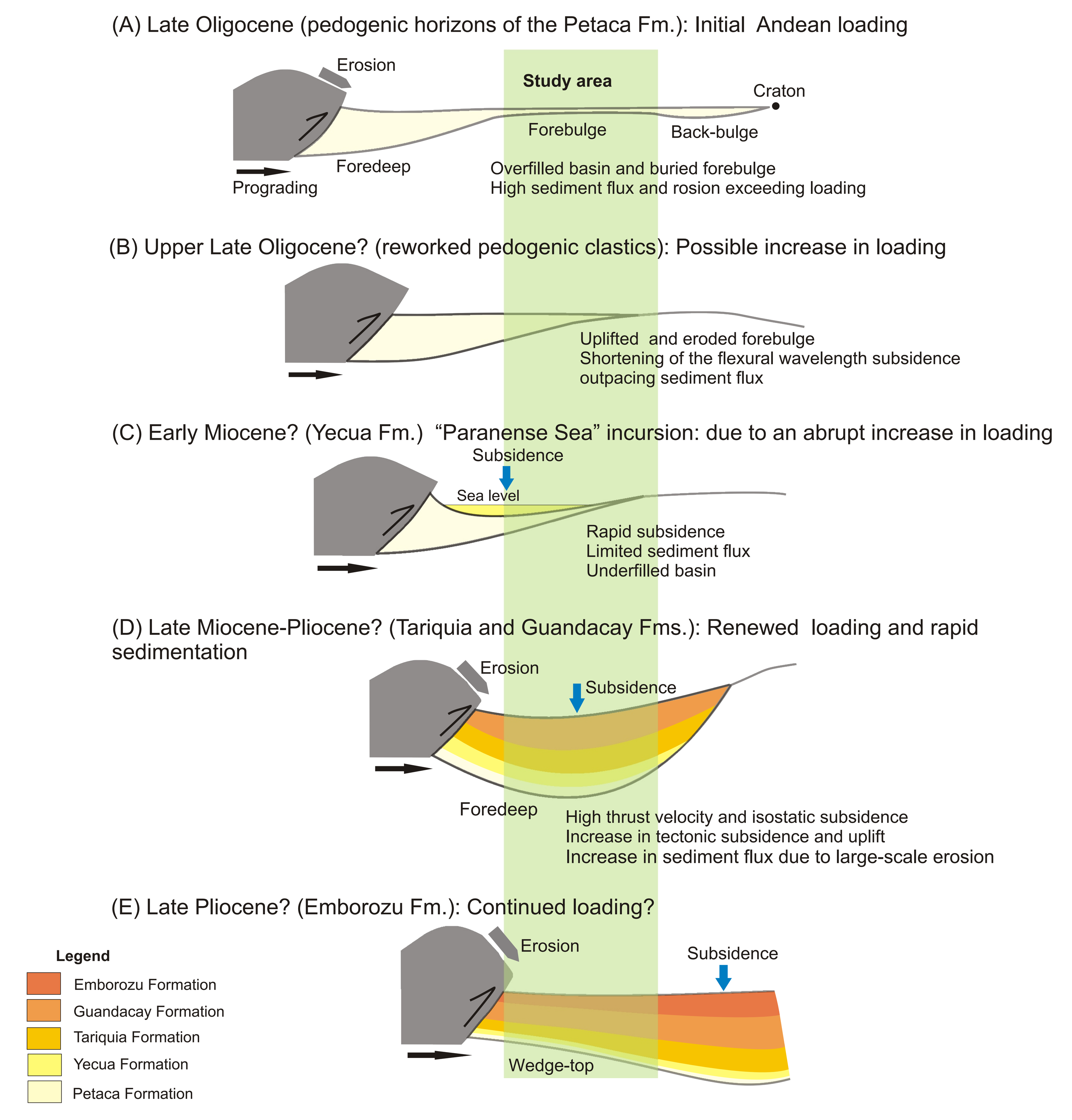

Figure 15: Preliminary model for the evolution of the Chaco foreland basin from Late Oligocene-late Pliocene(?) showing the eastward migration of the basin.

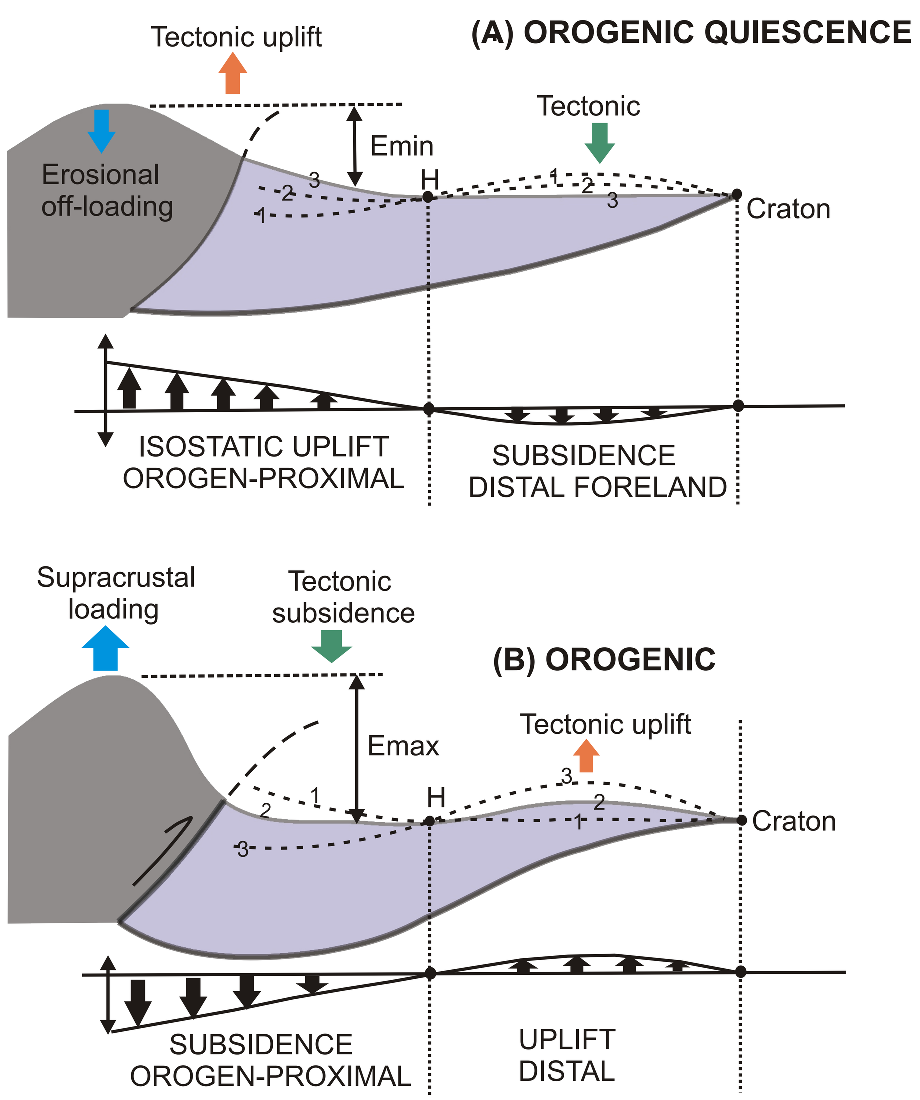

Figure 14: Flexural and surface model illustrating the evolution of a foreland basin system due to orogenic loading and unloading (modified after Catuneanu and Sweet, 1999).

Basin development

Lithofacies, paleocurrent and seismic stratal geometry of the entire succession provide support for the eastward migration of the Chaco foreland basin in response to loading, uplift and flexural behavior by the growing Subandean fold- and thrust belt. Based on our preliminary results, the Chaco basin development can be subdivided into forebulge, foredeep and wedge-top depozones (figure 15; DECELLES AND GILES, 1995). We interpret the up-to 16 m-thick, westward-thickening, well developed, and highly condensed basal pedogenic horizons of the Petaca Fm. as forebulge deposits. Sediments of the Yecua Fm. represent the time lag between the loading of the widening basin by Andean uplift and subsequent infill by the westerly-sourced, coarsening-upward clastics of the Tariquia and Guandacay Fms. (~1500 m and >2000 m, respectively), representing the rapidly subsiding foredeep. Deposits of the mainly conglomeratic, coarsening-upward Emborozu Fm. likely represent the wedge-top.

Conclusions

- The burial of the Petaca sediments (forebulge) indicates that there was a high erosion and sediment flux, coupled with efficient transportation.
- Marine incursion in Late Miocene (Yecua Fm.) indicates subsidence outpacing sedimentation due to orogenic loading.
- High sediment accumulation rates due to rapid subsidence, increased loading and uplift led to the deposition of Tariquia, Guandacay, and Emborozu Formations.
- Paleocurrents of Petaca, Tariquia, and Guandacay Formations show west to northwest provenance.
- Ostracodes of the Yecua Formation indicate Miocene age and possibly shallow marine environment.
- Bi-directional paleocurrents of the Yecua Formation indicate a marine transgression (southeast) and regression (northwest).
- The meandering-braided fluvial Tariquia Formation records decreasing channel sinuosity as indicated by a lower percentage of floodplain deposits.

Open questions

- What are the absolute ages of the Tertiary formations?
- What is the burial history of the basin?
- Where is the back-bulge depozone?
- How far does the Yecua Formation reach to the south?
- Does the Yecua Formation represent a marine or a lacustrine environment in southern Bolivia?
- How do the thickness and lithology of the Tertiary Formation vary throughout the basin?

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