

# **Paleoenvironmental, Paleoecological and Tectonic Considerations about Onshore Mucuri Member, Neo-Aptian, Espírito Santo Basin, Brazil\***

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## **Introduction**

The neo-Aptian Mucuri Member of Mariricu Formation, in Espírito Santo Basin, SE Brazilian continental margin ([Figure 1](#)) has been an exploratory target since the 1960's. It is located between parallel 18°20' and 21°00' (França and Tokutake, 2002). The studied section is the Mariricu Formation, divided into Itaunas Member. (evaporites) and Mucuri Member ([Figure 2](#)). In this article we refer only the member names.

## **Structural Aspects**

Structural aspects make the main well remarkably different from the others. It is placed on the border of the basin, with a relatively high basement plateau, showing a hinge line to the east. This hinge line is locally parallel to the Cedro Paleocanyon edge and shows fractures such as positive flower and pinnacles due to meso-tectonic reactivation. The main well is in a very proximal area in neo-Aptian morphology ([Figure 3](#)).

The main well geologically is on São Mateus Platform, on the W edge of Fazenda Cedro Paleocanyon ([Figures 4](#) and [5](#)).

## **Core Analysis**

This well was continuously cored in the section of interest; this made it possible to carry out many accurate analysis ([Figure 6](#)). Sandstones are predominant in the Mucuri Member in these cores, which are divided into two depositional sequences: basal fluvial facies and the other characterized by alluvial facies.

### **Petrographic Analysis**

Petrographic analysis shows very immature facies (textural and mineralogical) in both sections, with grains just a little better sorted in the fluvial section ([Figure 7](#)).

### **Palynology Analysis**

The palynologic assemblages are marked by continental elements, with a considerable amount of opaque and non-opaque phytoclasts and rare cuticles. Pollen grains of *Classopolis* (*Cheiropidiaceae*) constitute the predominant group, commonly recorded in the form of tetrads, as well as *Gnetales*.

The predominance of *Cheirolepideaceae* and *Gnetales* suggests a hot and dry paleoclimate, possibly in salty soils (Lima, 1978). The good preservation and the high frequency of tetrads (mainly *Classopolis classoides*) indicate a very short transport. Pollen grains of *Araucariacites australis* are less abundant; during the Aptian preference was the highlands near salty seaside (Dutra, 2003).

No cores were taken in the other wells ([Figure 5](#)) that were drilled in a less proximal area. The palynological content shows *Classopolis classoides* predominance again, but tetrads are less common, with *Gnetales*, spores and rare, but consistently present, *Araucariacites australis*.

### **Paleoenvironmental Reconstruction**

The massive presence of hot and dry climate proxies and a constant occurrence of a colder climate proxy show a predominant hot and dry climate, with adjacent highlands very close to depositional site.

Structural analysis shows the main well is near the edge of the basin, on a relative high basement plateau

Integration of the available data sets allows us to make an interpretation of a depositional site in a low area, with non-perennial rivers under hot and arid climate providing influx from the nearby rise to form an alluvial fan complex ([Figure 8](#)).

### **Conclusion**

- A geomorphologic analogue is The Death Valley in California, USA: a very flat hot and dry basin near highlands, with associated colder climate and alluvial fans.
- The integration of different data sets and knowledge allowed for a more accurate interpretation of the paleoenvironmental setting.

## References

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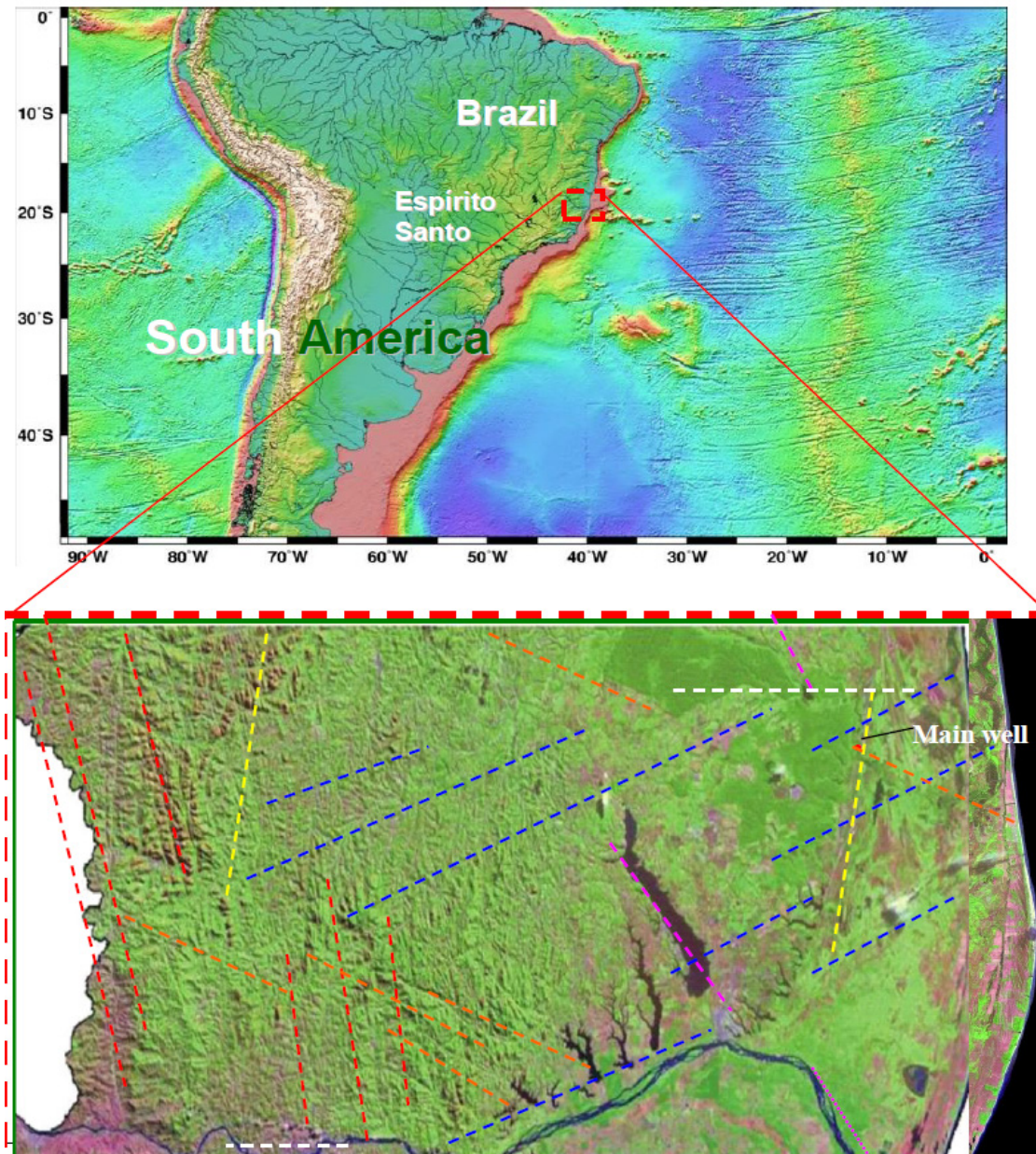


Figure 1. Location map and structural context (lineaments) in the area.

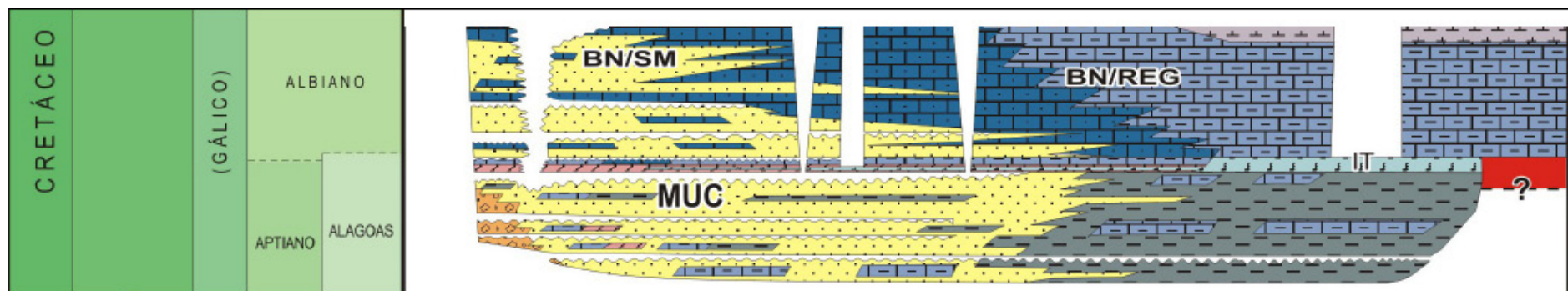


Figure 2- Stratigraphic chart (Aptian-Albian) of Espirito Santo Basin (from França et al., 2007).

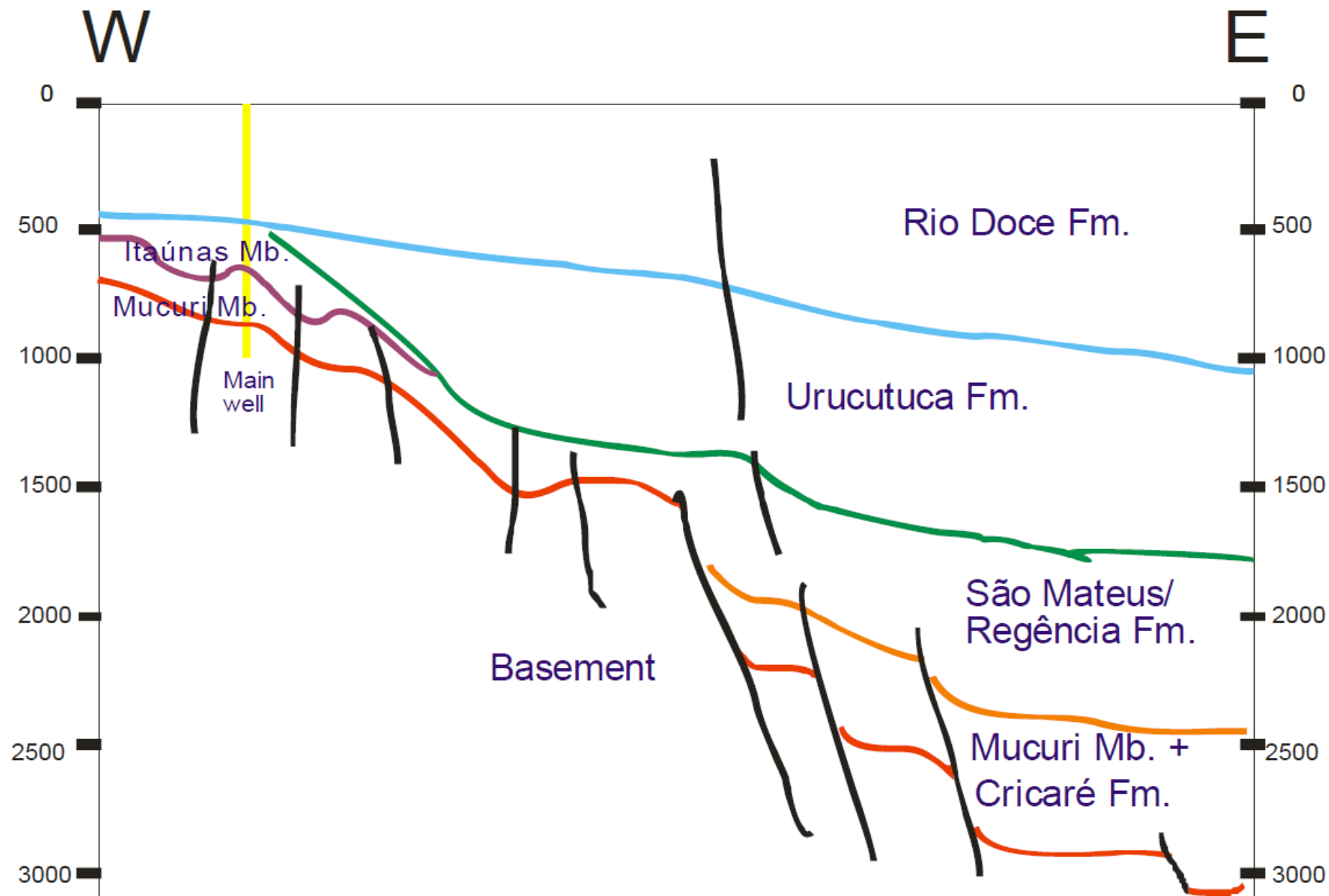


Figure 3. Geological cross-section (in time—ms) of study area.

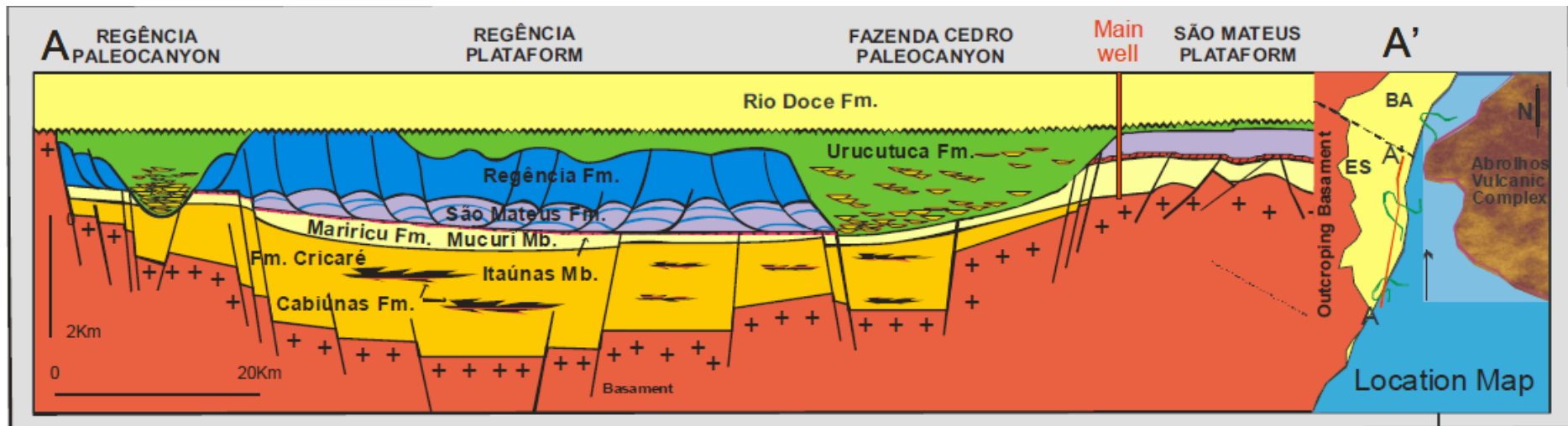


Figure 4. Geological cross-section, onshore Espírito Santo Basin (from Vieira and Tschidel, 2001)

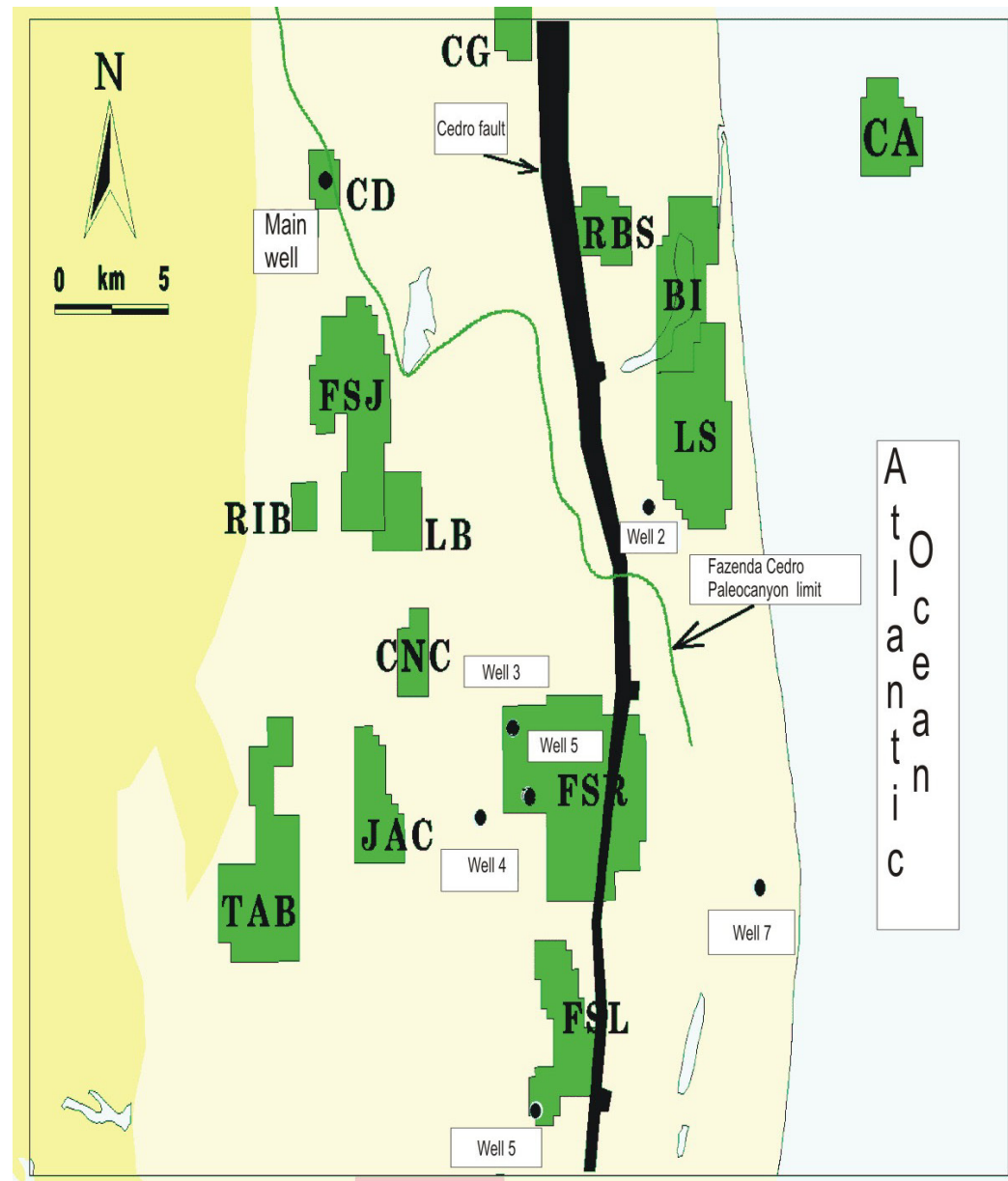


Figure 5. Location map with blocks (“ring-fences” in green), main geological features, and studied wells

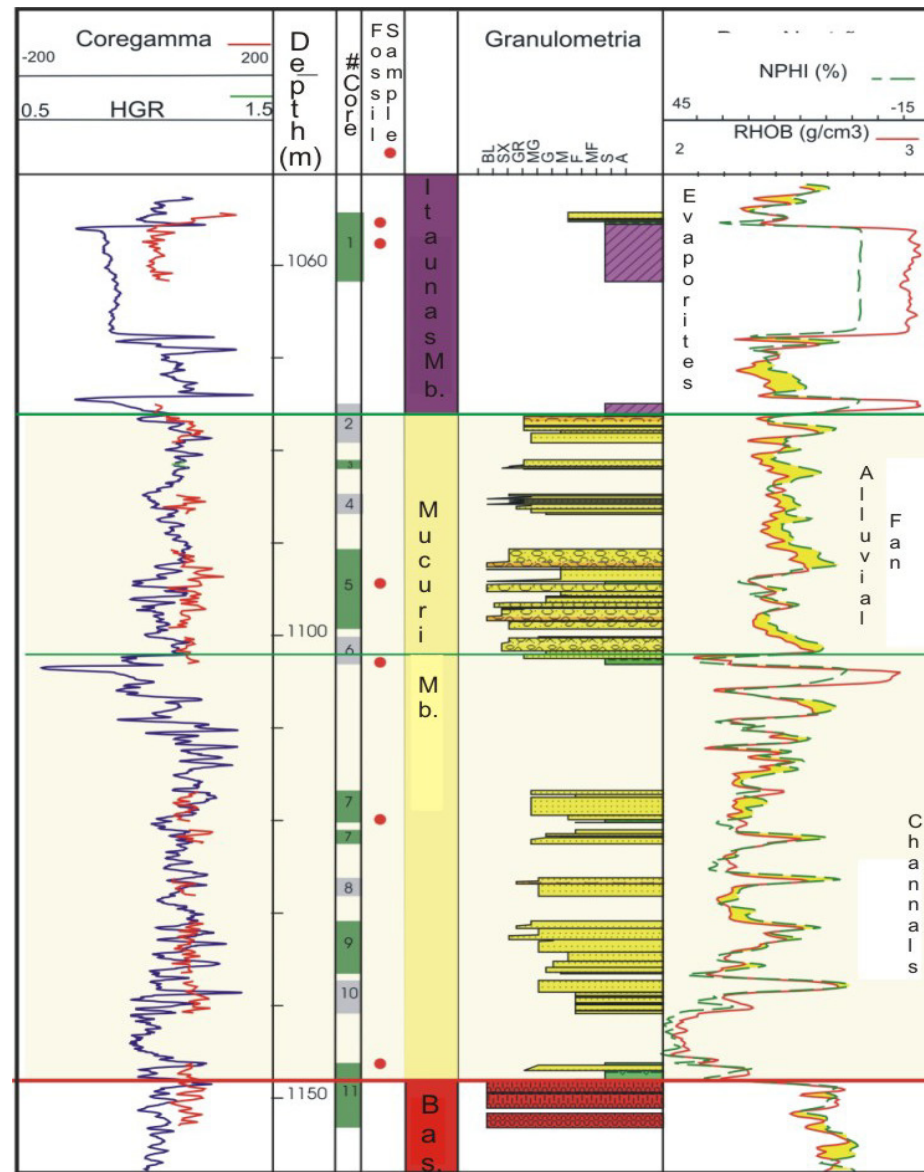
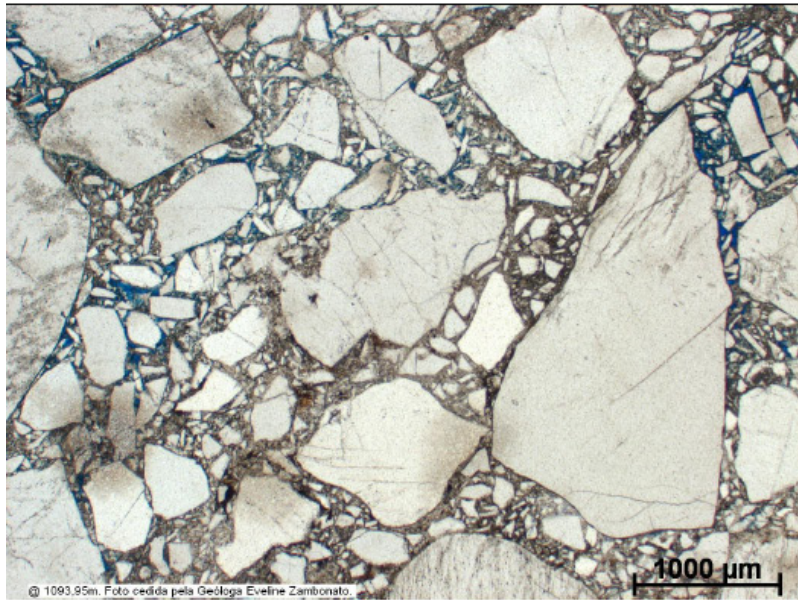
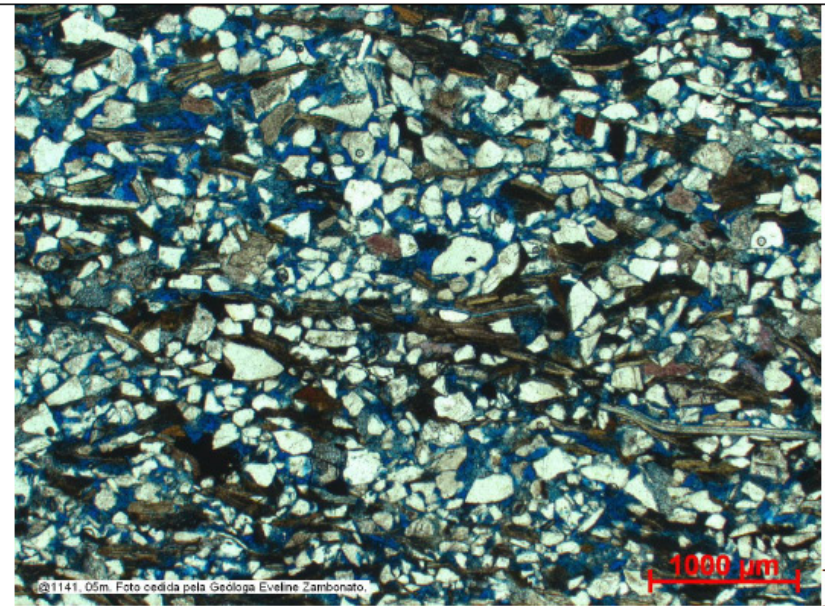


Figure 6. Core/log/petrophysics analysis of the main well, with photomicrographs of *Classopolis* tetrads + *Arucariacites australis* above *Classopolis* spp. (scarce tetrads) + *Arucariacites australis* (less frequent in alluvial fans).



A



B

Figure 7. A – Photomicrograph of alluvial-fan section sample. B – Photomicrograph of fluvial section sample.

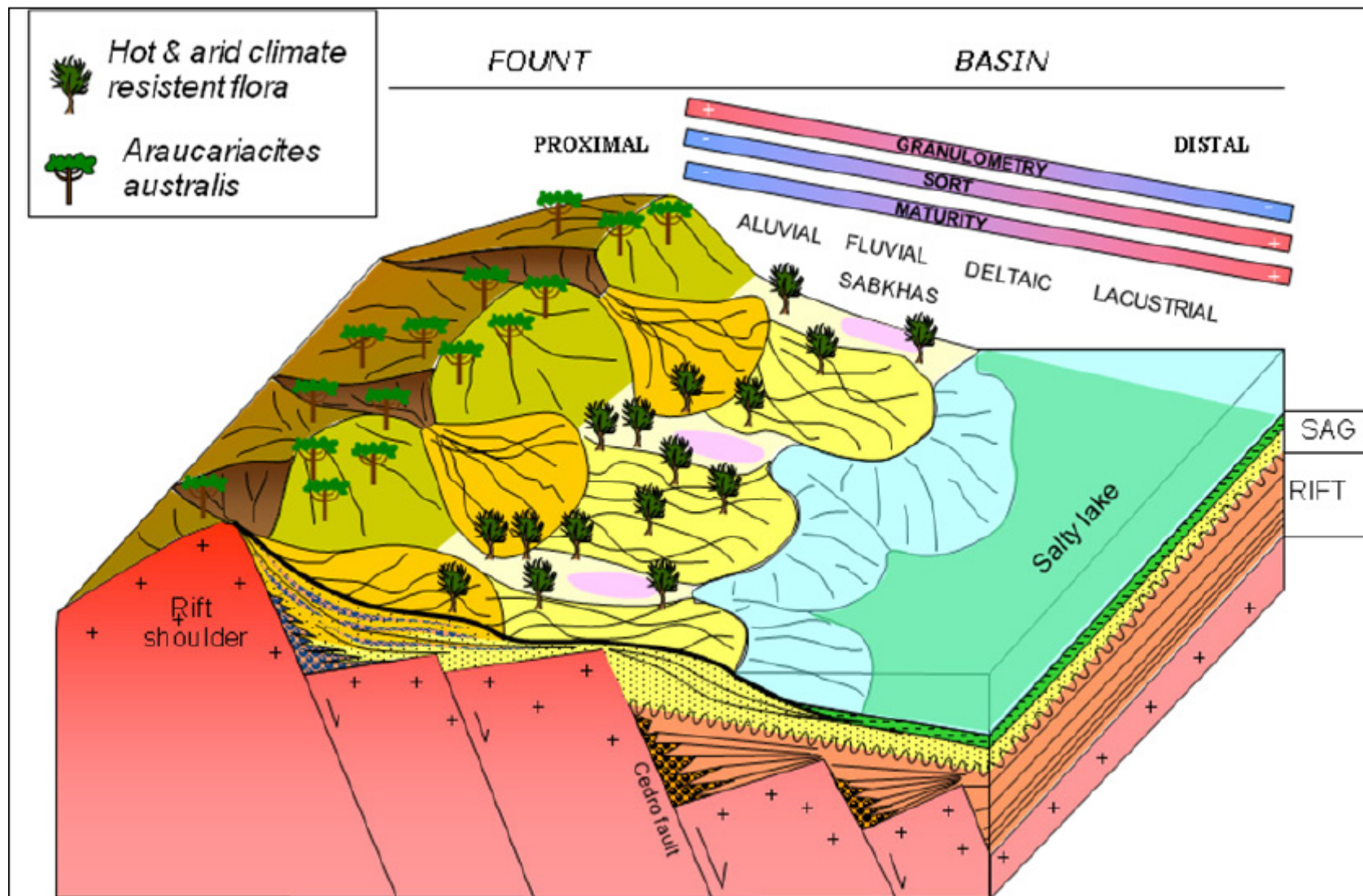


Figure 8. Schematic paleoenvironmental reconstruction.