

Tectono-stratigraphic evolution of the Aptian Pre-Salt of the onshore Espírito Santo Basin, SE Brazil, an example of proximal passive margin sag basin

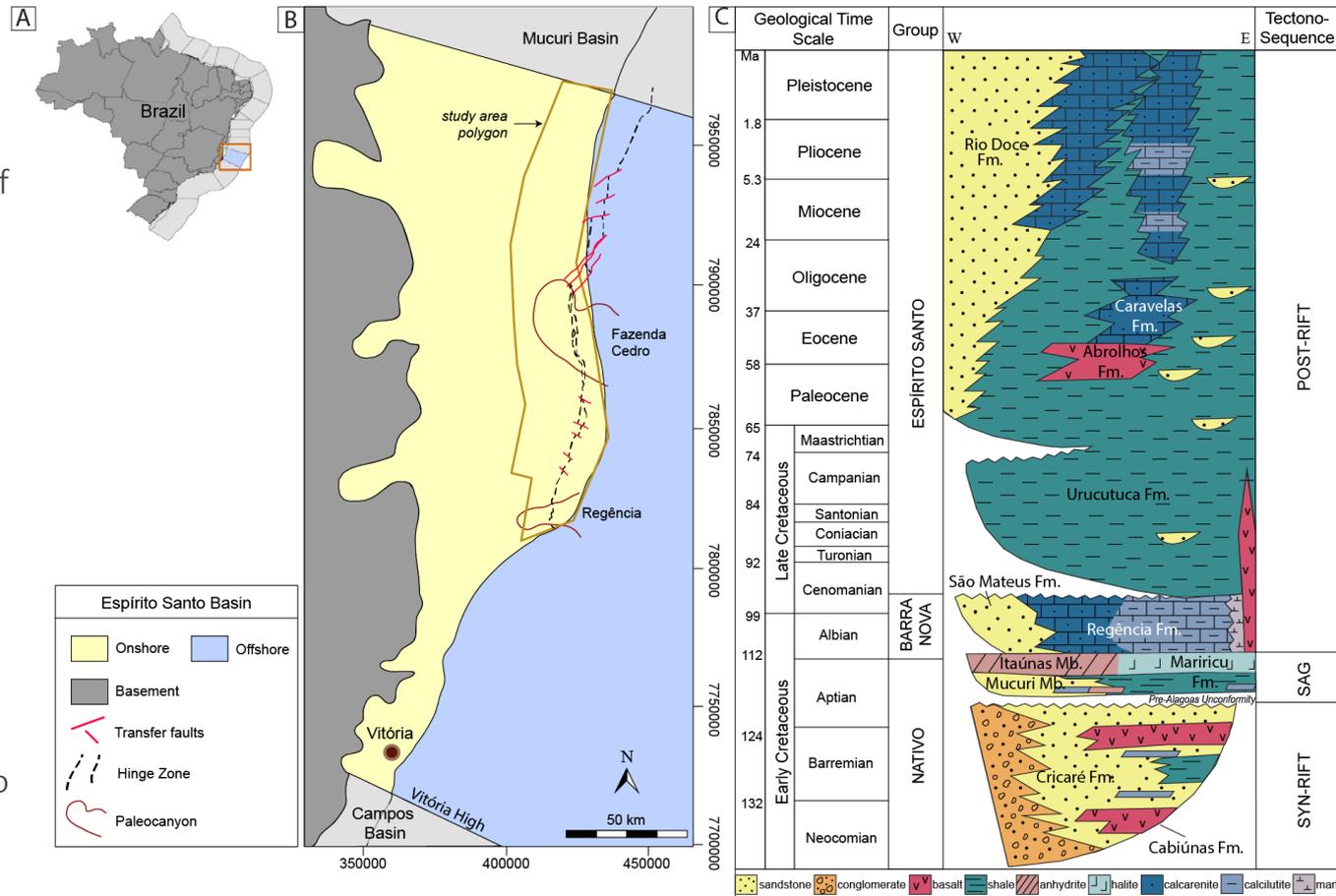
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Location and Geological Context

The Espírito Santo Basin is part of the Brazilian rift system basins, formed by the break-up of the Supercontinent Gondwana and subsequent opening of the South Atlantic Ocean.

The Aptian sedimentary succession of the basin is named Mucuri Member, lower unit of Mariricu Formation, and is contemporary to the pre-salt main carbonate reservoirs.

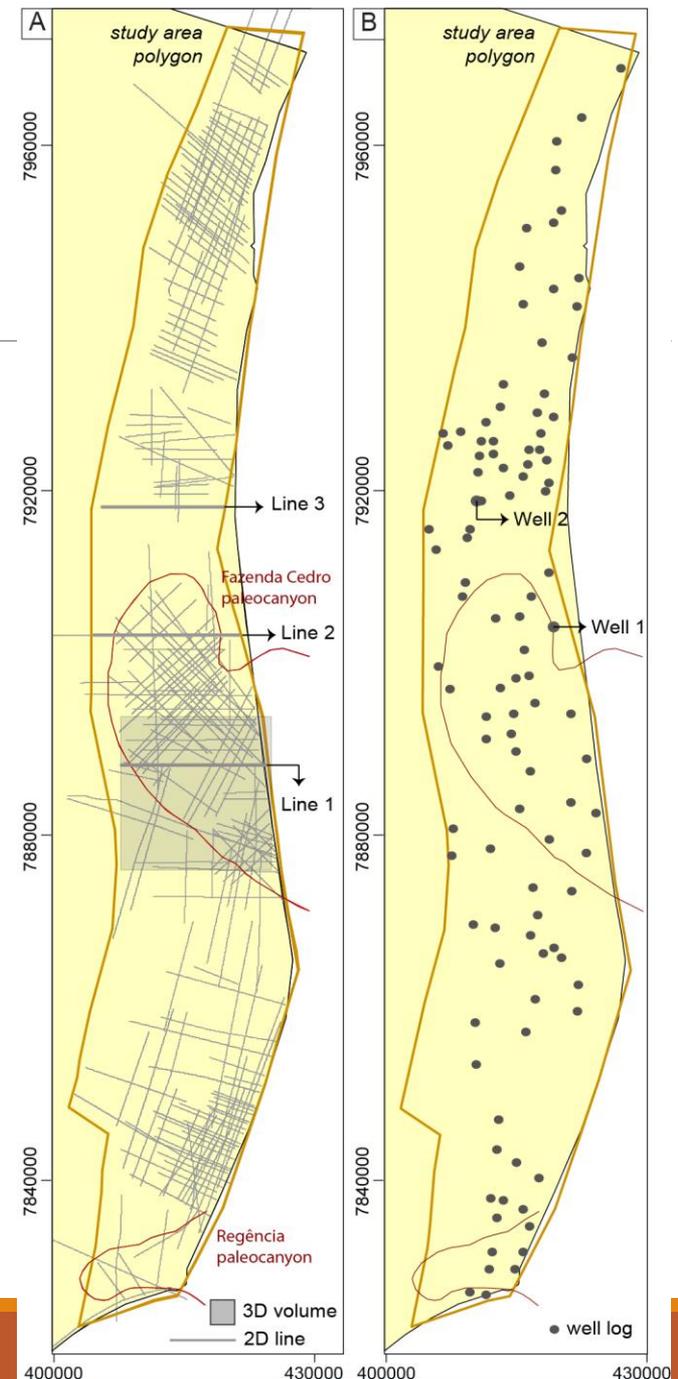
Proximal deposition consists mostly of clastic sediments, interpreted as fluvial and coastal systems in the margins of a wide lake, which synchronously accumulated carbonates to the distal portions.



Database

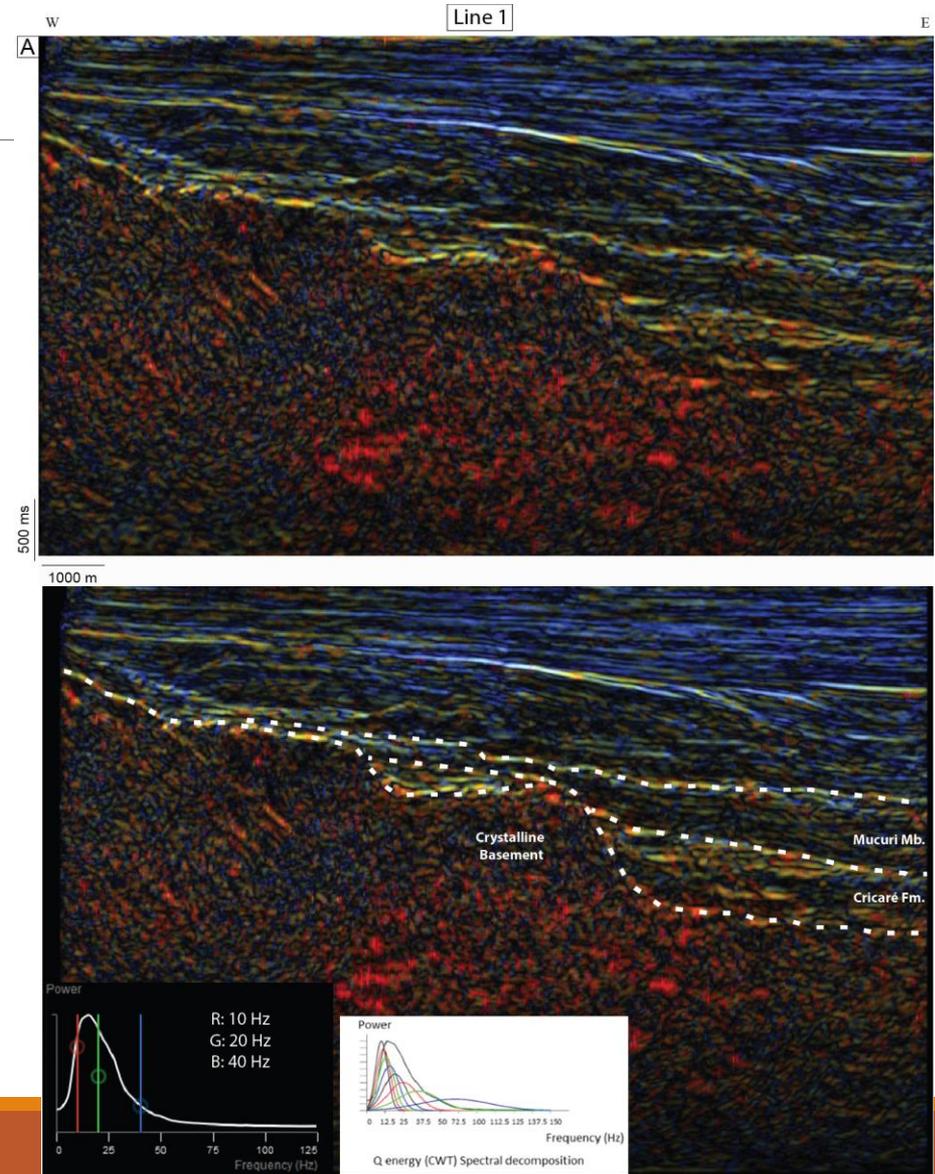
The main objective of this study is the tectono-stratigraphic analysis of the marginal Mucuri Member.

Leading methodology is seismic stratigraphy based on 220 2D lines and 1 3D volume, coupled with petrophysical and lithological analysis of 103 well log data and 5 cored wells.



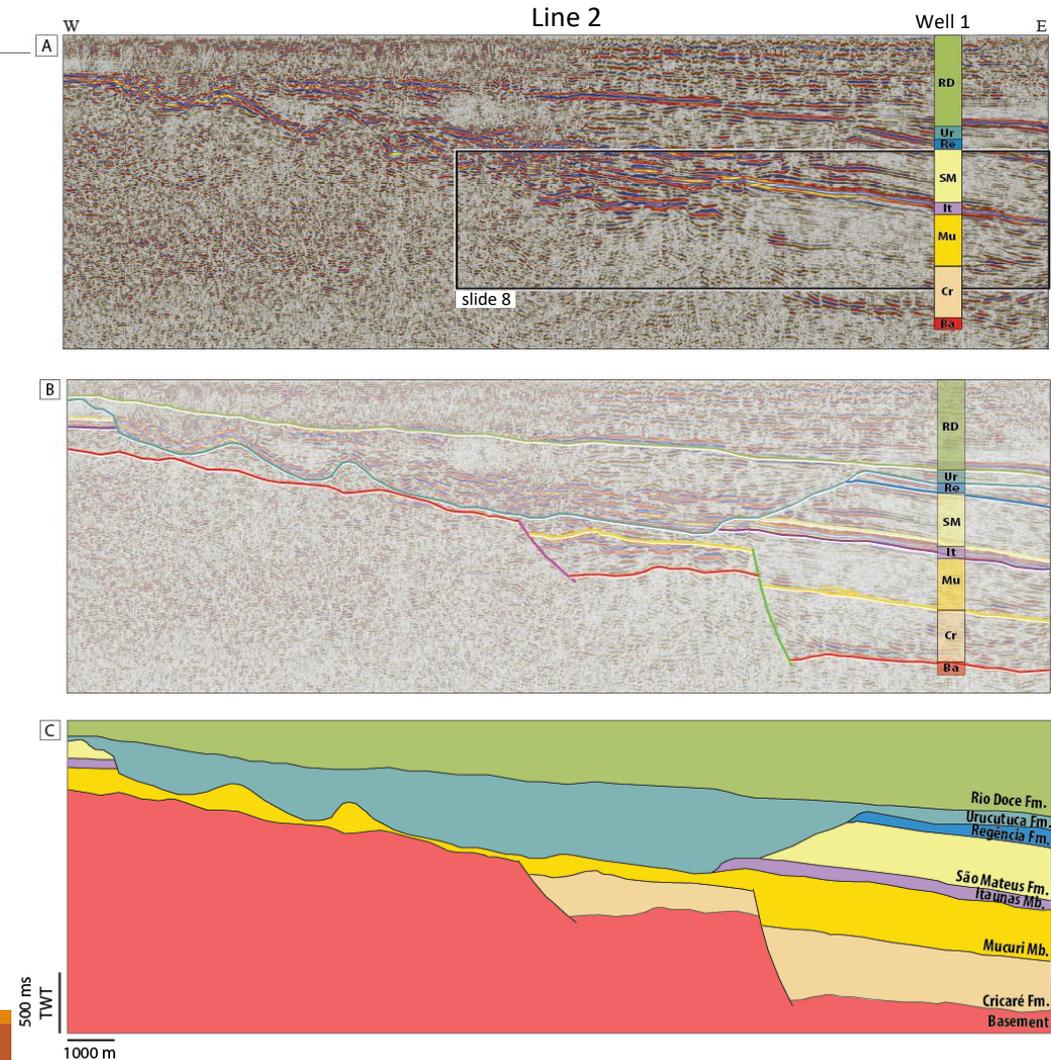
Systematic Mapping of the Mucuri Member

Frequency spectral decomposition attribute, obtained and represented through a volume color blend for different frequencies (red: 10 Hz; green: 20 Hz; blue: 40 Hz).



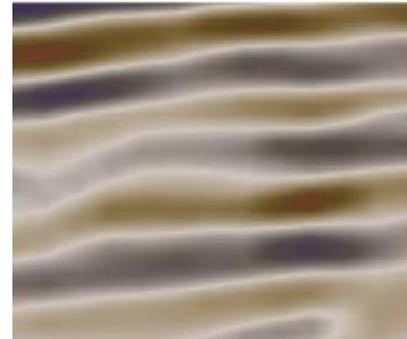
Contact Relations

The Mucuri Member is observed overlying either the syn-rift sedimentary- volcanic sequence of Cricaré Formation in rift troughs or the basement. The Mucuri Member underlies the evaporitic sequence of Itaúnas Member in most mapped seismic lines. Exceptions occur in the vicinity of Fazenda Cedro and Regência paleocanyons, where erosive truncation reflection terminations define the upper contact with the Urucutuca Formation; also, in the southern region between the paleocanyons, the Mucuri Member directly underlies either Regência or São Mateus formations.

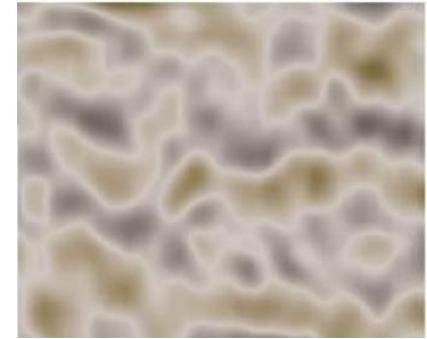


Seismic Facies

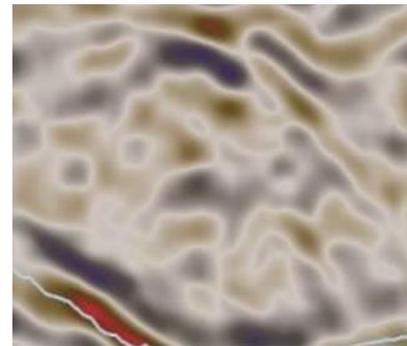
SF	Description	Interpretation
SF 1	Continuous to semi-continuous, parallel reflectors; constant thickness; high to moderate amplitude.	Predominance of offshore and lower shoreface sediments.
SF 2	Chaotic reflections, with broken reflectors without parallelism. moderate to low amplitude.	Dominance of poorly confined fluvial channels facies association
SF 3	Mound-like structure, with complex internal structure in downlap.	Interaction between fluvial and coastal successions composing wave-dominated deltaic facies associations.
SF 4	Clinoforms in the edge of seismic resolution, with structural control.	Sandspits influenced by basement high.



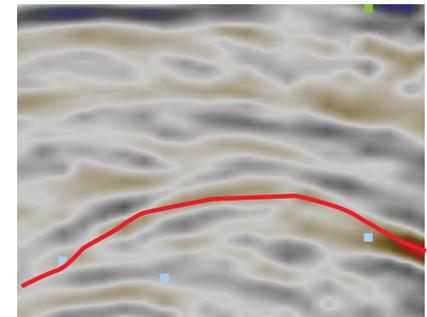
SF 1



SF 2



SF 3



SF 4

Cored Wells

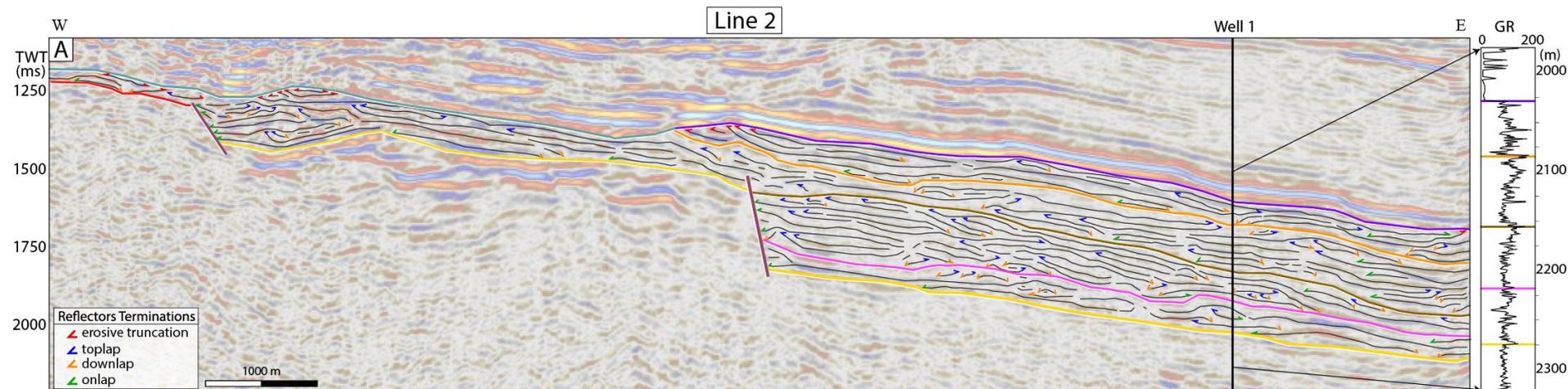
Predominant facies associations of the Mucuri Member with examples of occurrence in described cored wells, modified from Althaus et al. (2019). A- Poorly Confined Fluvial Channel, with predominance of sand. B- Upper Shoreface, amalgamated sands with oscillatory flow structures. C- Lower Shoreface, sand and mud showing oscillatory flow structures. D- Offshore, with mud and anhydrite.



Seismostratigraphic Units

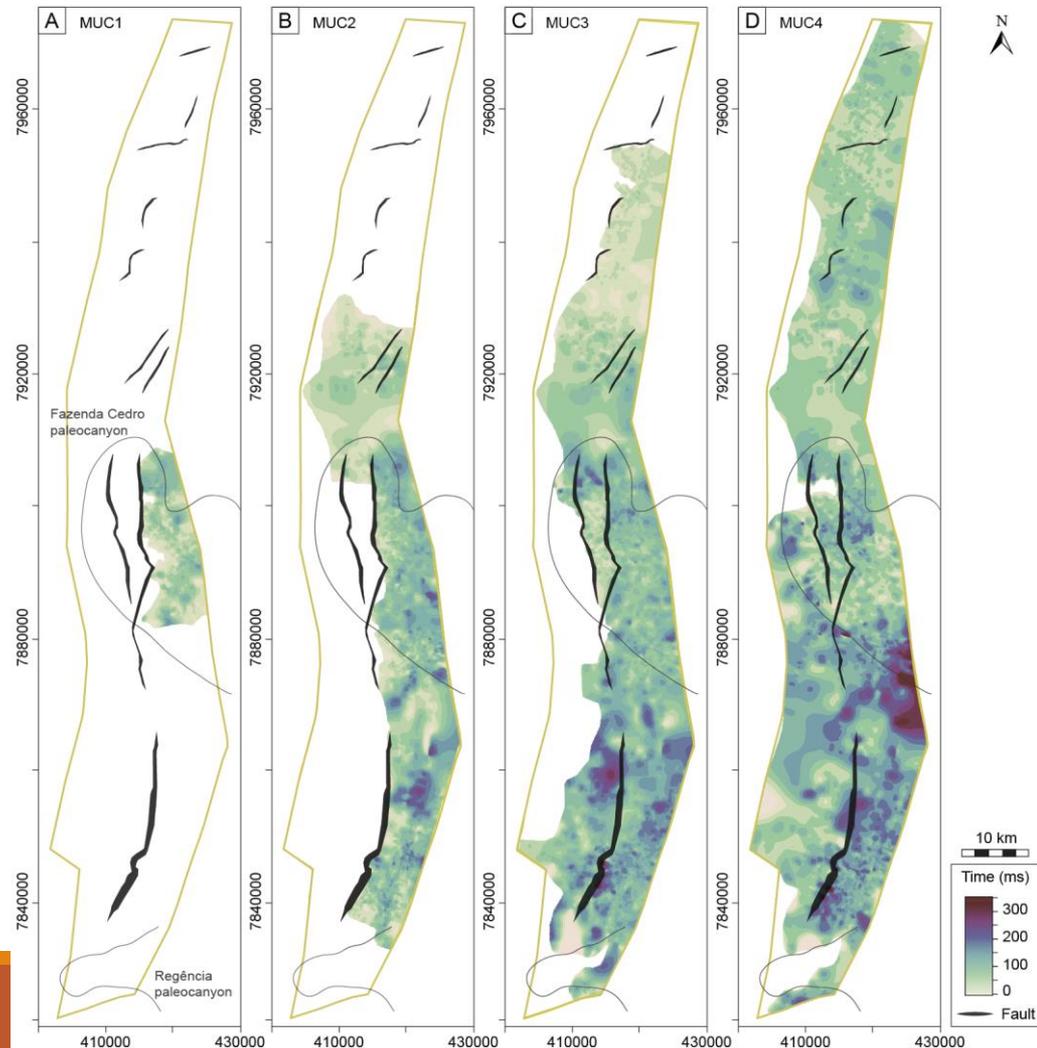
Four seismostratigraphic units were identified (named, from the base upwards: MUC1, MUC2, MUC3 and MUC4), delimited by three subparallel horizons.

Unit-bounding reflectors coincide with gamma ray minima or maxima representing shales or anhydrites, respectively, deposited in deep water environments.



Seismostratigraphic Units

The Mucuri Member records an enlargement in depositional area from the base upwards witnessing an overall lacustrine base level rise during deposition. The geometry of the depositional area during MUC1 and MUC2 was conditioned by the paleorelief of the preceding rift basins. MUC3 and MUC4 seismic units record a decrease in thickness as remnant topography was gradually filled; both units transcended and draped the half-grabens.



For further discussion and information:



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Seismic tectono-stratigraphic analysis of the Aptian pre-salt marginal system of Espírito Santo Basin, Brazil

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SEISMIC-BASED RESERVOIR CHARACTERIZATION ON PRE-SALT APTIAN CLASTIC DEPOSITS – MUCURI MEMBER OF ESPÍRITO SANTO BASIN

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Wave-dominated lacustrine margin of Aptian pre-salt: Mucuri Member, Espírito Santo Basin

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