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Hydrocarbon Exploration Potential in the Barreirinhas Basin: *A Stratigraphic Assessment of Cretaceous Sandstone Turbidite Reservoirs*

Eduardo dos Reis Leaubon

Geophysicist Interpreter at the Superintendence of Geological and Economic Assessment (SAG) - ANP

August 17, 2023

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Hydrocarbon Exploration Potential in the Barreirinhas Basin

A Stratigraphic Assessment of Cretaceous Sandstone Turbidite Reservoirs

15-17 AUGUST 2023

RIO DE JANEIRO | BRAZIL

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Agenda

- INTRODUCTION
- TECTONO-STRATIGRAPHIC EVOLUTION
- SEISMIC INTERPRETATION – MAIN PLAY & PETROLEUM SYSTEM EVALUATION
- FINAL REMARKS

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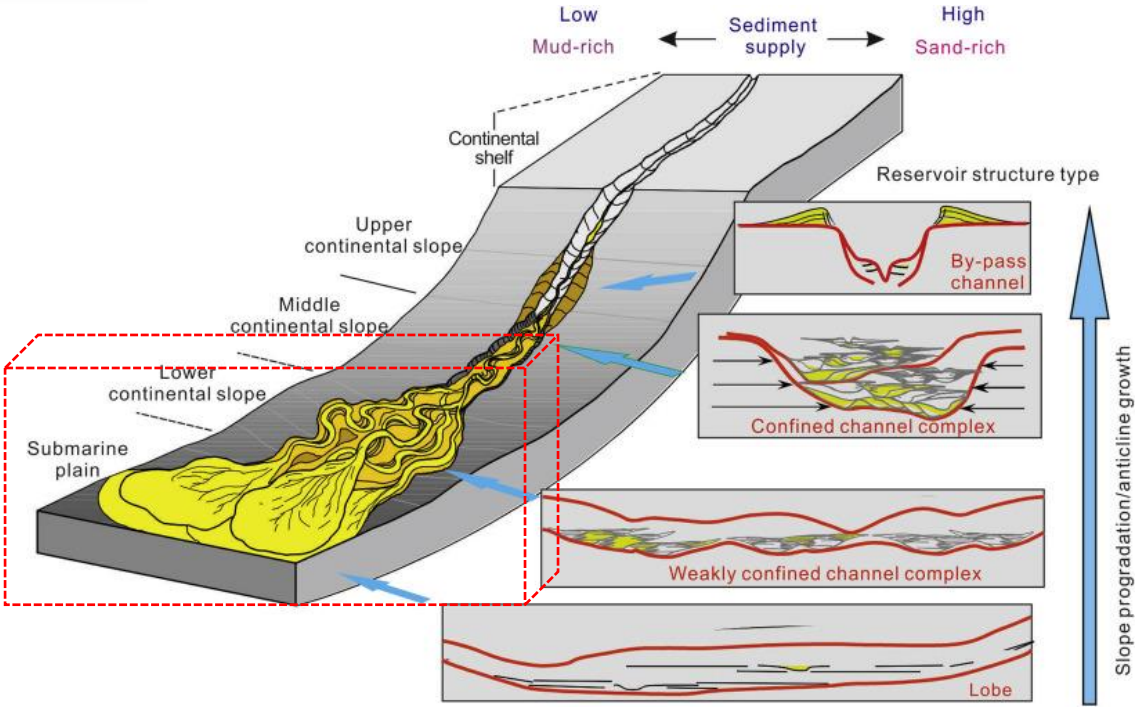
Model of the Reservoir: Turbidites in DeepWaters

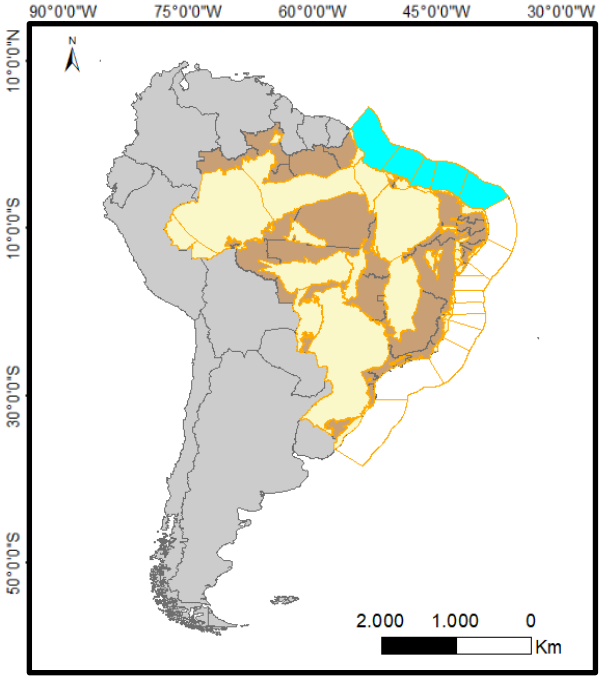


Interval of Interest – lobes and channel complexes in deepwaters

Sedimentary Model of Turbidite Fan:

Huang (2018). showing that the incised valleys and by-pass channels are developed in the continental slope and the upper slope; the confined channel complexes and weakly confined channel complexes are developed in the middle slope and the lower slope; and the lobes are developed in the submarine plain (according to ENI with slightly modification).

Location Map: Brazil and Brazilian Equatorial Margin



AREA: 884,535 sqm BRAZILIAN EQUATORIAL MARGIN

STUDY AREA – BARREIRINHAS BASIN - *BAR*

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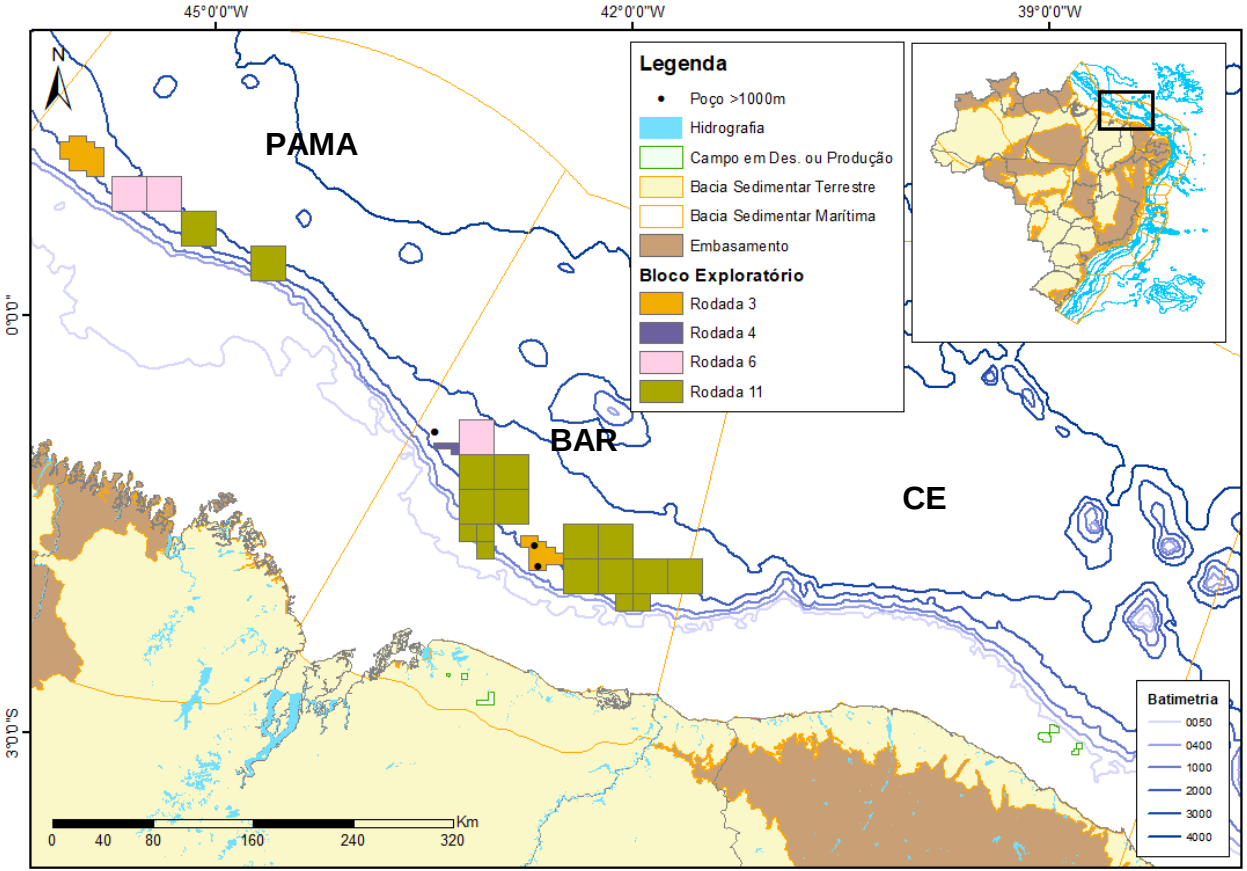
Location Map of the Basin: Deep Water



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Tectono-Stratigraphic Evolution: Tectonic Plates and Position of Continents

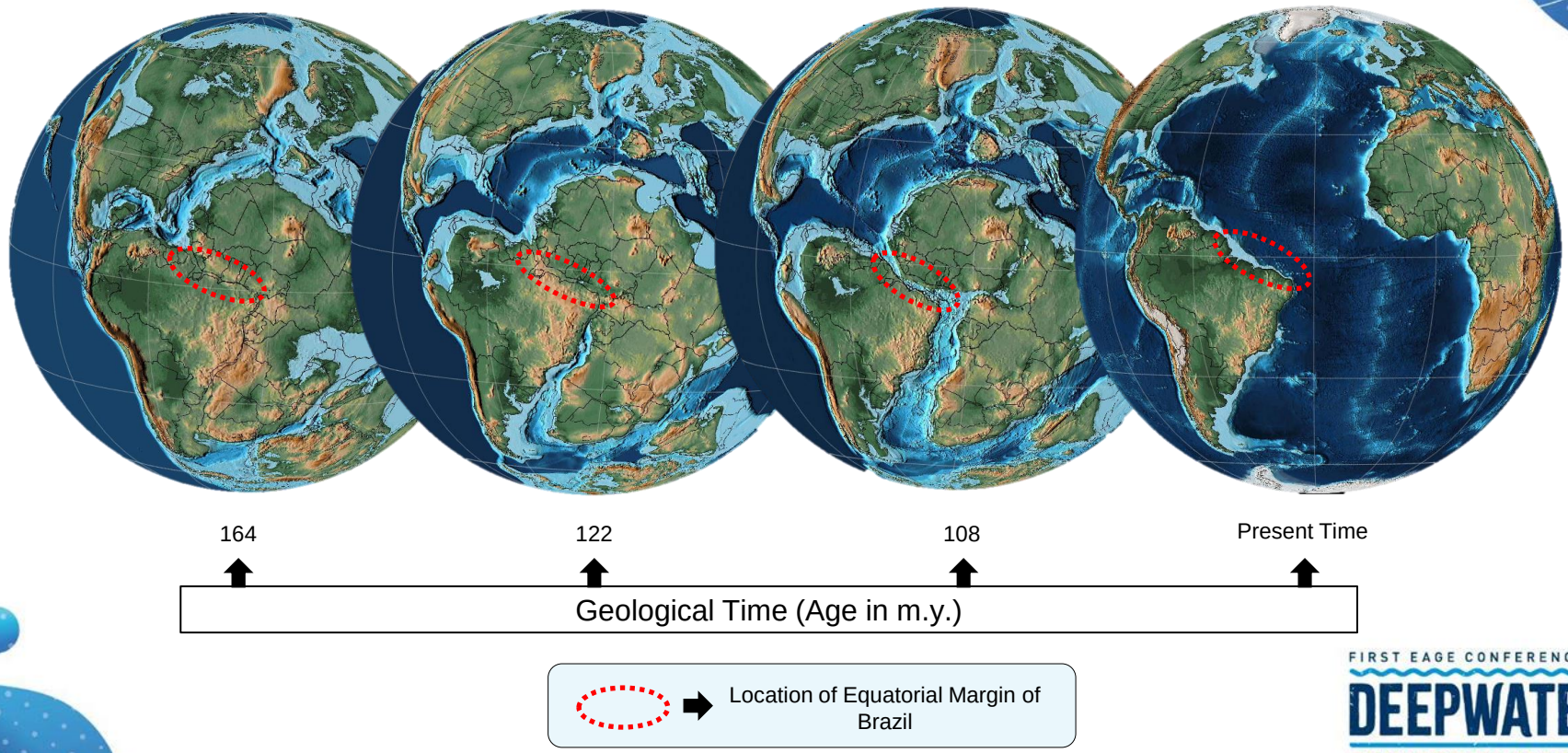
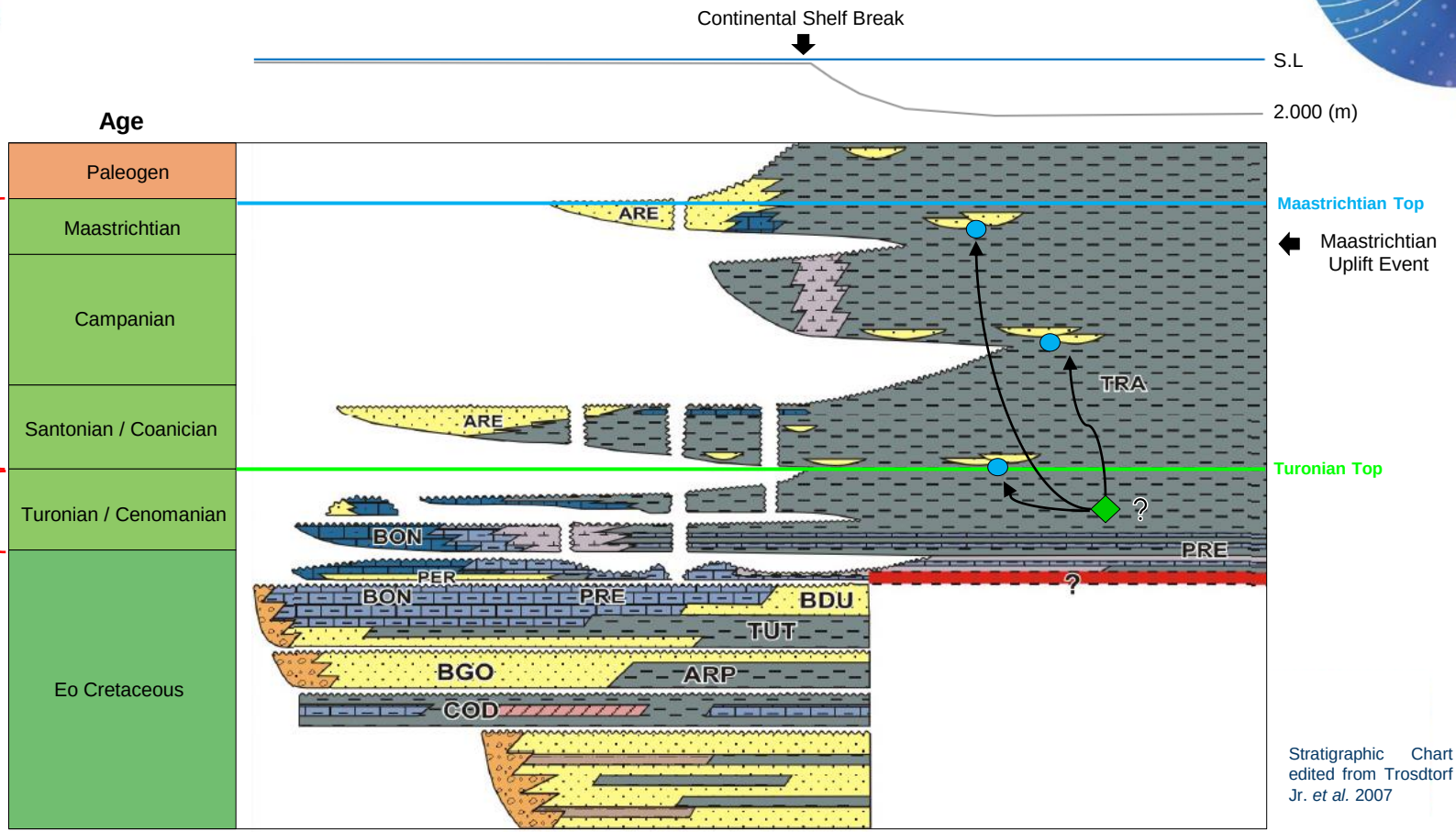


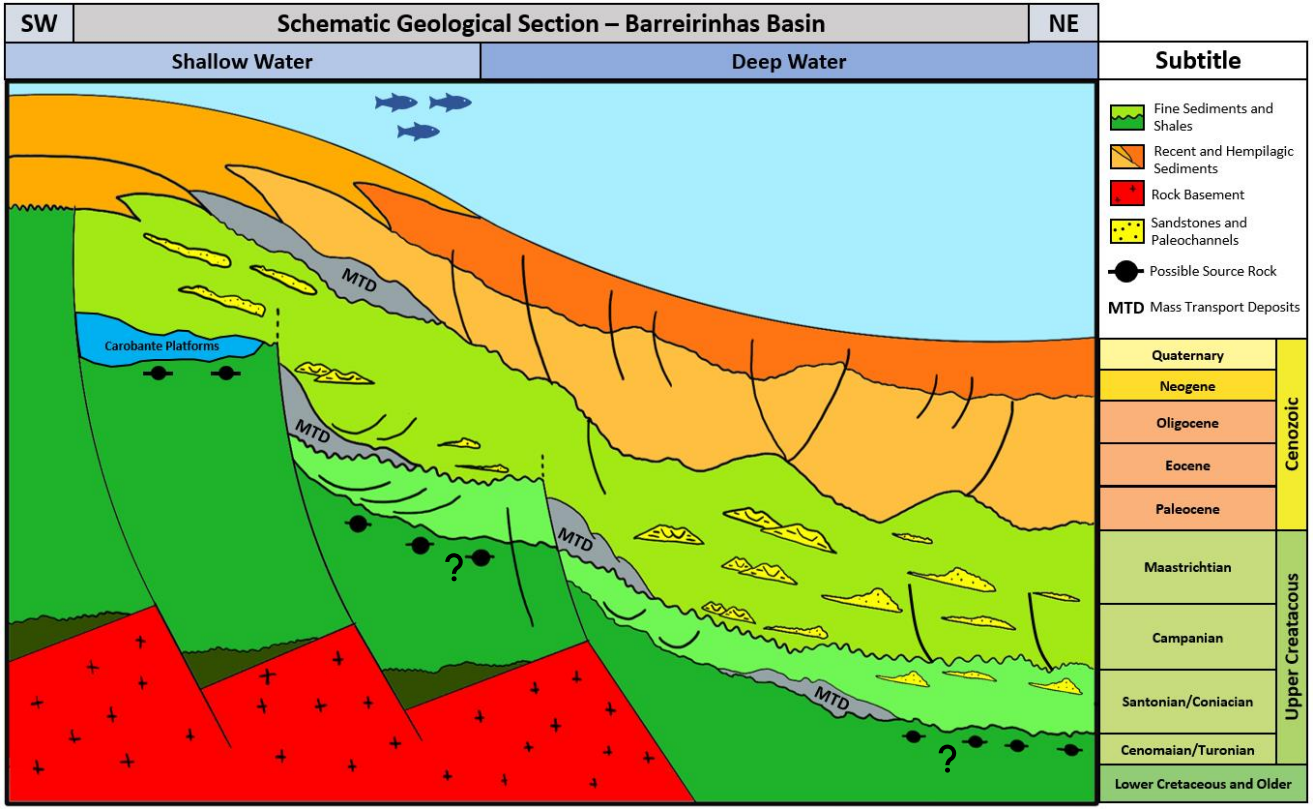
Figure made in the software GPlates

Barreirinhas Basin Stratigraphic Chart: Main Interpreted Horizons

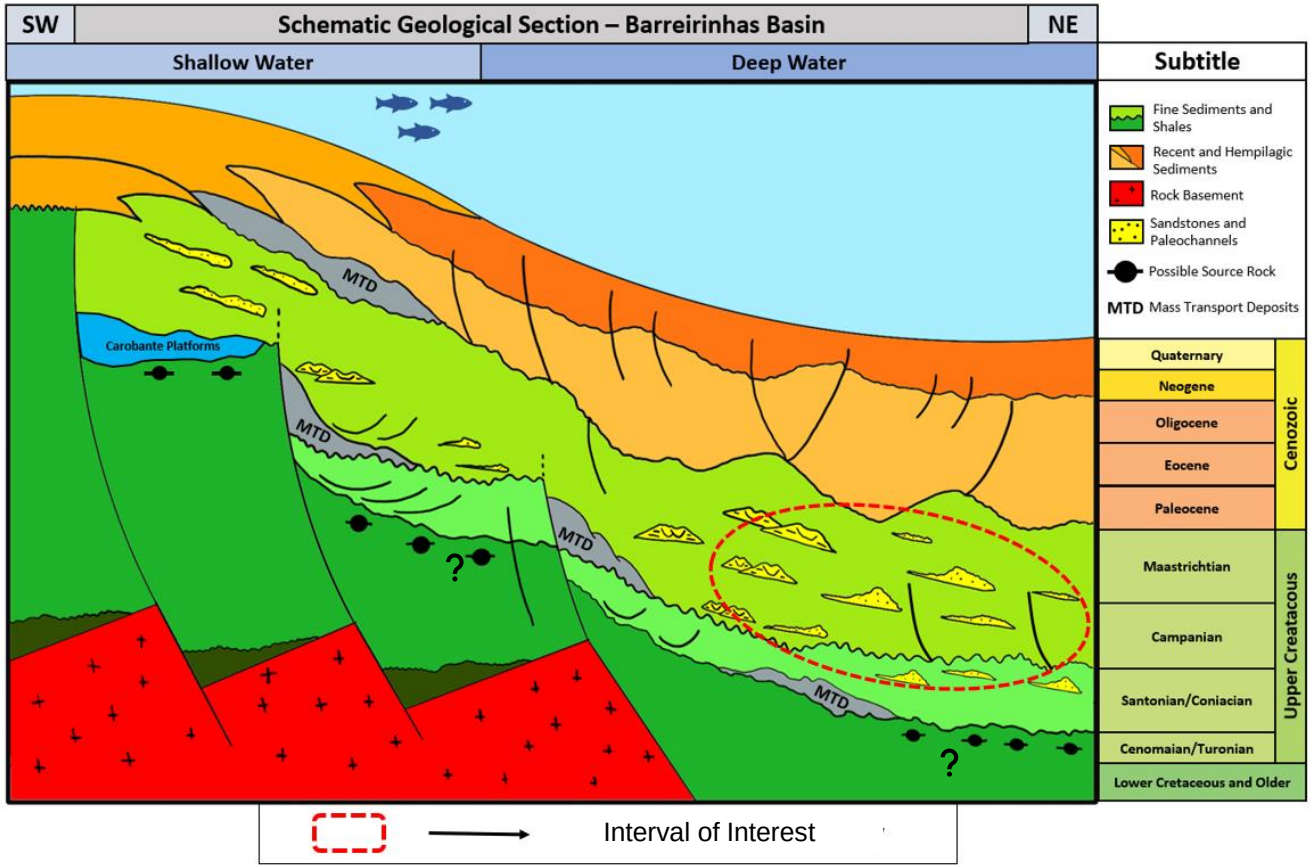


Stratigraphic Chart edited from Trosdtorf Jr. *et al.* 2007

Stratigraphic Interpretation of the Basin



Stratigraphic Interpretation of the Basin: Interest Interval



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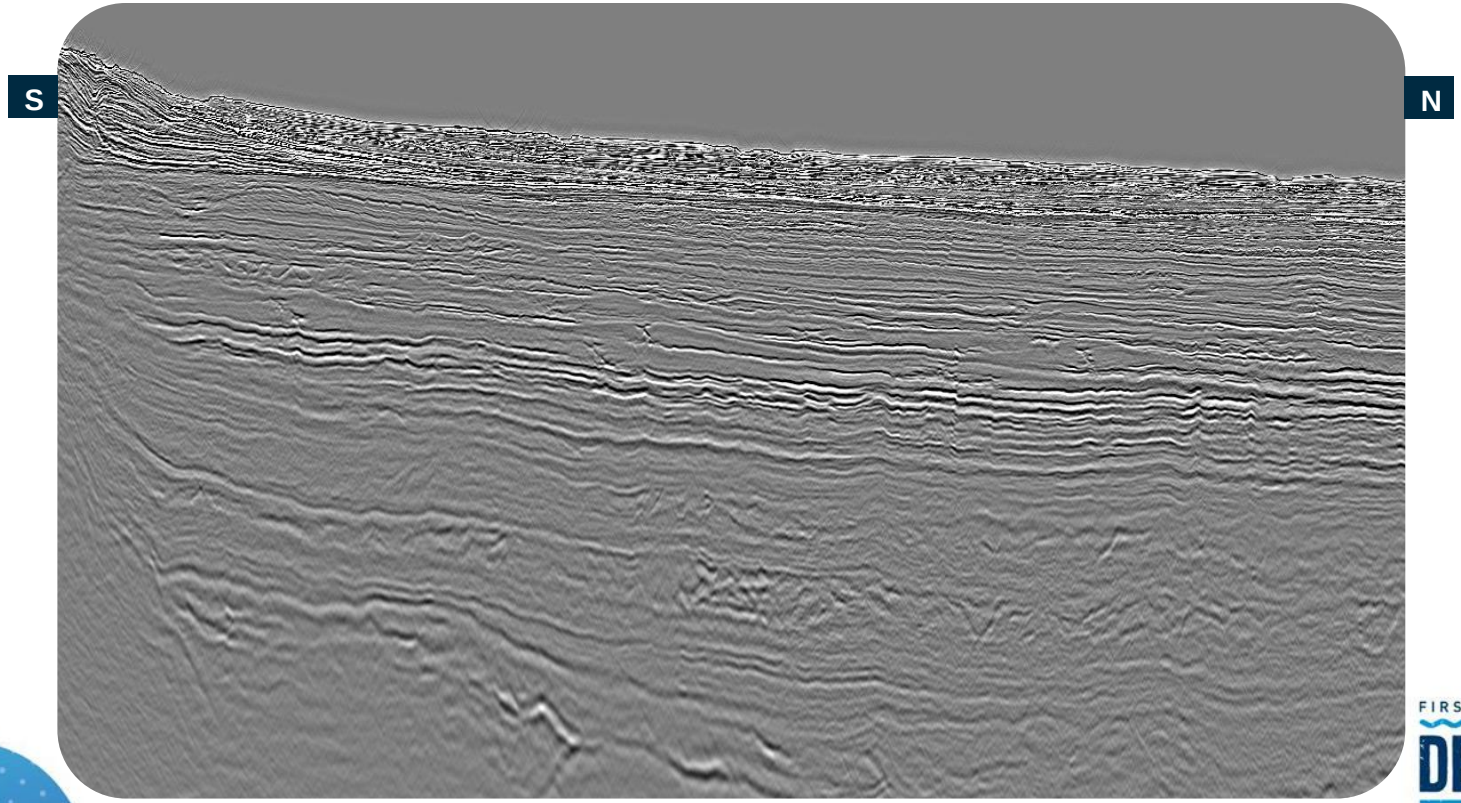
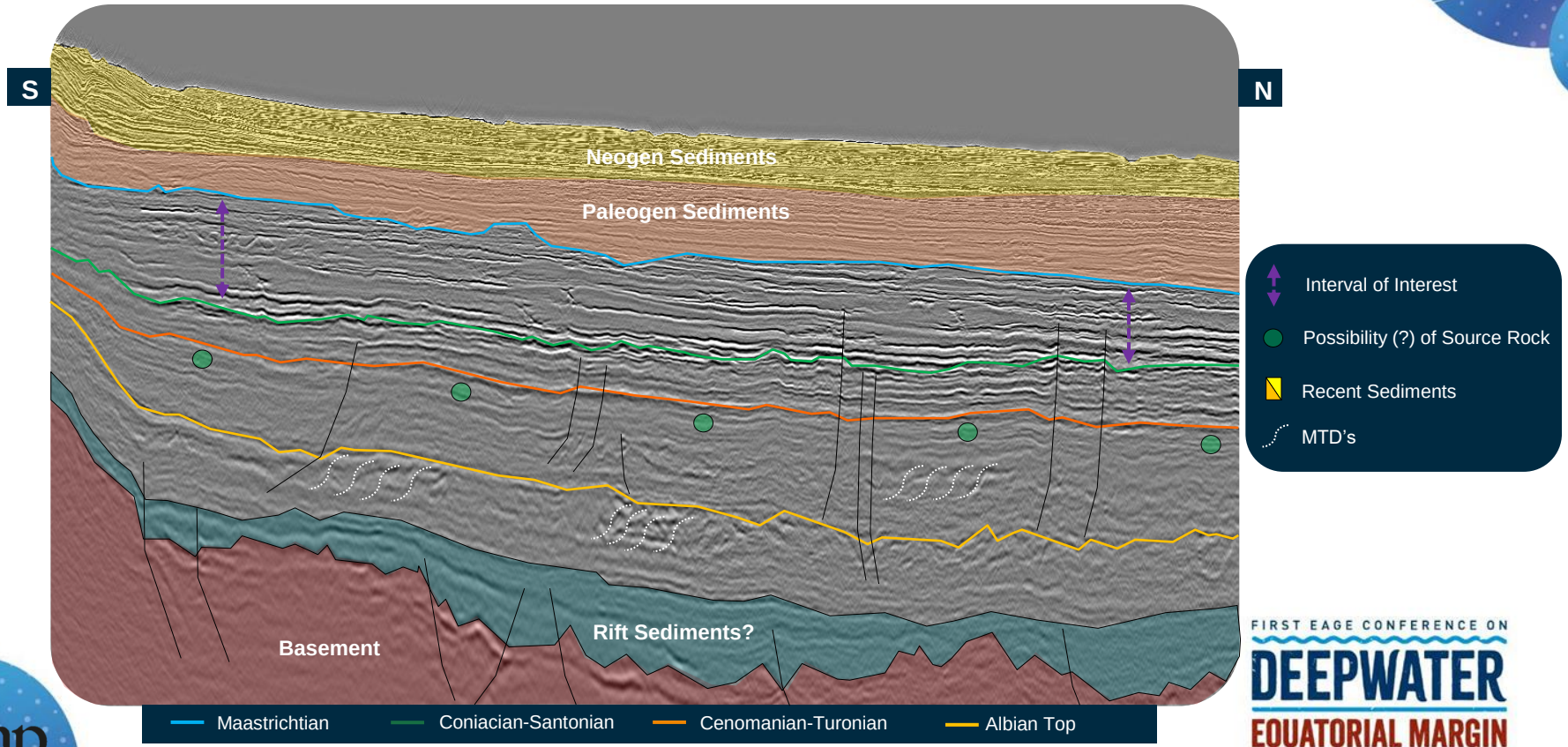
Seismic Interpretation: Dip Section

Courtesy



Seismic Interpretation: Dip Section

Courtesy



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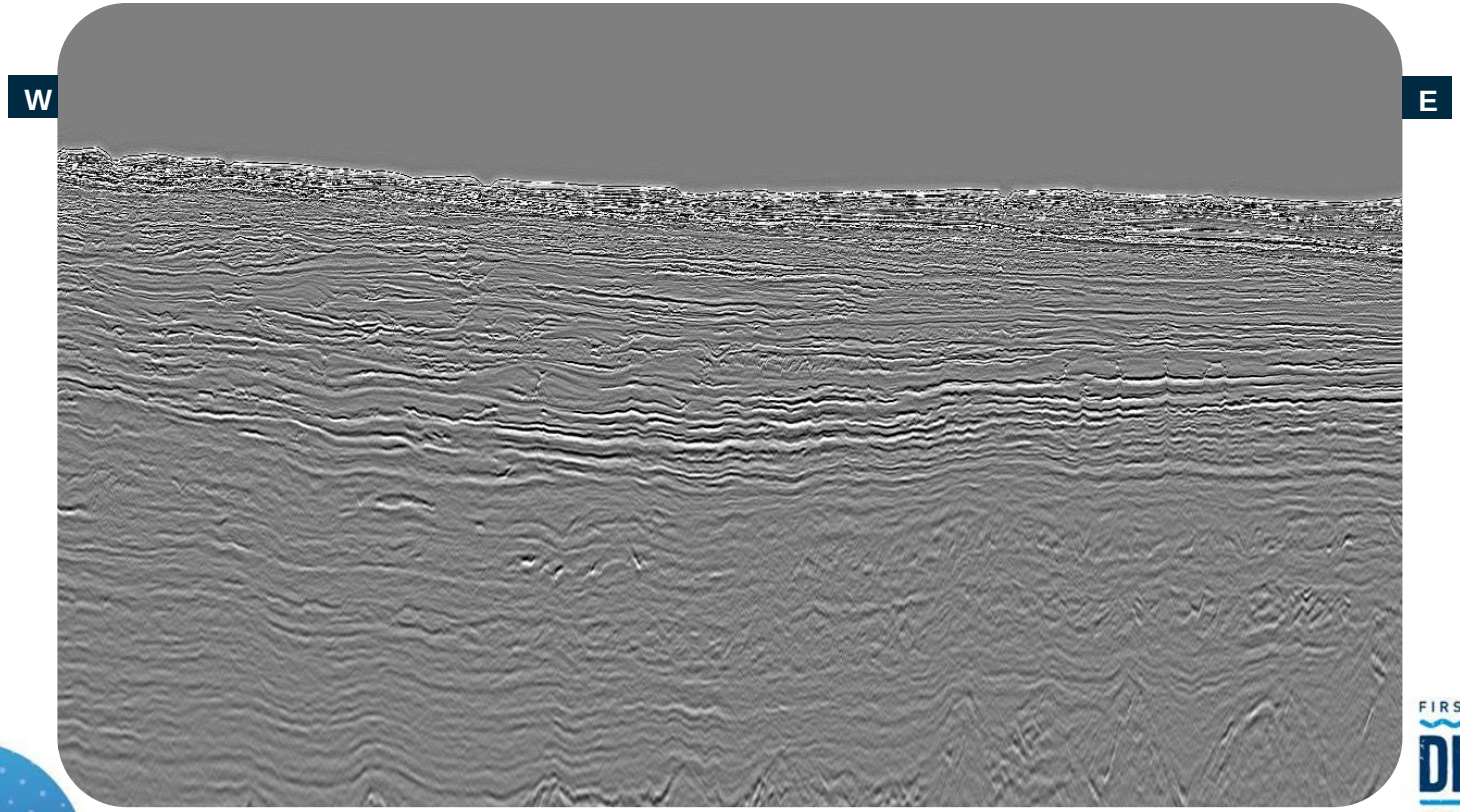
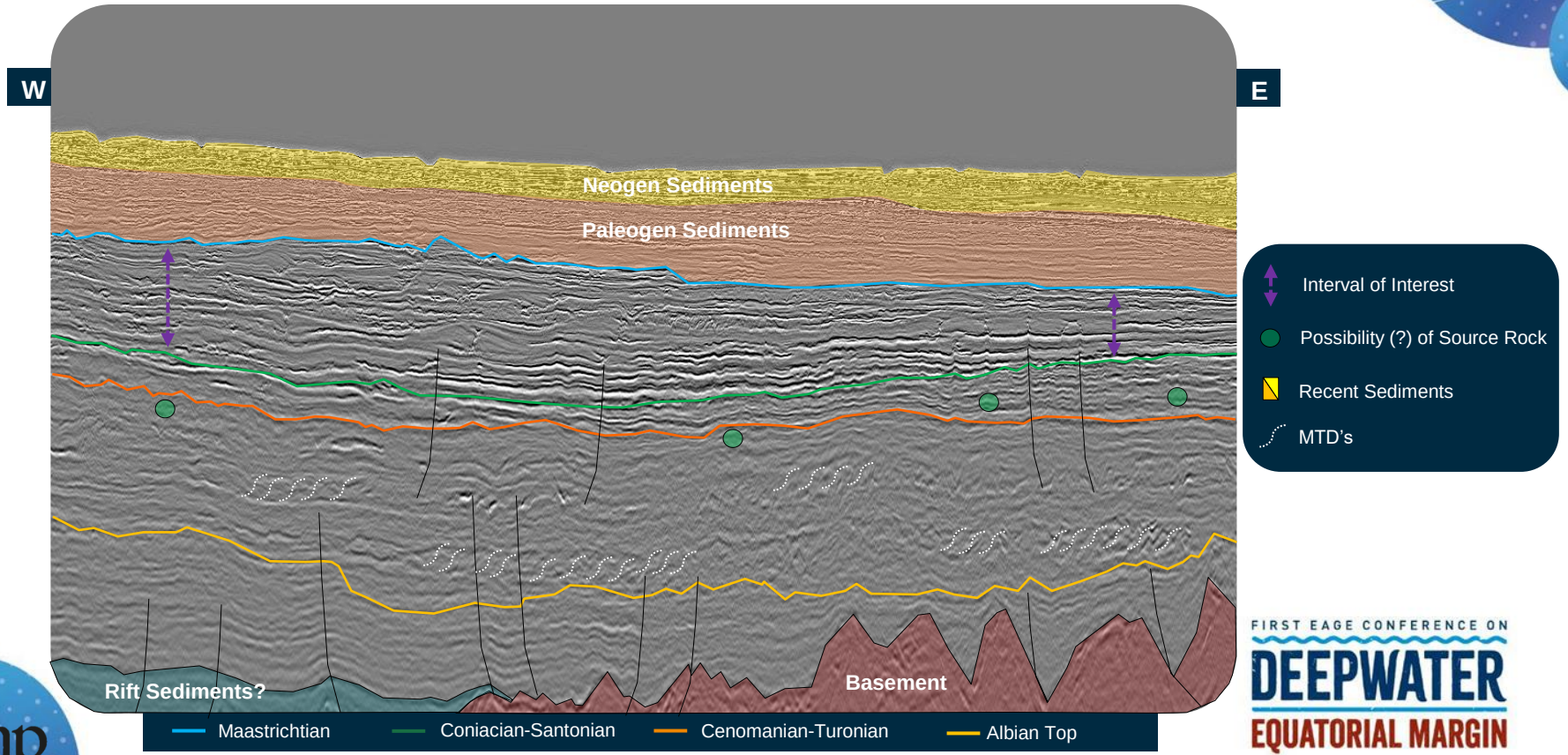
Seismic Interpretation: Strike Section

CGG Courtesy



Seismic Interpretation: Strike Section

Courtesy



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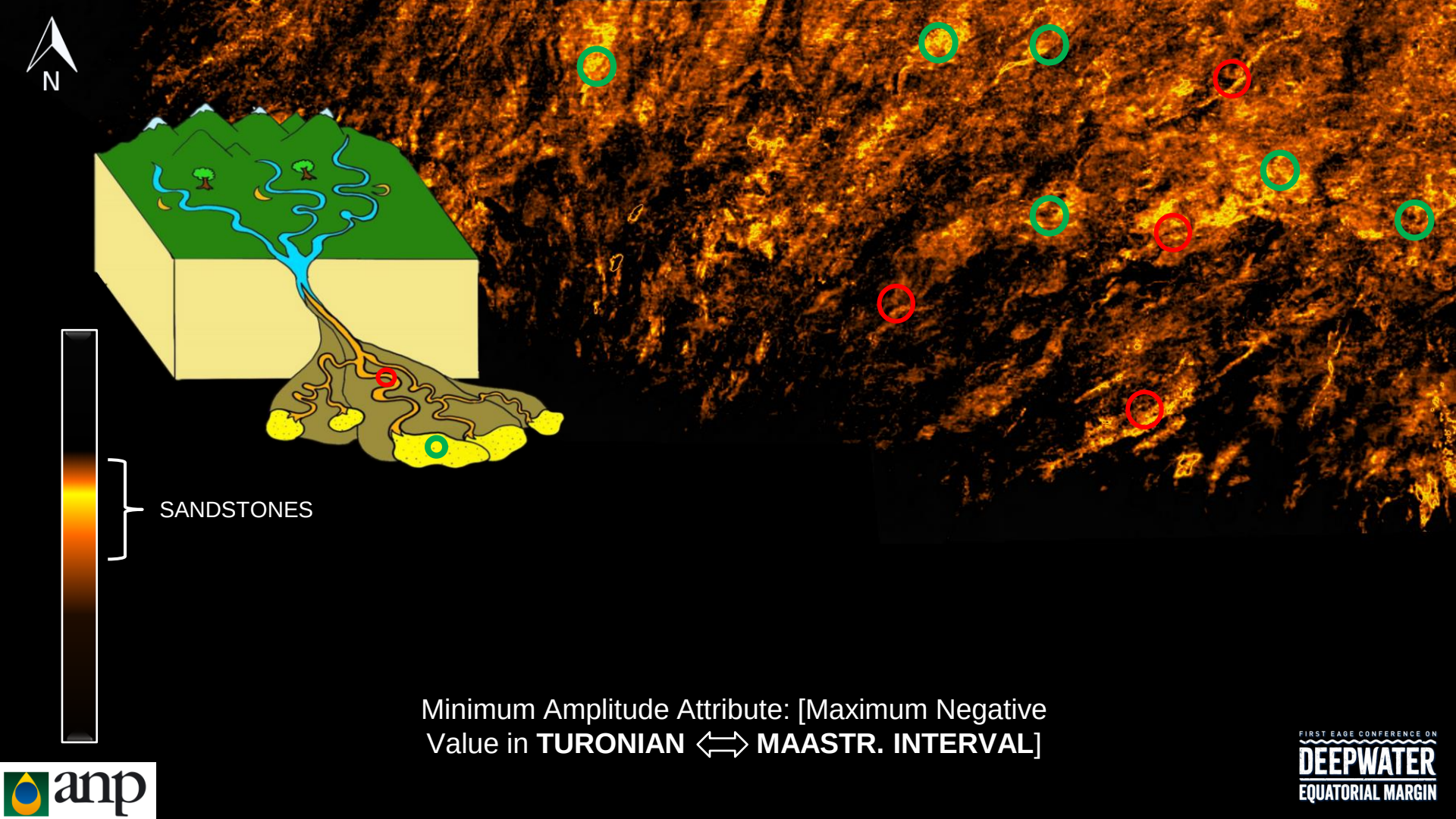

Minimum Amplitude Attribute: [Maximum Negative Value in **TURONIAN** ⟺ **MAASTR. INTERVAL**]

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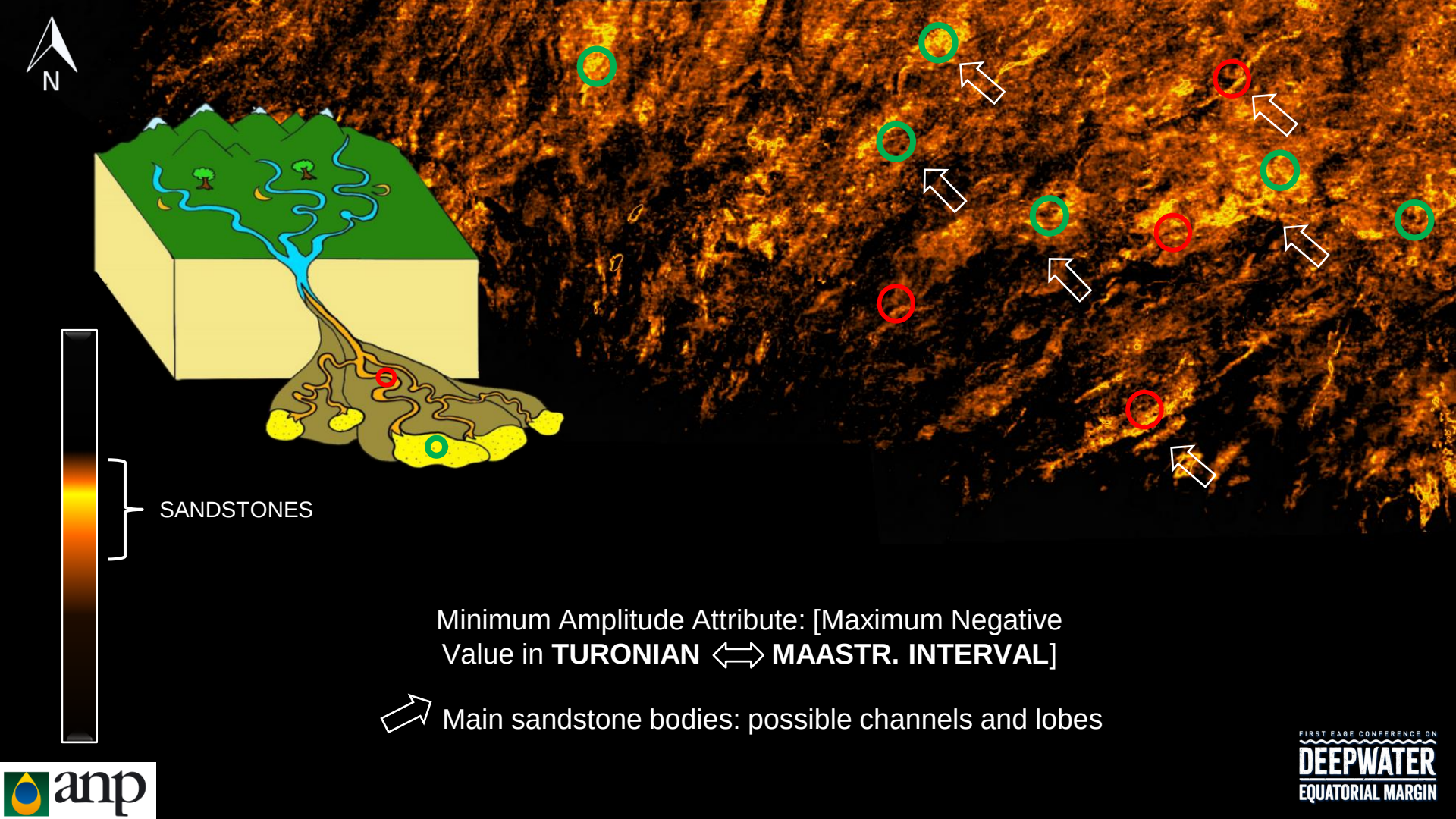
N
SANDSTONES
Minimum Amplitude Attribute: [Maximum Negative Value in **TURONIAN** ⟺ **MAASTR. INTERVAL**]
Main sandstone bodies: possible channels and lobes
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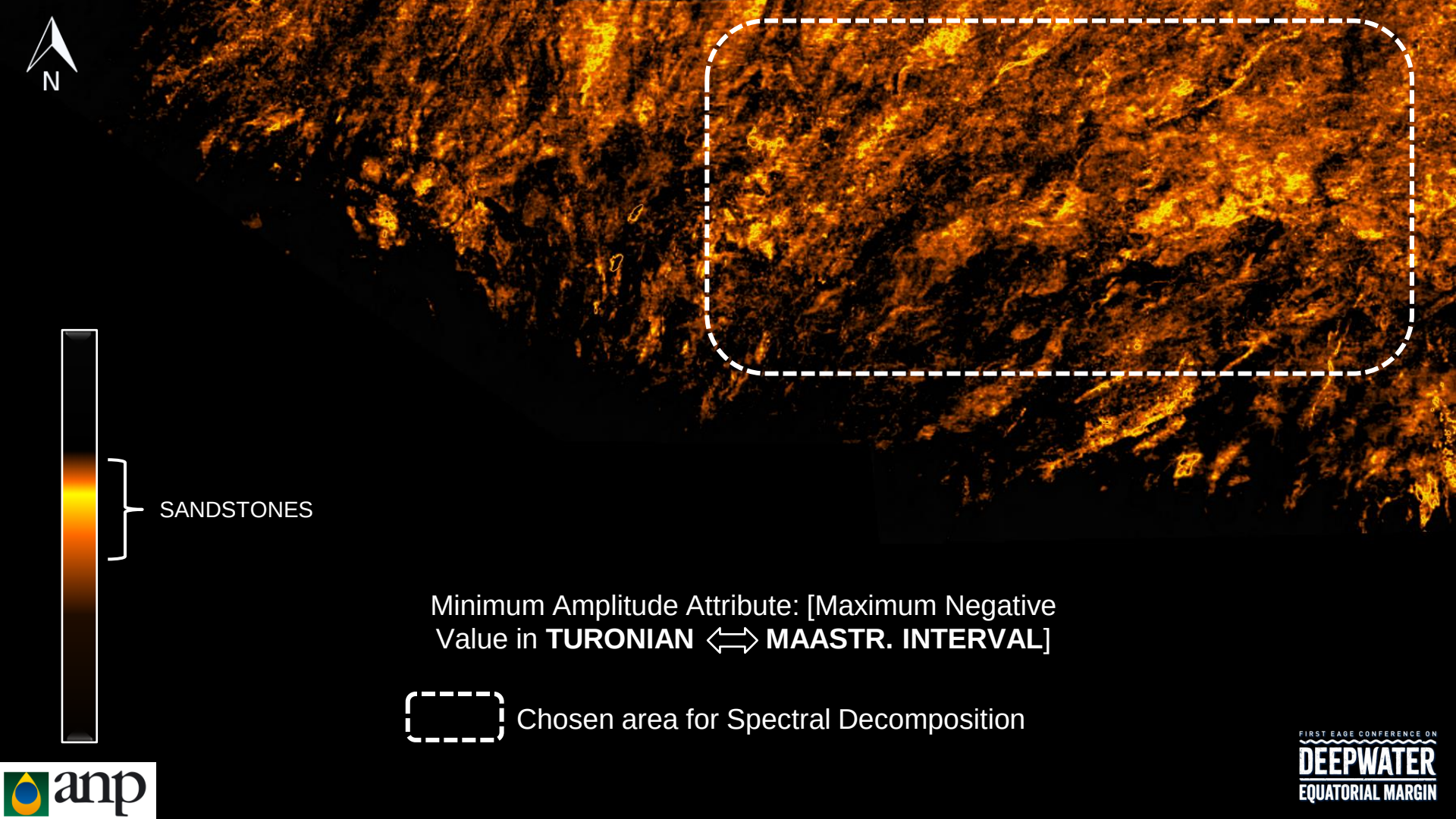

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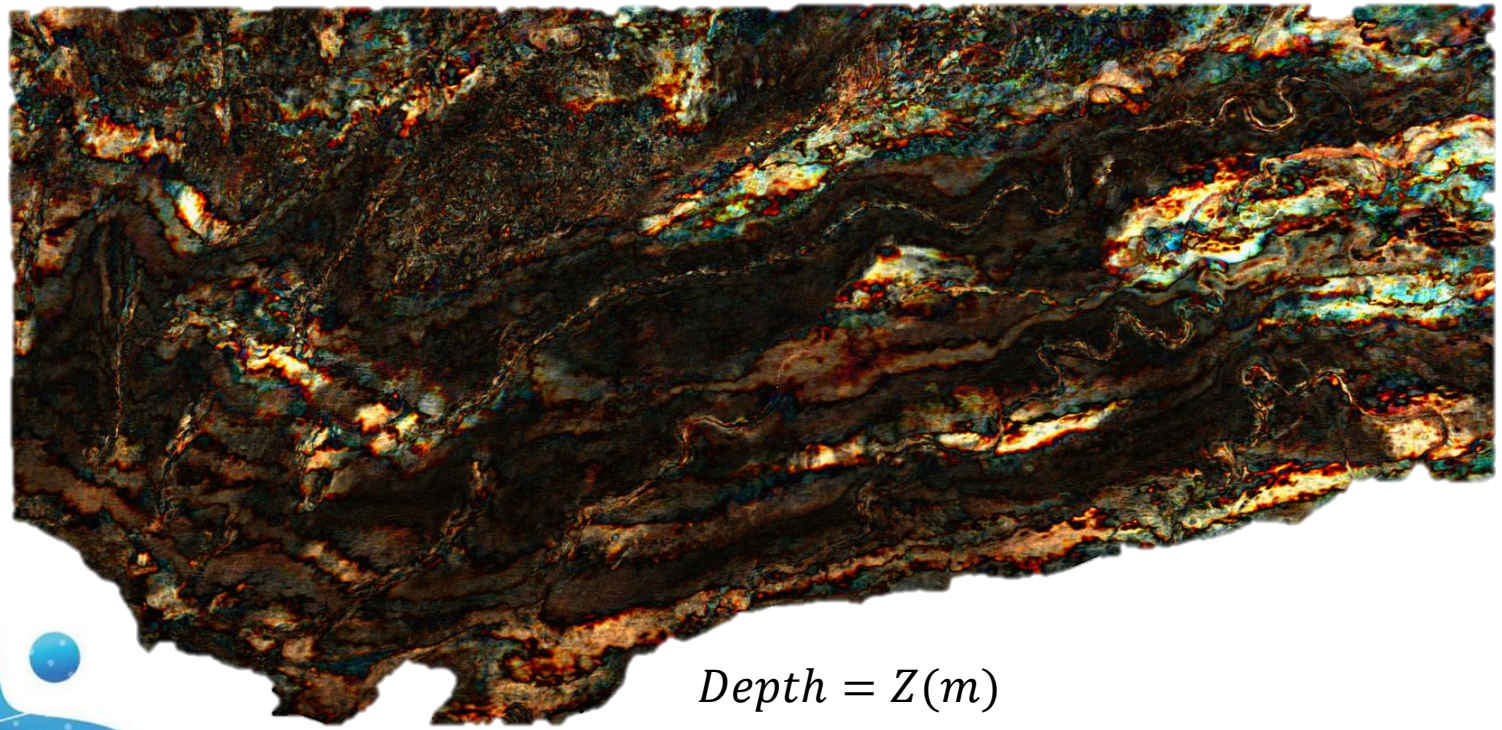
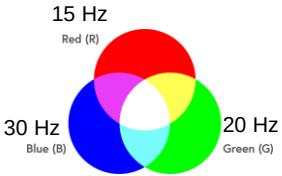
Spectral Decomposition Attribute (RGB) for Enhance Seismic Geometries



$$Depth = Z(m)$$

N

The frequencies chosen for RGB Spectral Decomposition were: 15 Hz (R), 20 Hz (G) and 30 Hz (B).



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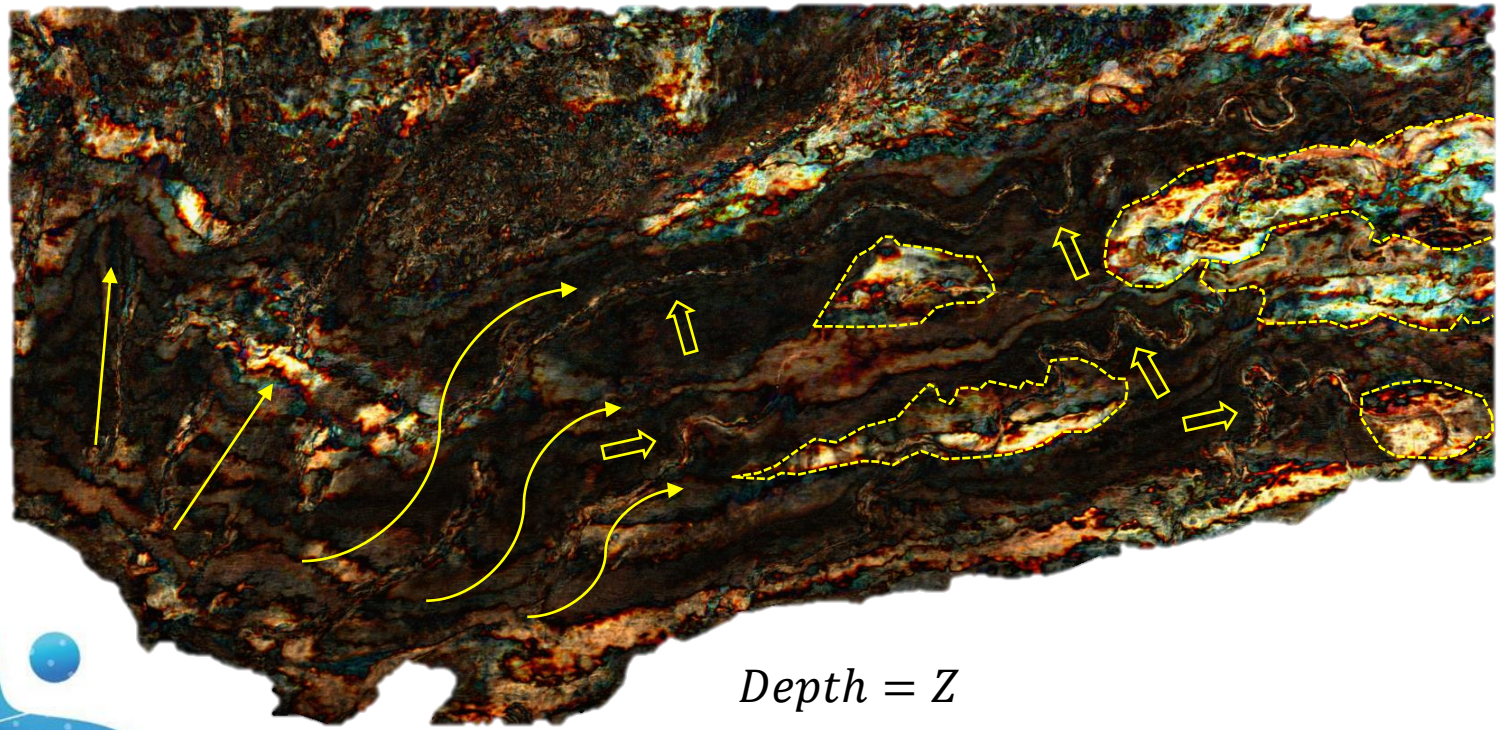
Spectral Decomposition Attribute (RGB) for Enhance Seismic Geometries



$$Depth = Z$$

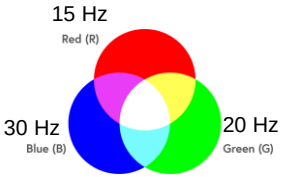
N

Channels/Sinuous Channels

Lobes

Direction of progradation

The frequencies chosen for RGB Spectral Decomposition were: 15 Hz (R), 20 Hz (G) and 30 Hz (B).



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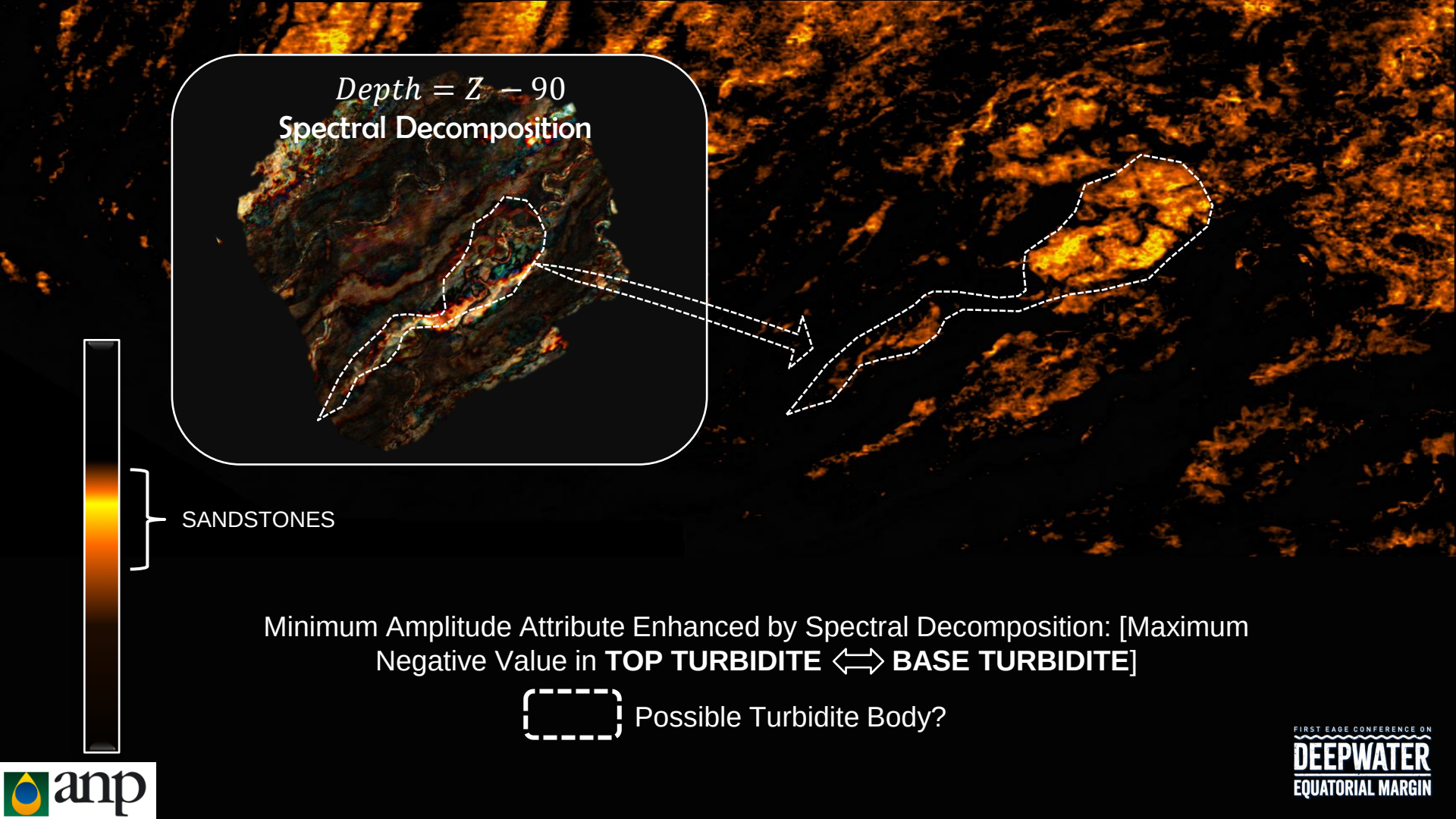

Minimum Amplitude Attribute Enhanced by Spectral Decomposition: [Maximum Negative Value in **TOP TURBIDITE** ⟺ **BASE TURBIDITE**]

Possible Turbidite Body?

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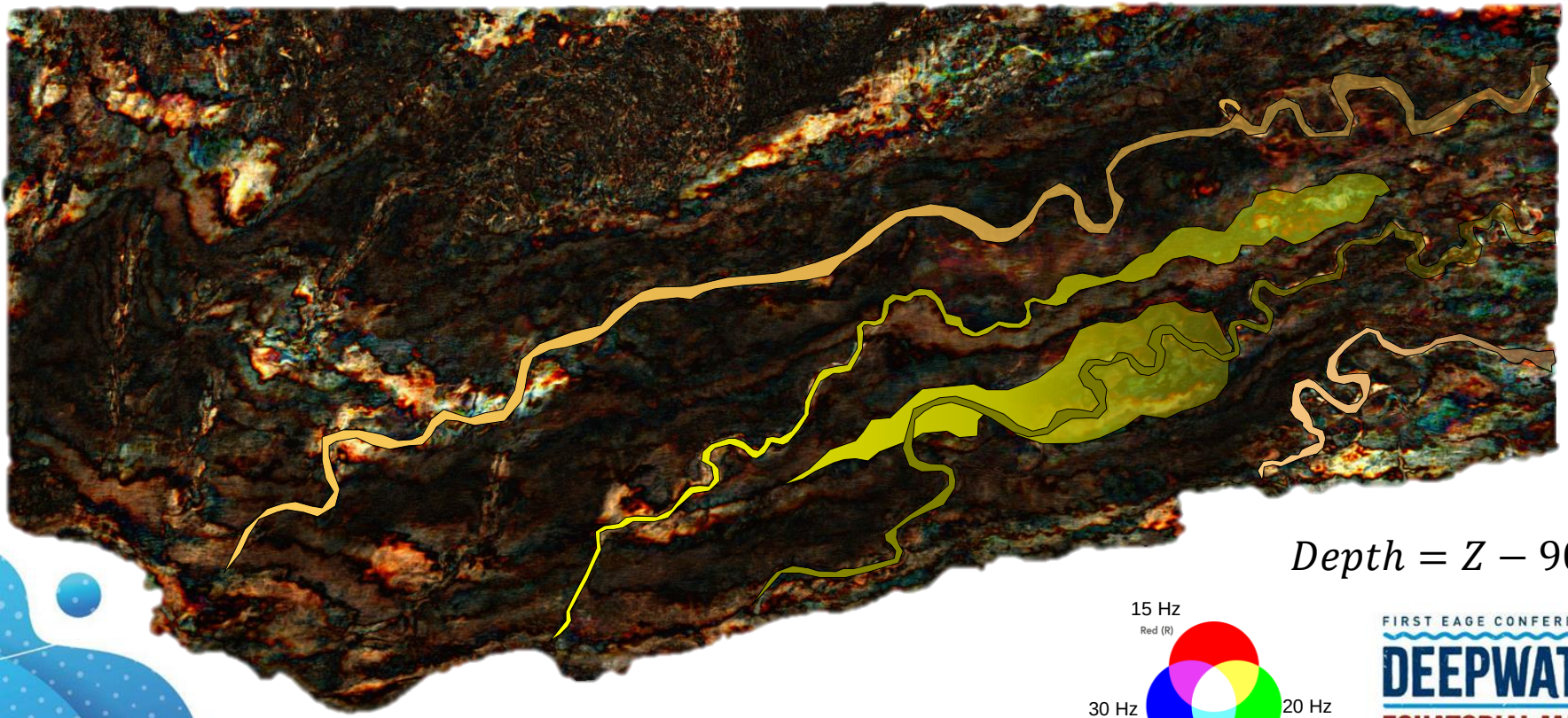
Spectral Decomposition Attribute (RGB): Channels and Lobes Visualization



$$Depth = Z - 90(\mathrm{m})$$

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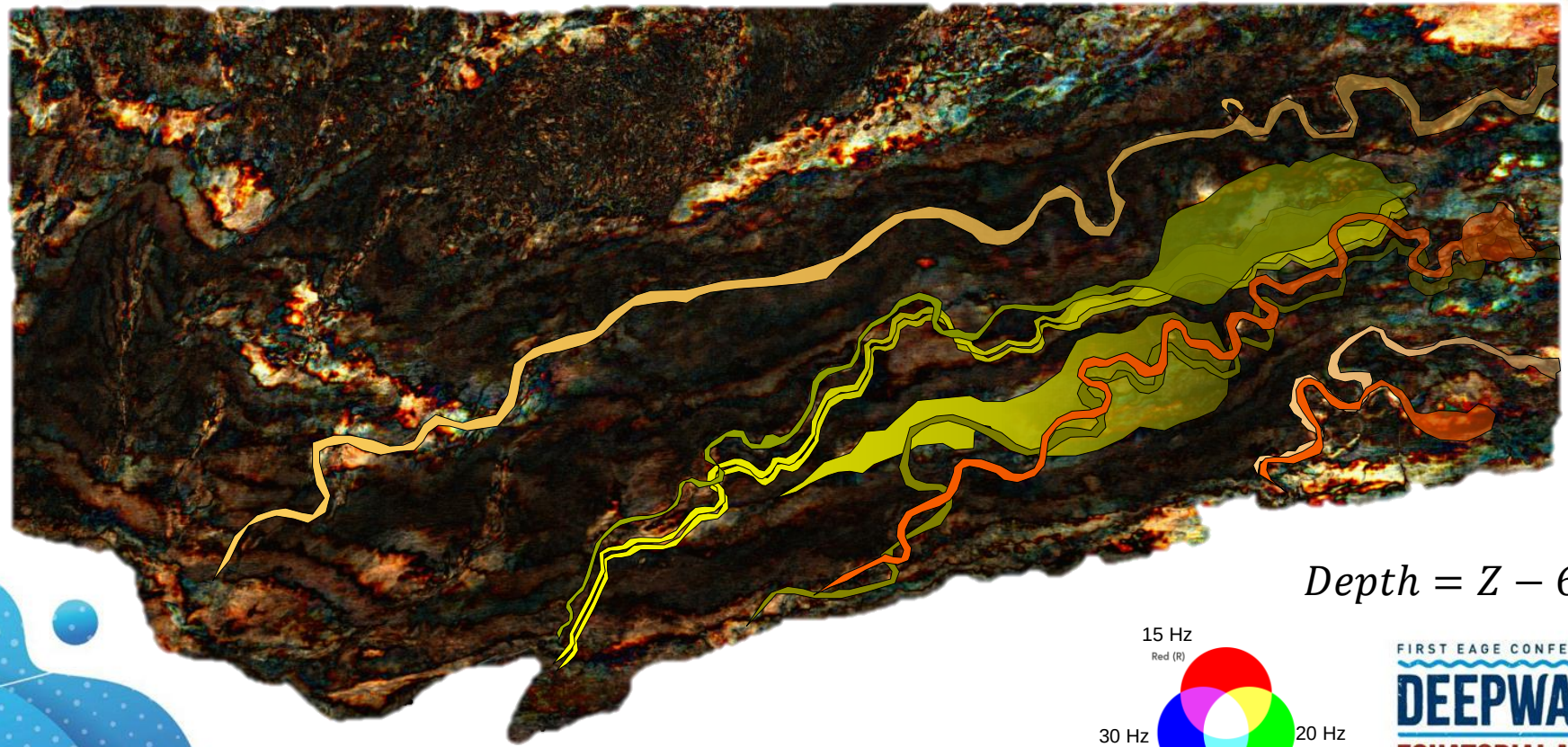
Spectral Decomposition Attribute (RGB): Channels and Lobes Visualization



N

$$Depth = Z - 60(\mathrm{m})$$

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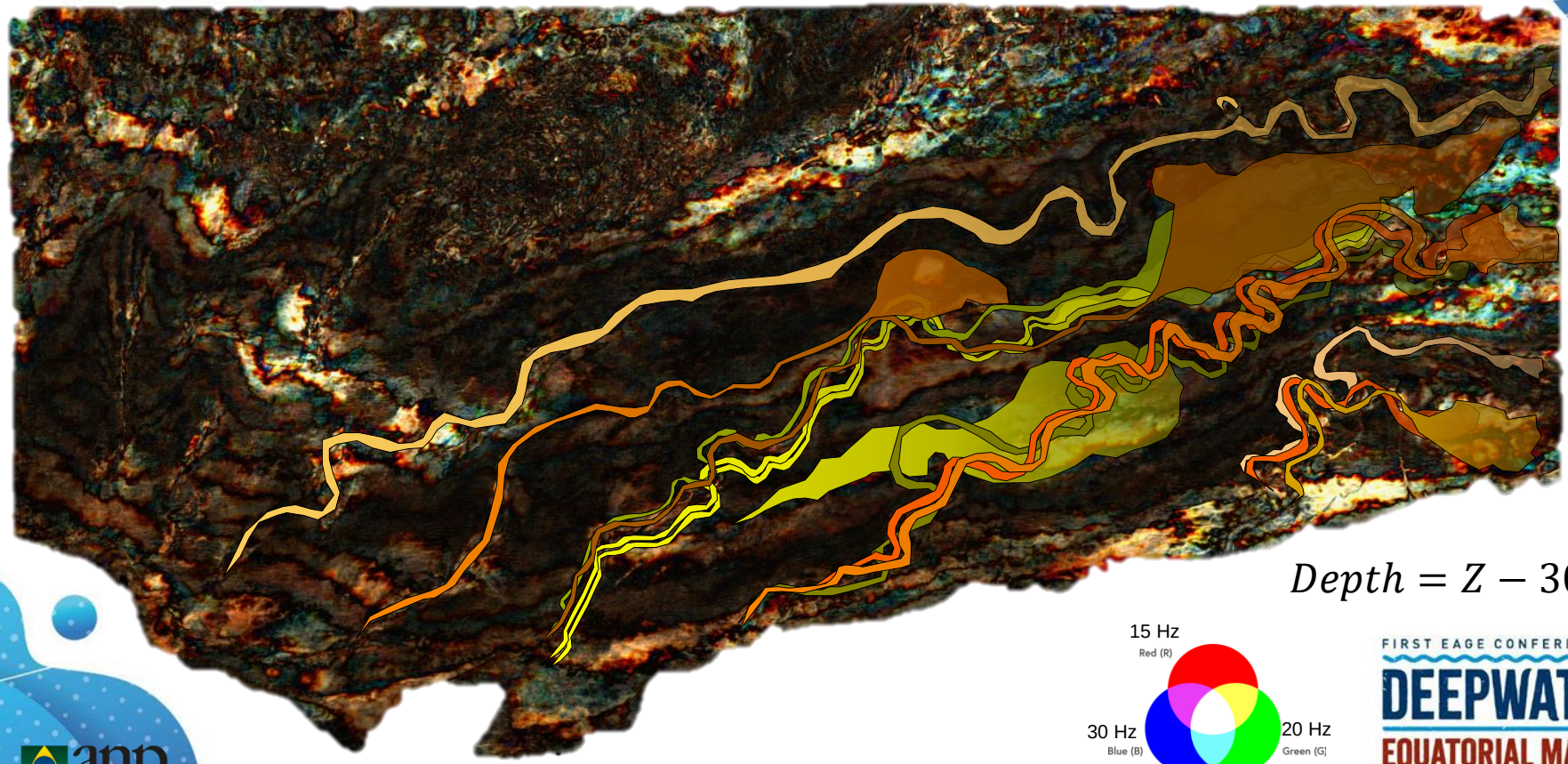
Spectral Decomposition Attribute (RGB): Channels and Lobes Visualization



$$Depth = Z - 30(\mathrm{m})$$

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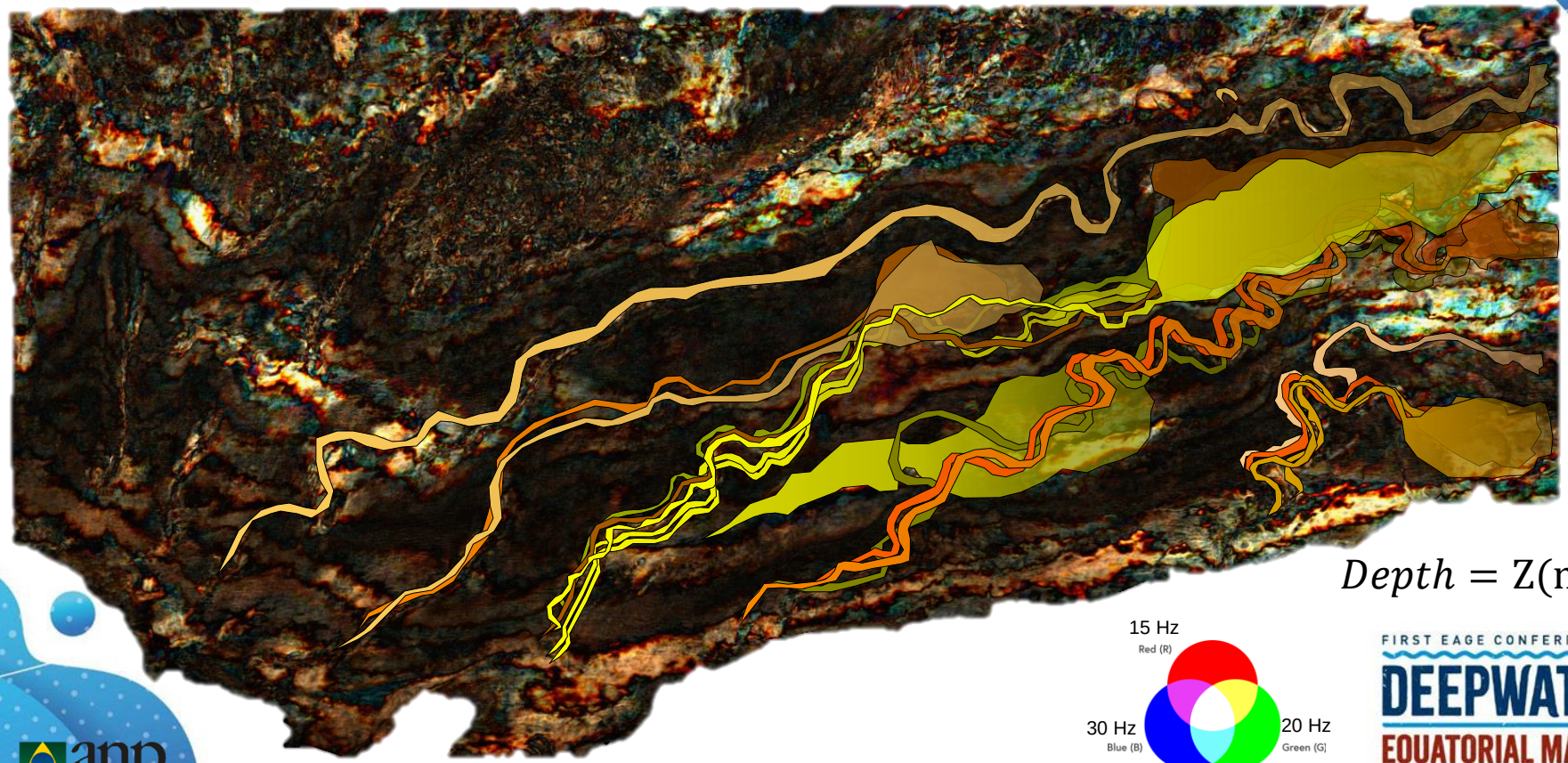
Spectral Decomposition Attribute (RGB): Channels and Lobes Visualization



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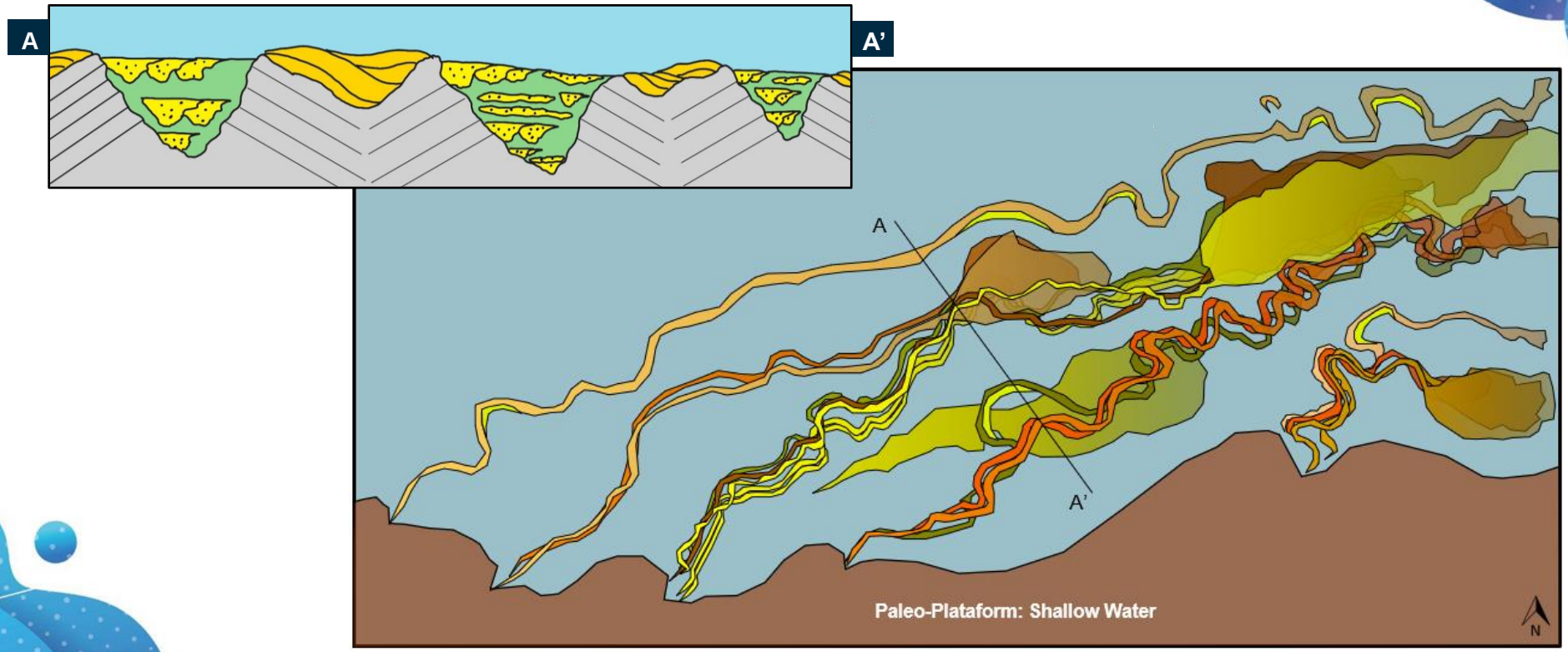
Stratigraphy of Upper Creataceous Environment in DeepWaters



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Conclusions and Final Remarks

- Reservoir: Negative Anomaly Amplitudes and the Spectral Decomposition Attribute enriched possible geometries and increased the possibility of Reservoir existence in the range of interest.

- Seal and Traps: The spectral decomposition showed possible geometries related to channels and lobes and their various sequences interspersed with possibly thinner materials. The Minimum Amplitude attribute also differentiated sandy geological structures from the sedimentary matrix.

- Source Rock: The possible source rock of Cenomanian/Turonian age was identified below the reservoir interval through seismic interpretation. However, further analyzes to prove the existence of the source rock in the region still need to be done.

- Final considerations: The seismic attributes enriched the interpretations regarding the reservoir and the type of trap. However, future studies still need to be done in the region to understand even more about the Deepwater Basin Petroleum System.


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Obrigado!
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