

**18<sup>th</sup> International Congress  
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RIO DE JANEIRO 16-19 OCTOBER 2023

# Assessing Hydrocarbon Potential in the Mundaú Sub-Basin: *Cretaceous Turbidites in Deepwater Settings*

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

**October 17, 2023**

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# Agenda

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



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

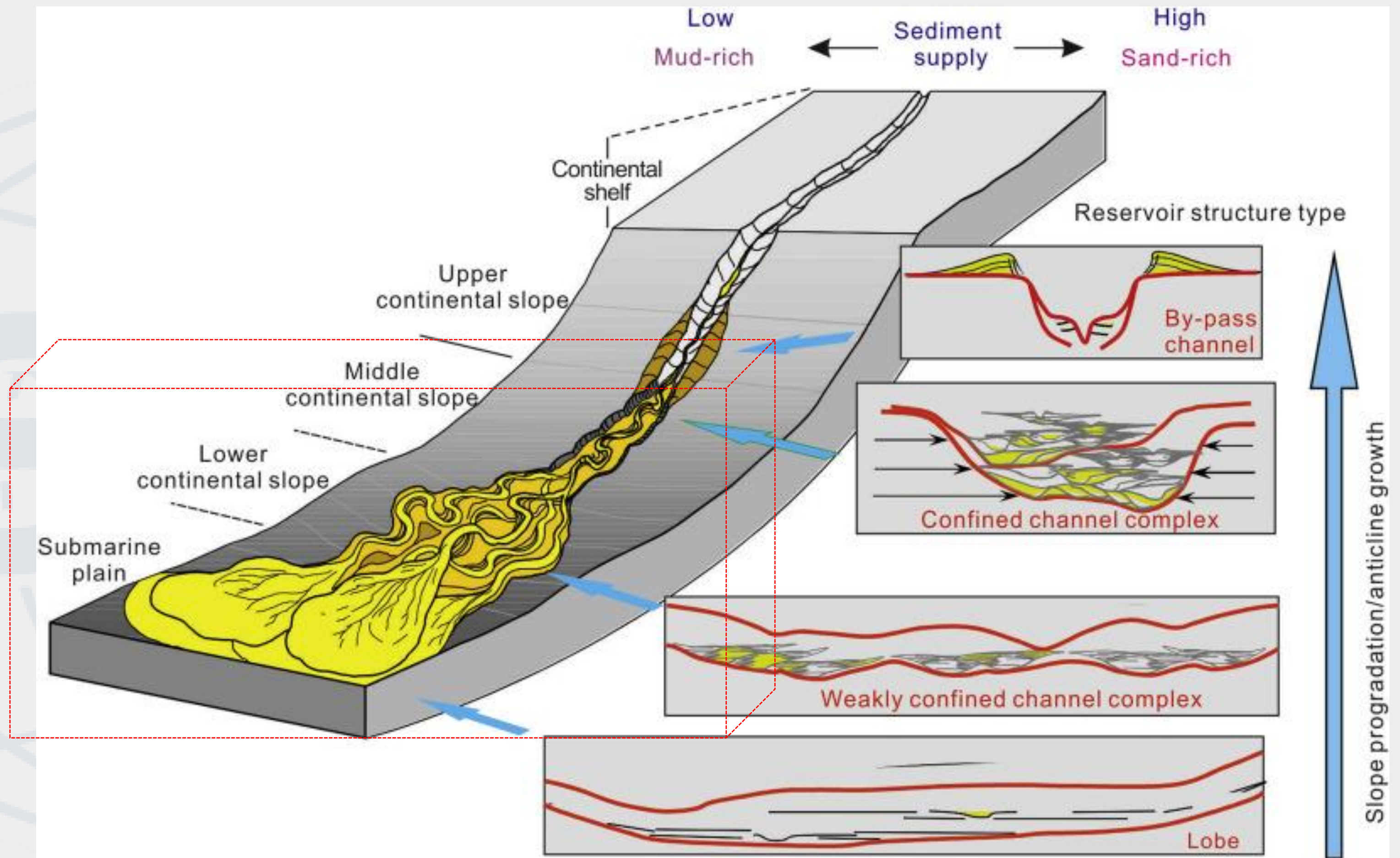


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# Model of the Reservoir: Turbidites in Deep Waters

## Sedimentary Model of Turbidite Fan:

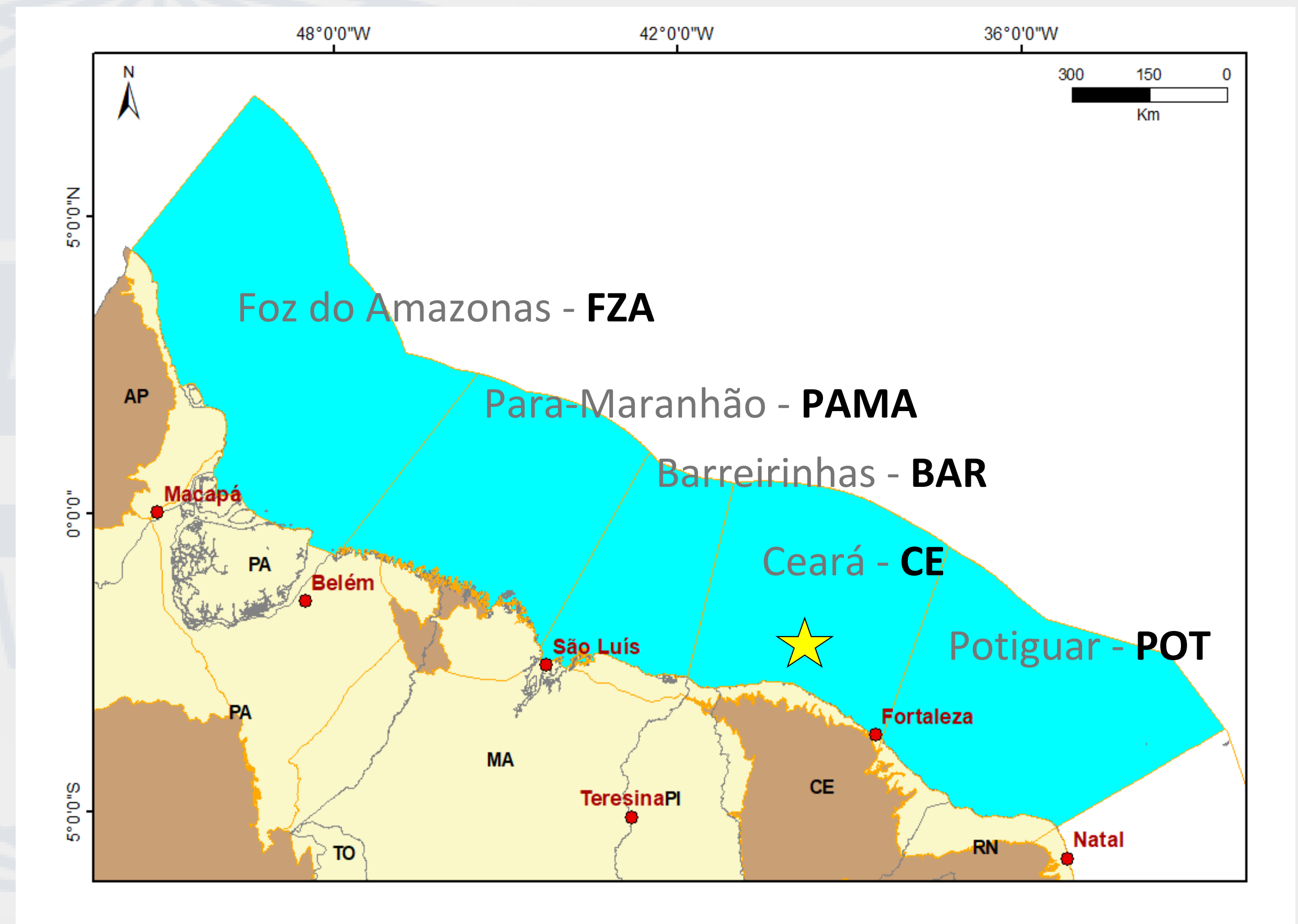
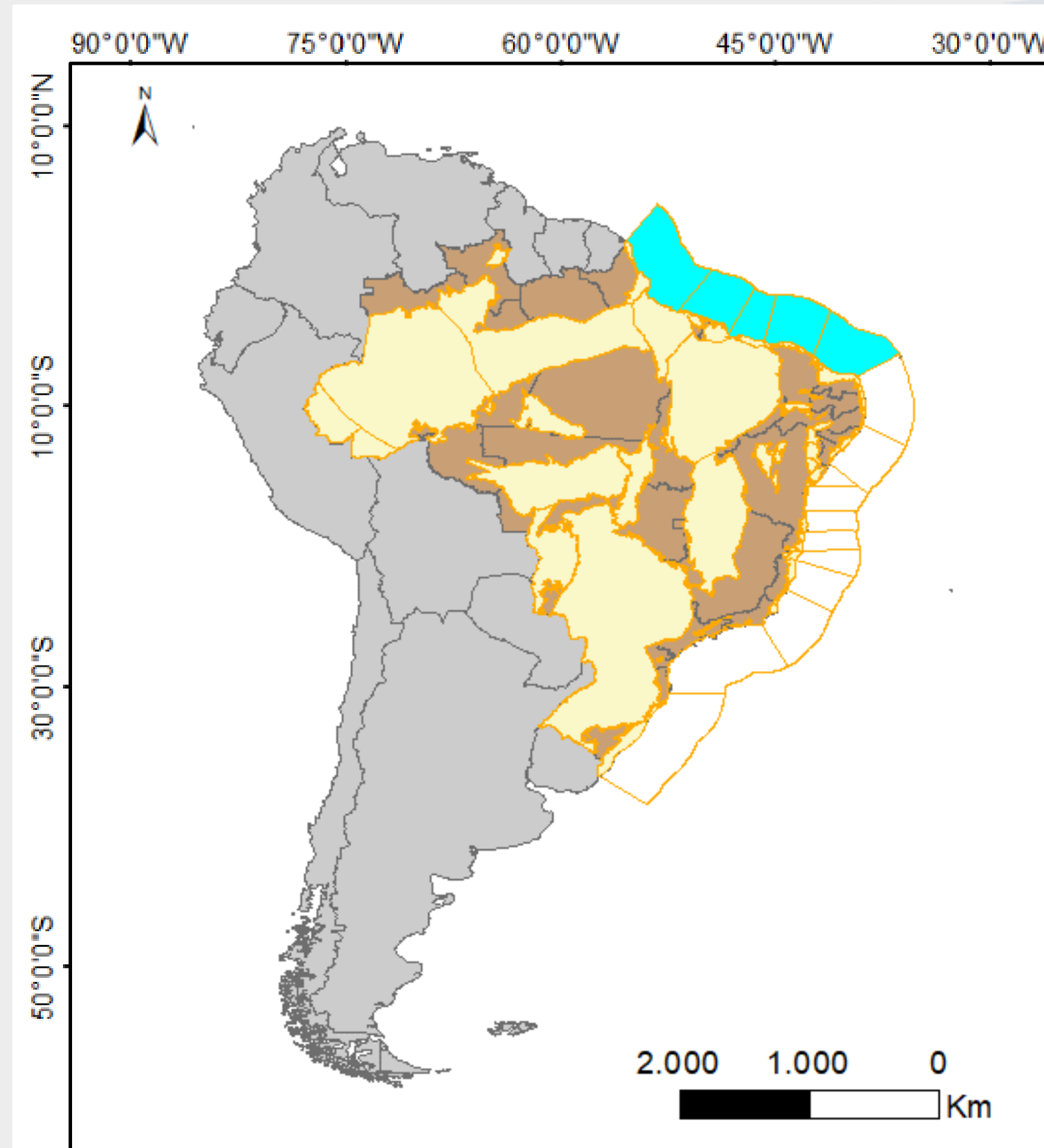
Huang (2018). showing that the incised valleys and by-pass channels are developed in the continental slope and the upper slope; the confined channel complexes and weakly confined channel complexes are developed in the middle slope and the lower slope; and the lobes are developed in the submarine plain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






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# Location Map: Brazil and Brazilian Equatorial Margin



 AREA: 884,535 sqm BRAZILIAN EQUATORIAL MARGIN

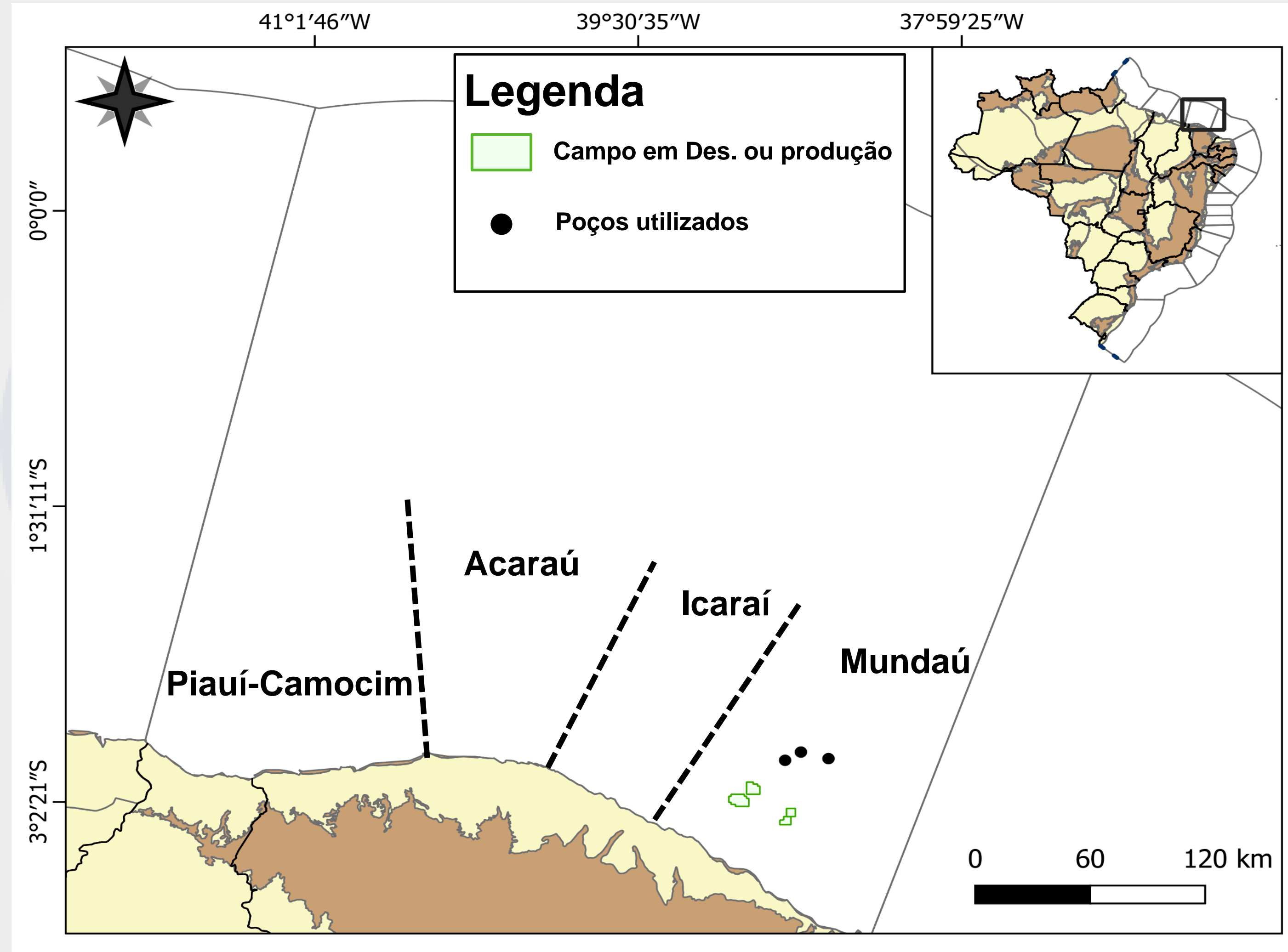
 STUDY AREA – CEARA BASIN - CE





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## Location Map: Brazil and Ceará Basin



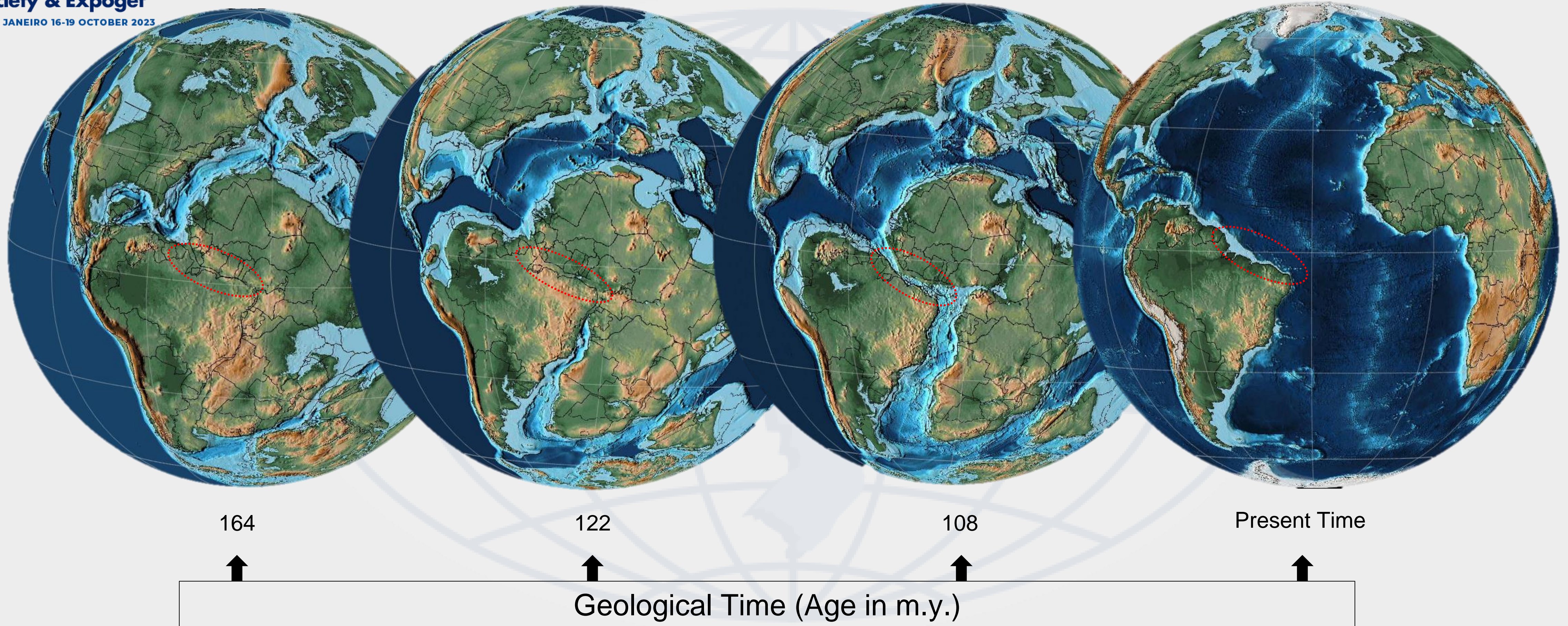
- INTRODUCTION
- **TECTONO-STRATIGRAPHIC EVOLUTION**
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# Tectono-Stratigraphic Evolution: Tectonic Plates and Position of Continents




 → Location of Equatorial Margin of Brazil

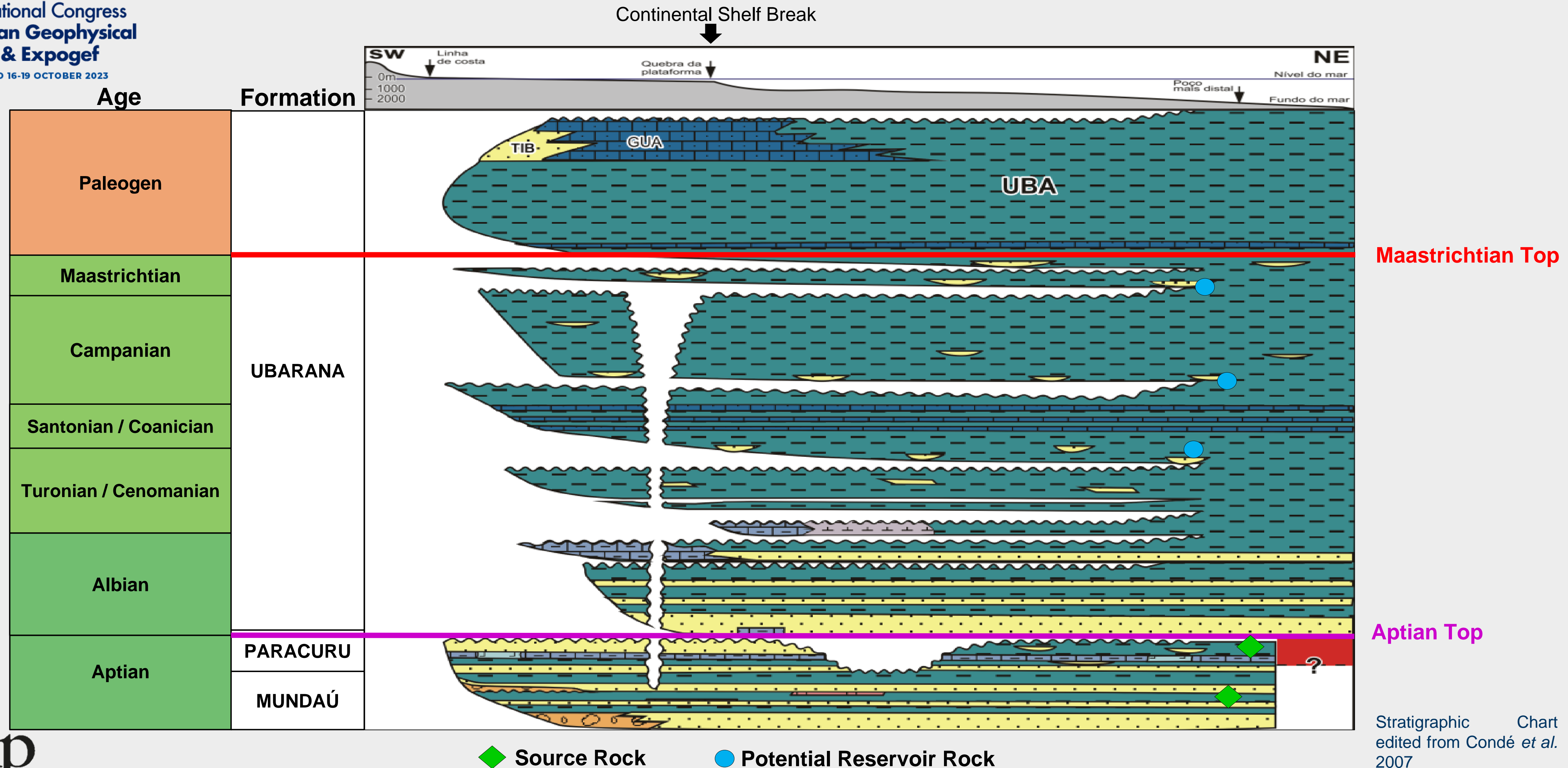


Figure made in the software GPlates



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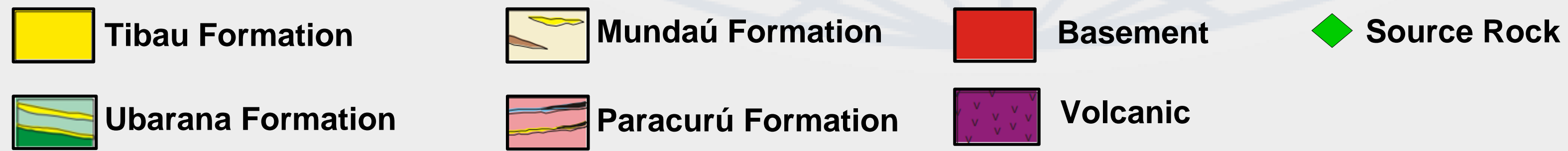
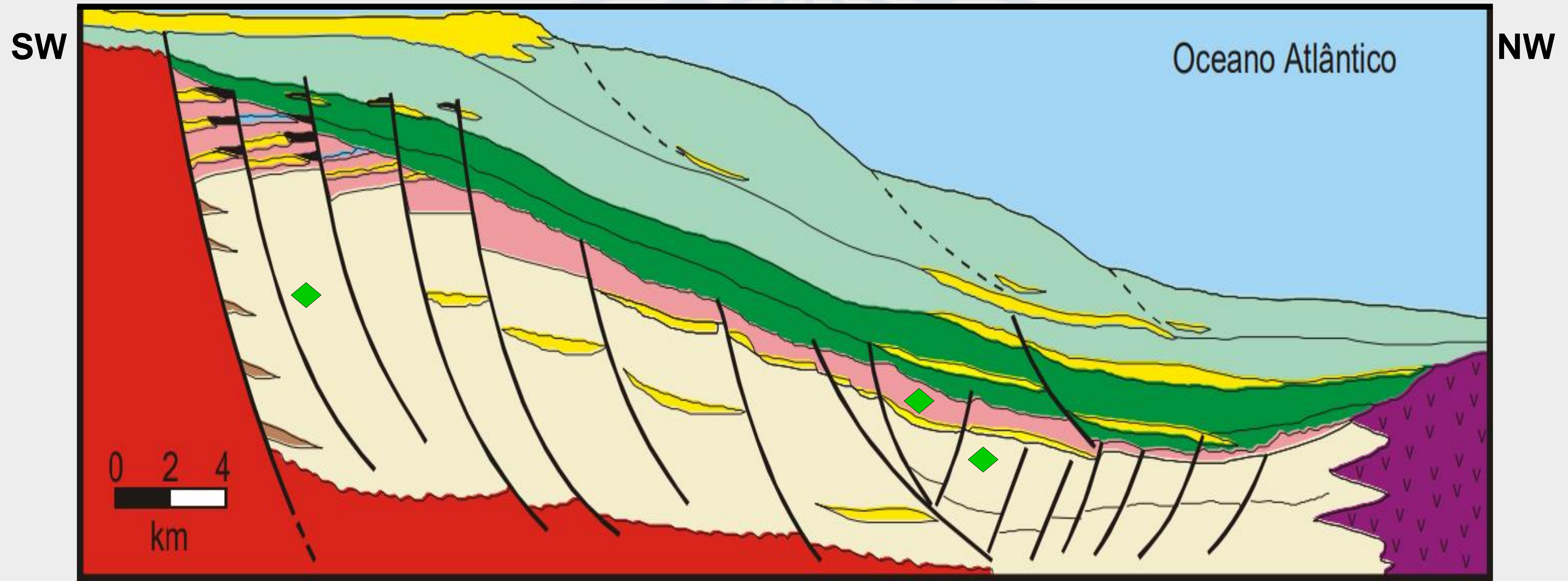
# Ceara Basin Stratigraphic Chart: Main Interpreted Horizons





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## Schematic section of the Mundaú Sub-basin, Ceará Basin



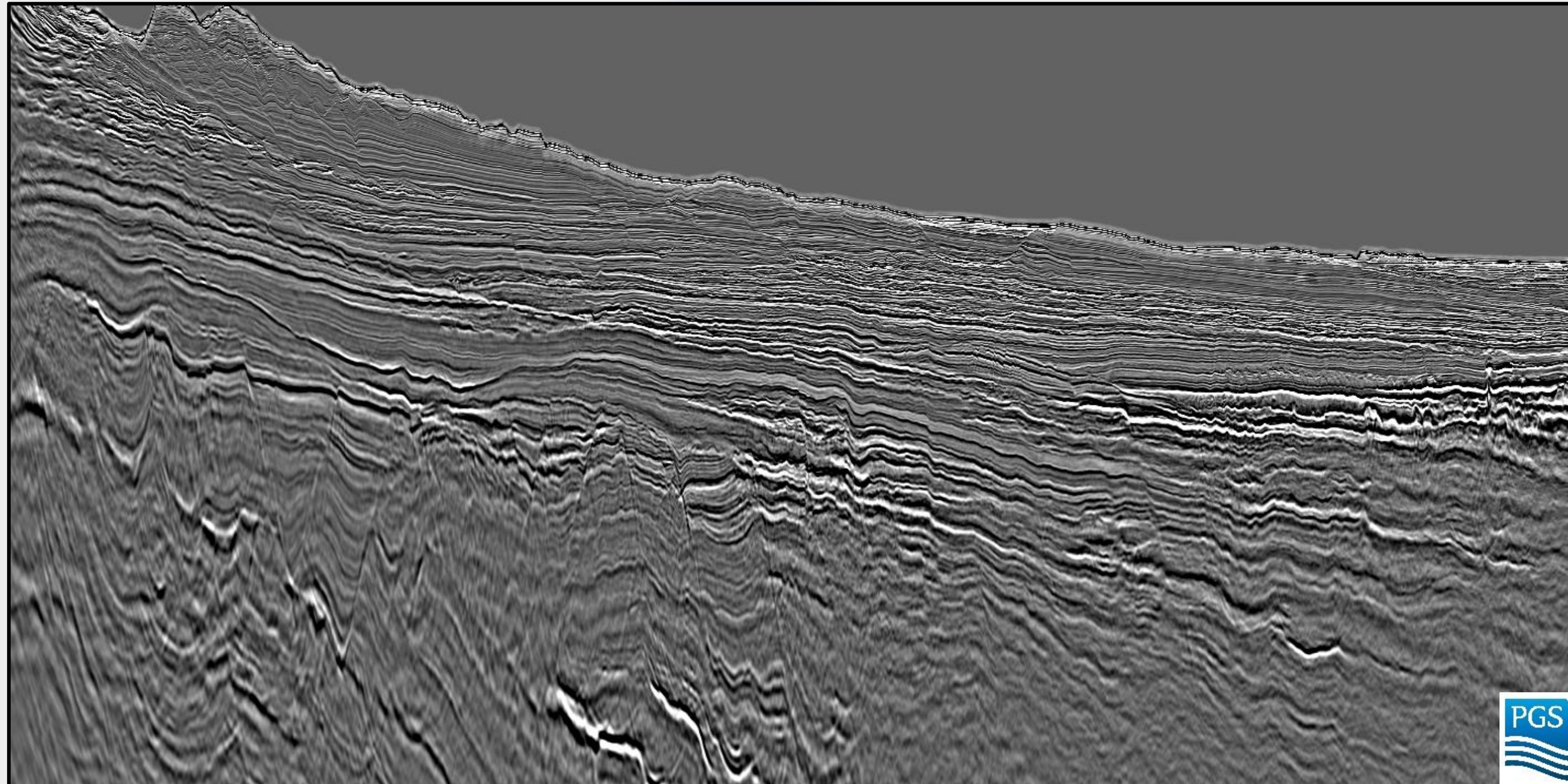
Wellington Filho, 2004; adapted from Costa et al, 1990 and ANP, 2002

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# Seismic Interpretation: Strike Section



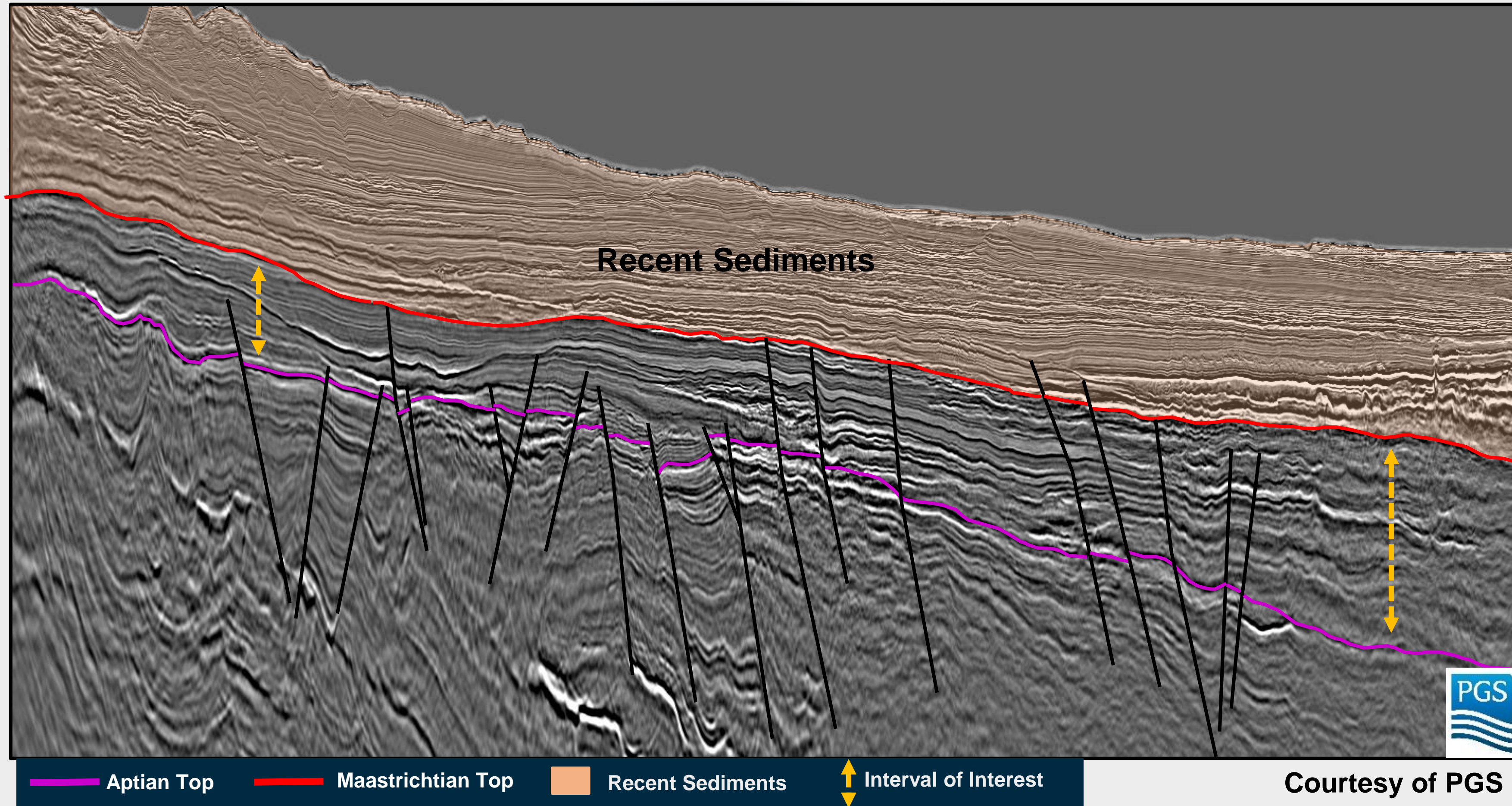
Courtesy of PGS





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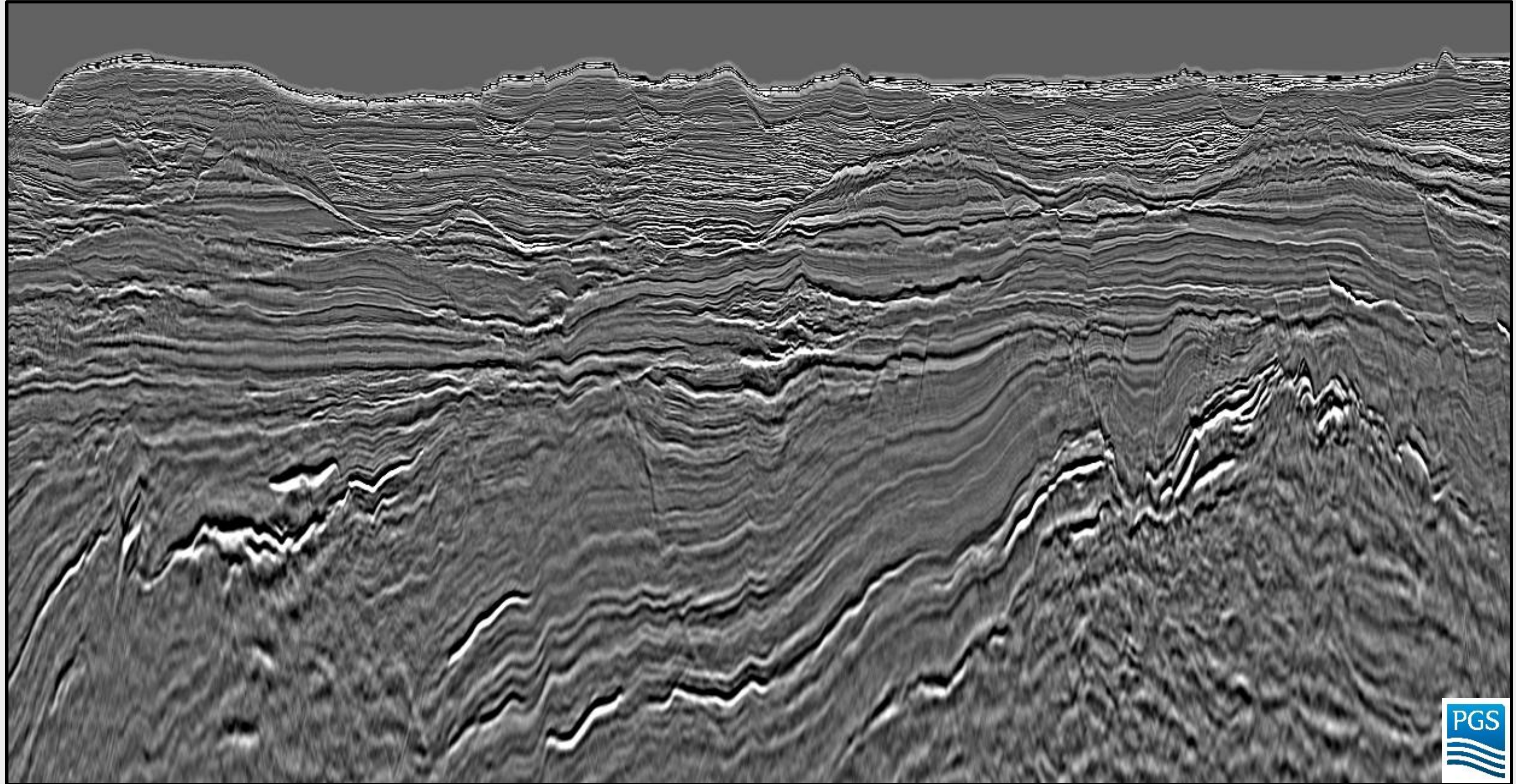
# Seismic Interpretation: Strike Section





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# Seismic Interpretation: Strike Section



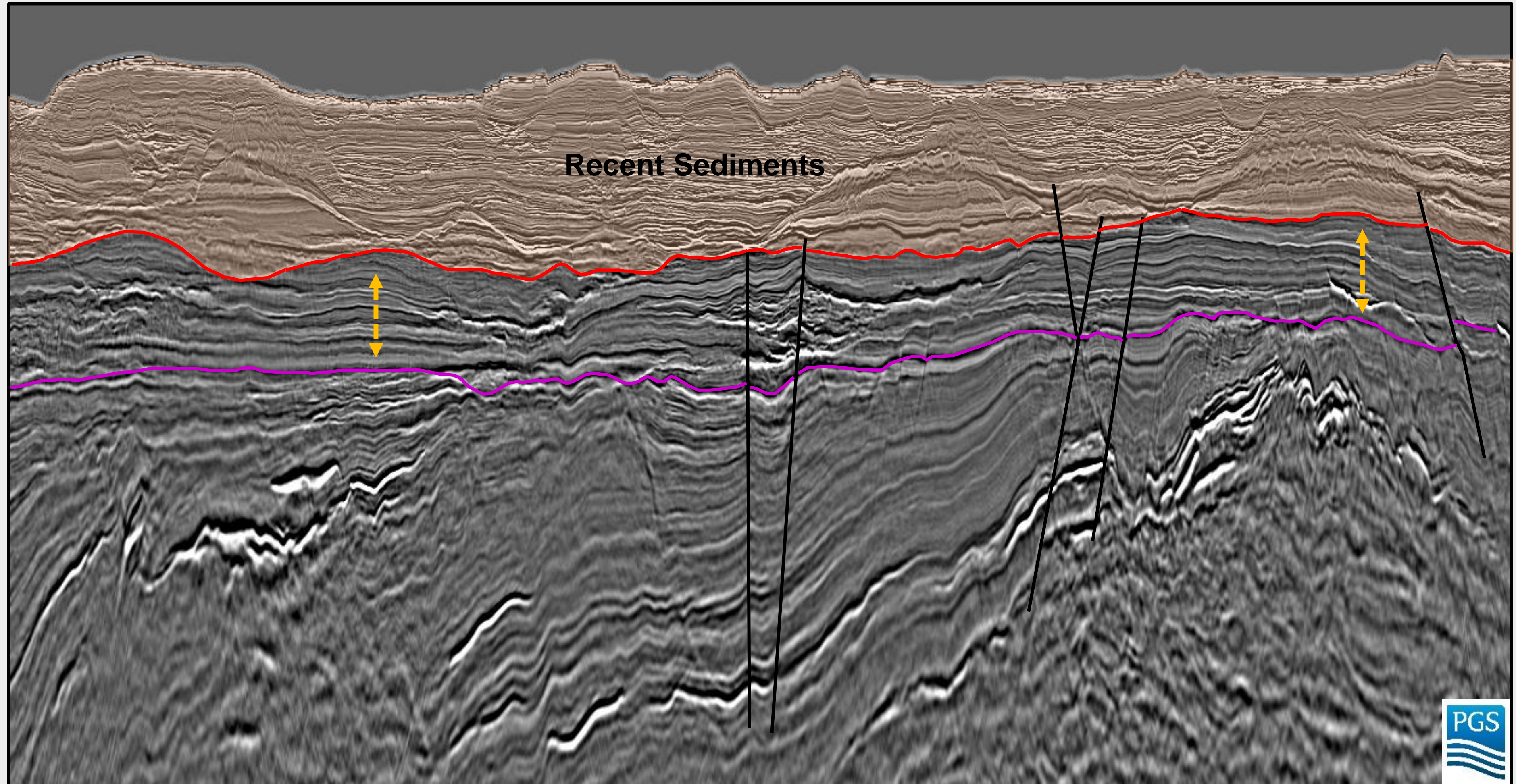
Courtesy of PGS





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# Seismic Interpretation: Strike Section



— Aptian Top    — Maastrichtian Top    Recent Sediments    ↑ Interval of Interest

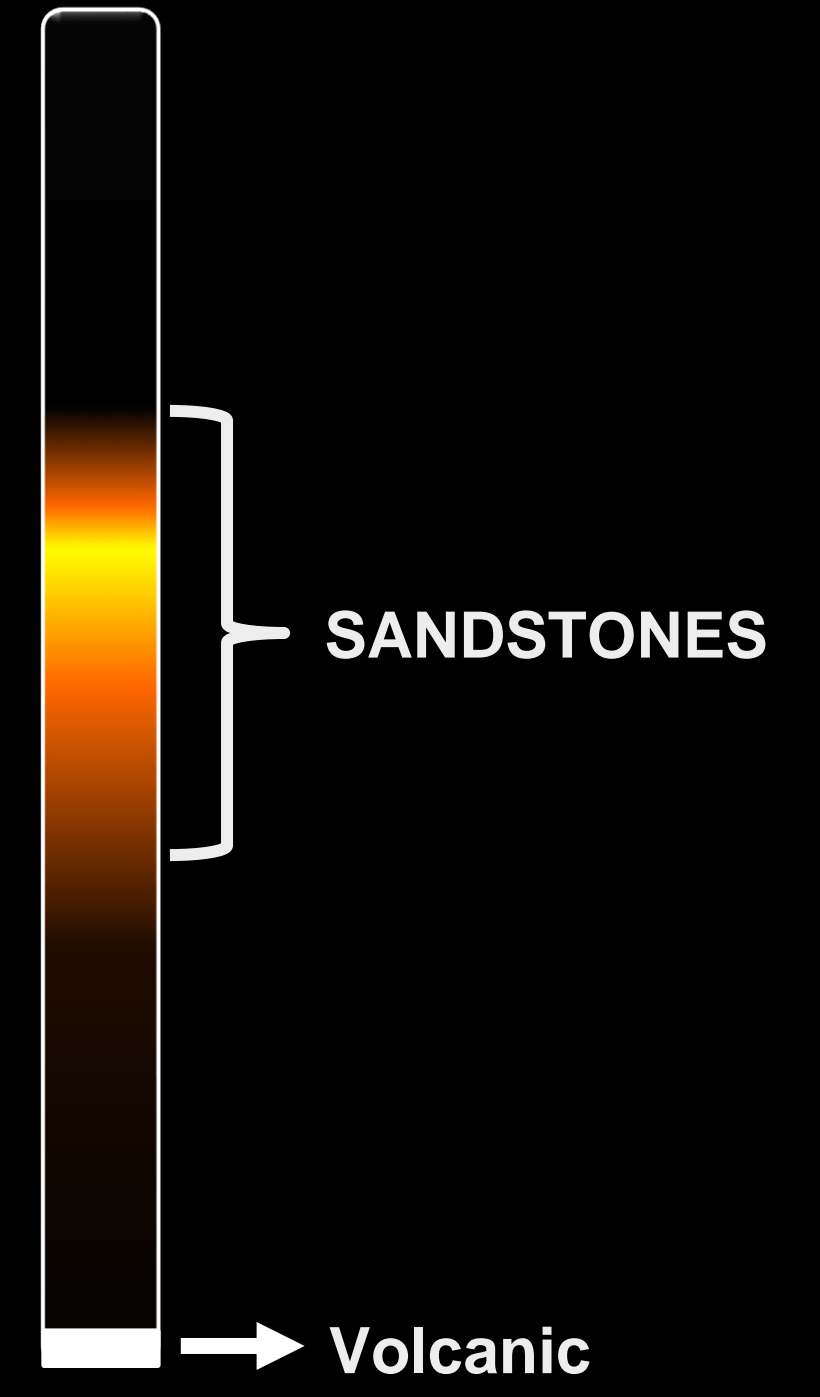
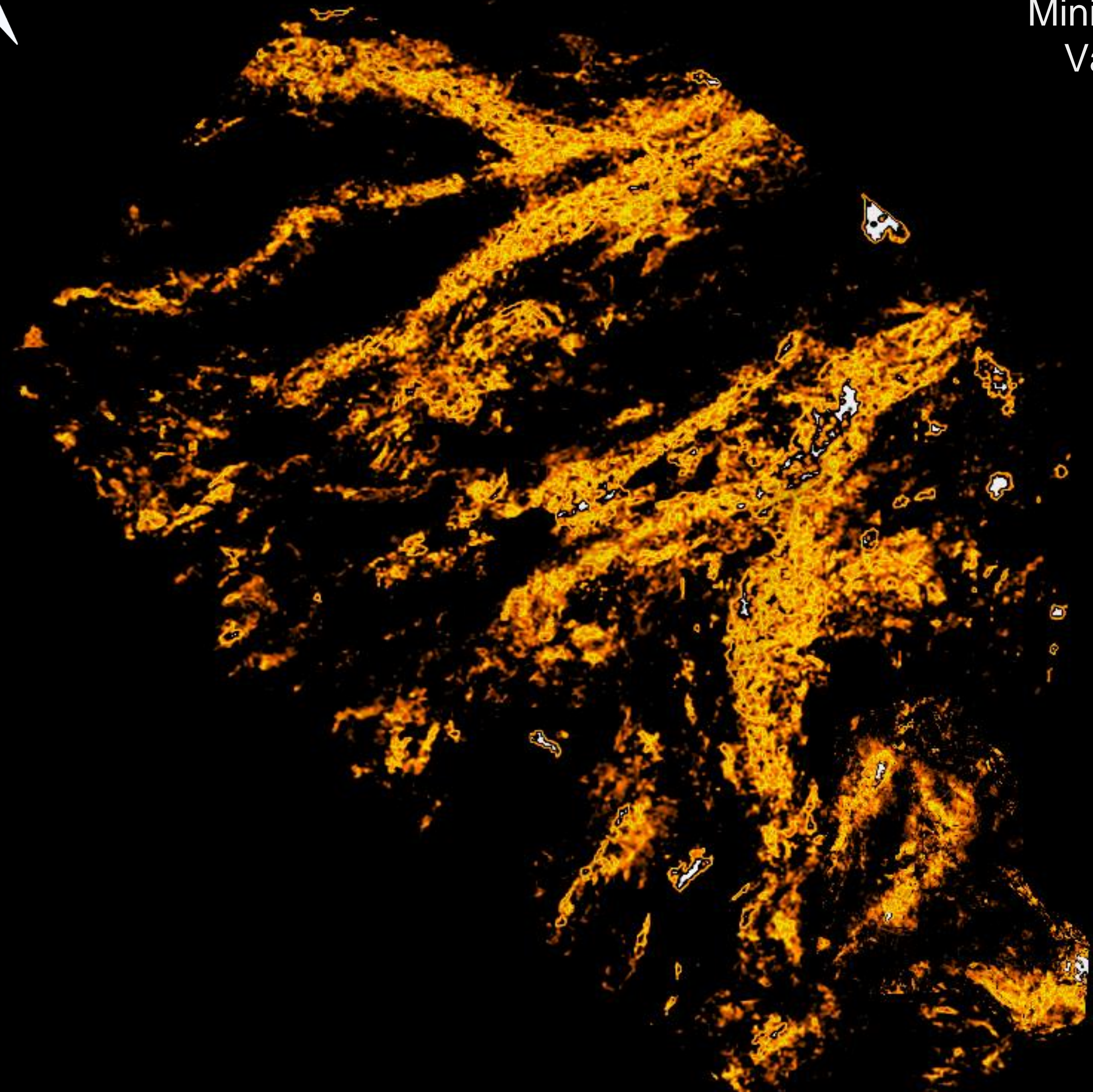
Courtesy of PGS





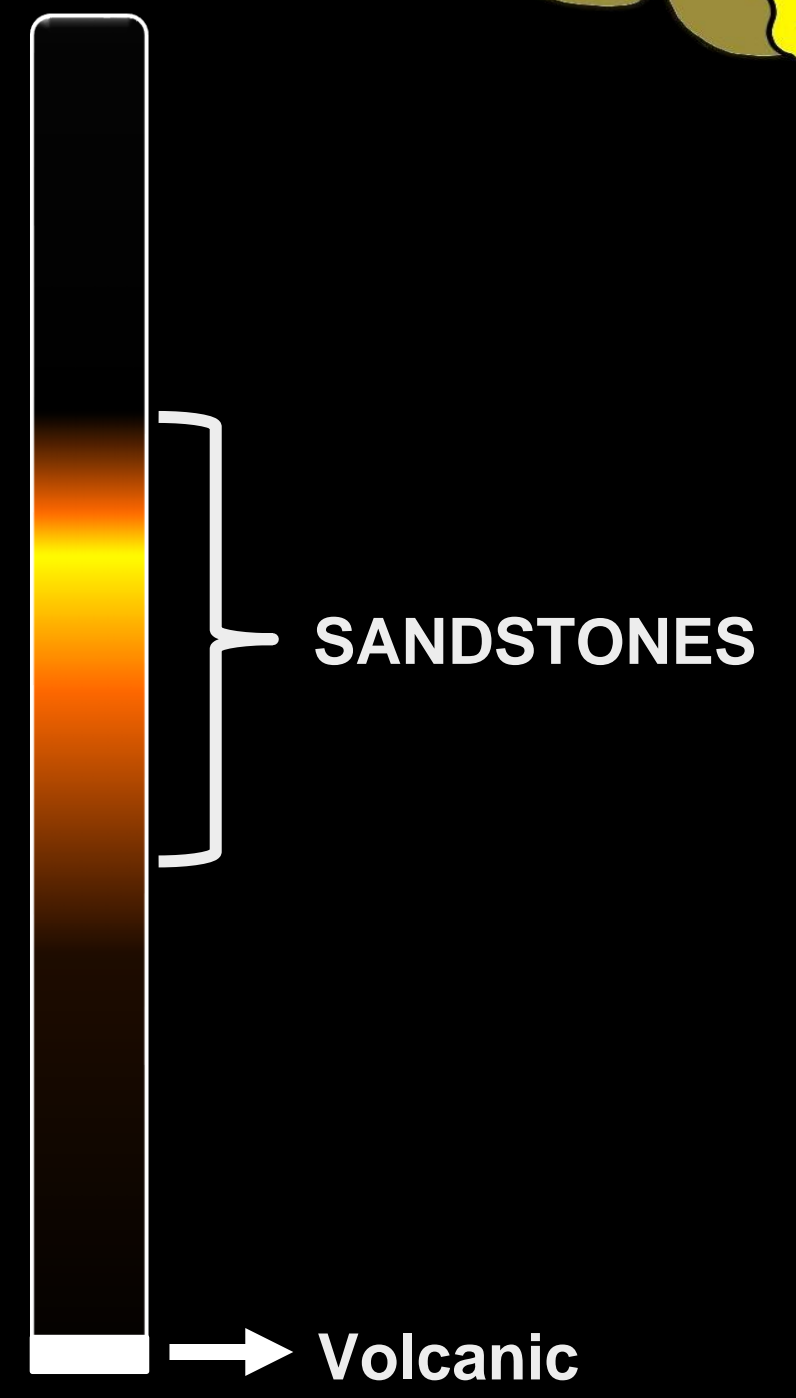
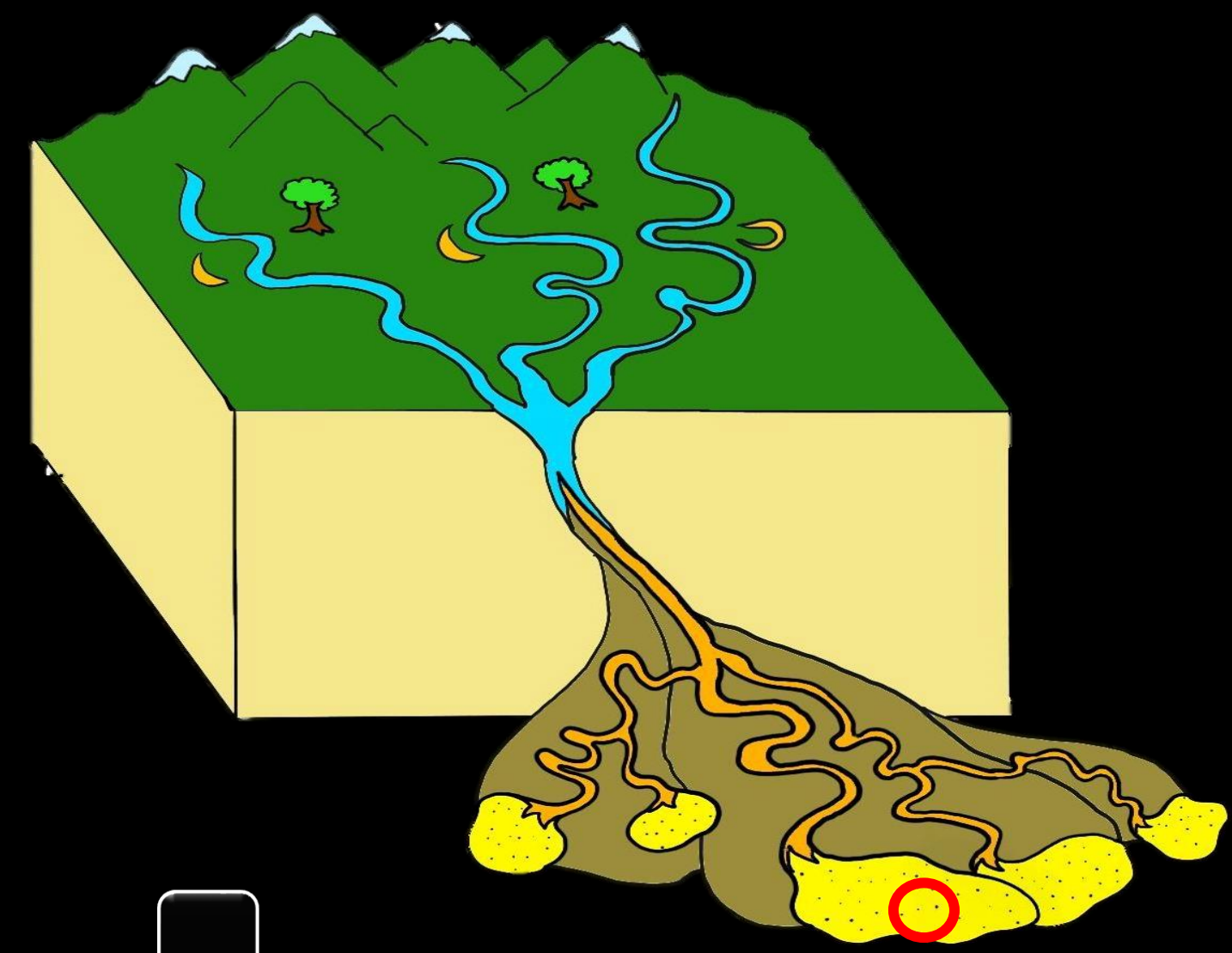
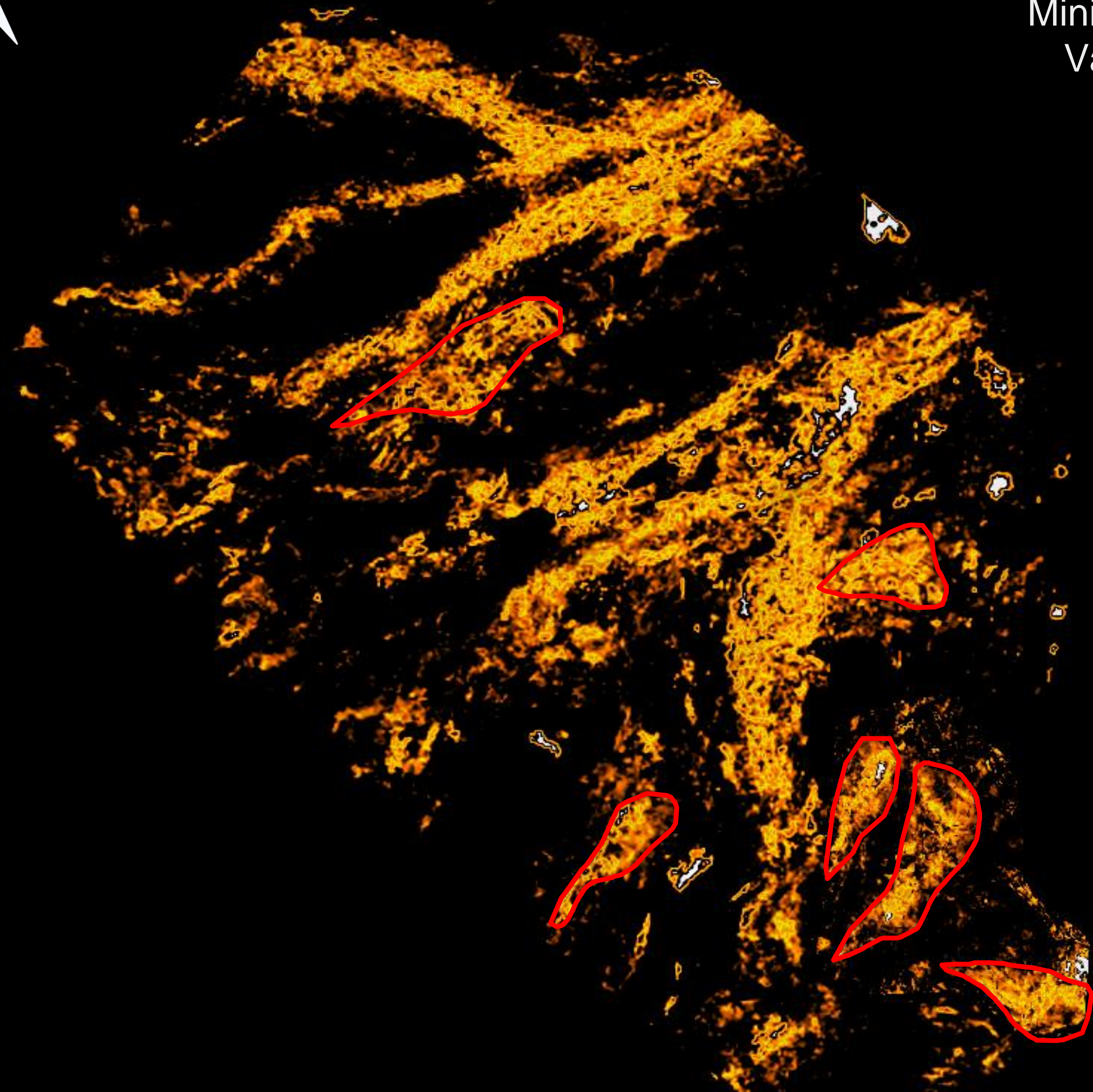


Minimum Amplitude Attribute: [Maximum Negative Value in **ALBIAN** ↔ **MAASTR. INTERVAL**]



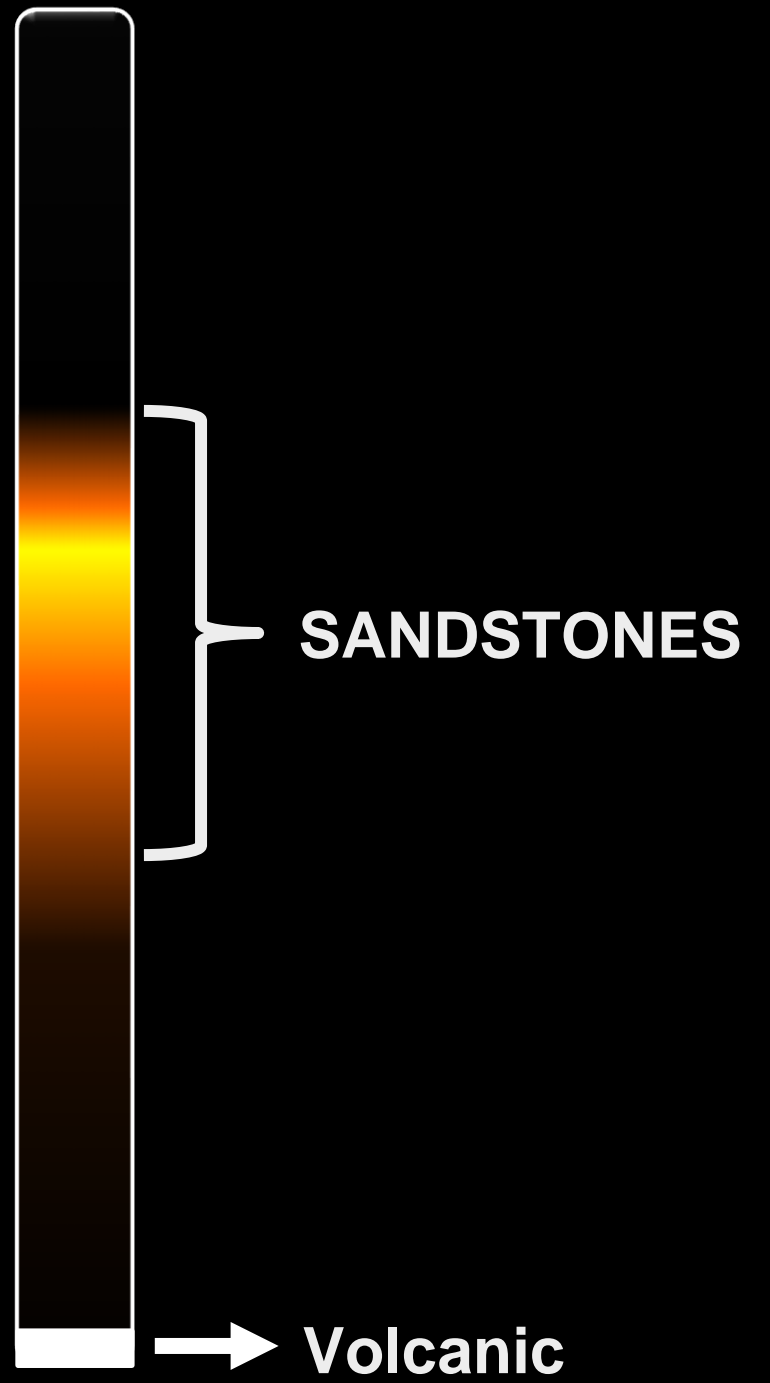
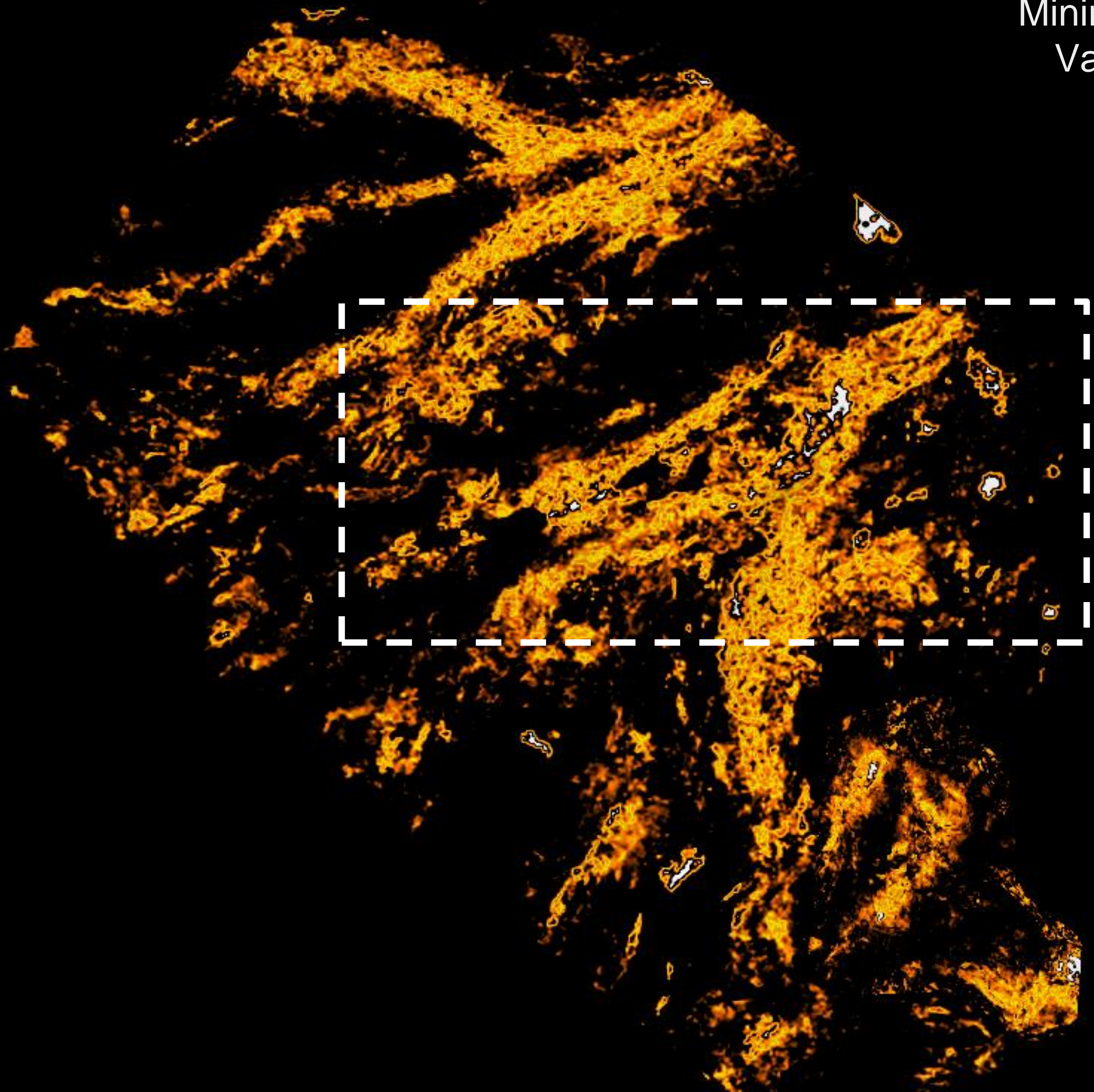


Minimum Amplitude Attribute: [Maximum Negative Value in ALBIAN ↔ MAASTR. INTERVAL]



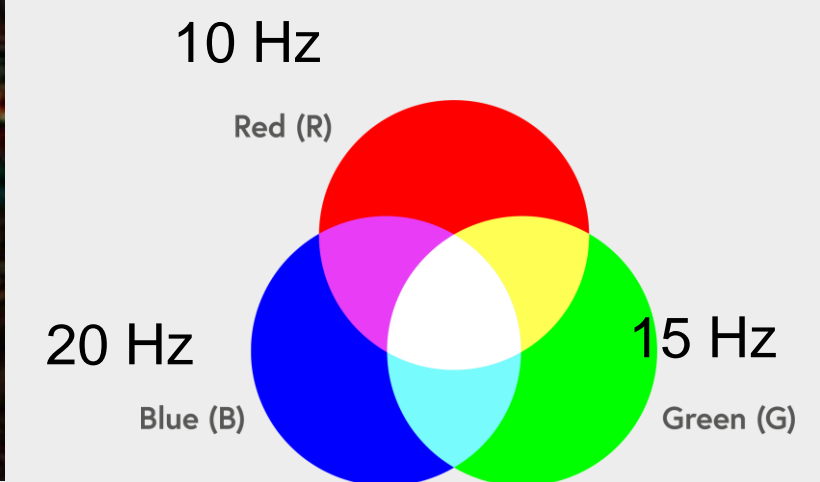
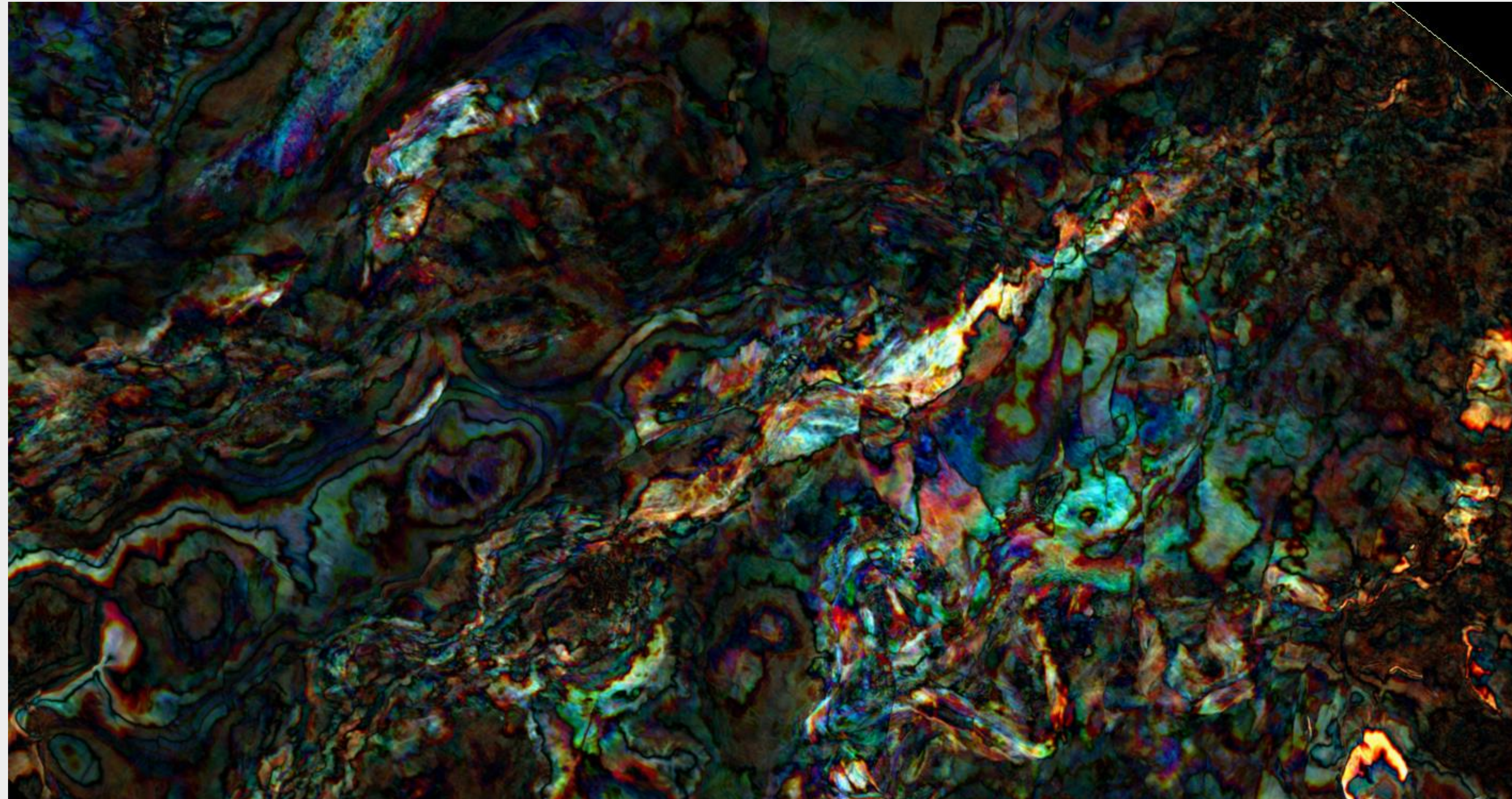


Minimum Amplitude Attribute: [Maximum Negative Value in **ALBIAN** ↔ **MAASTR. INTERVAL**]



# Spectral Decomposition Attribute (RGB): Channels and Lobes Visualization

Z+60

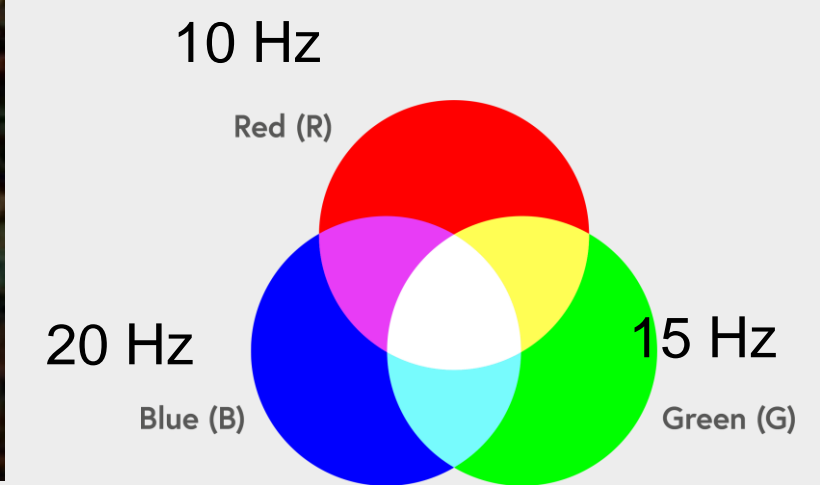
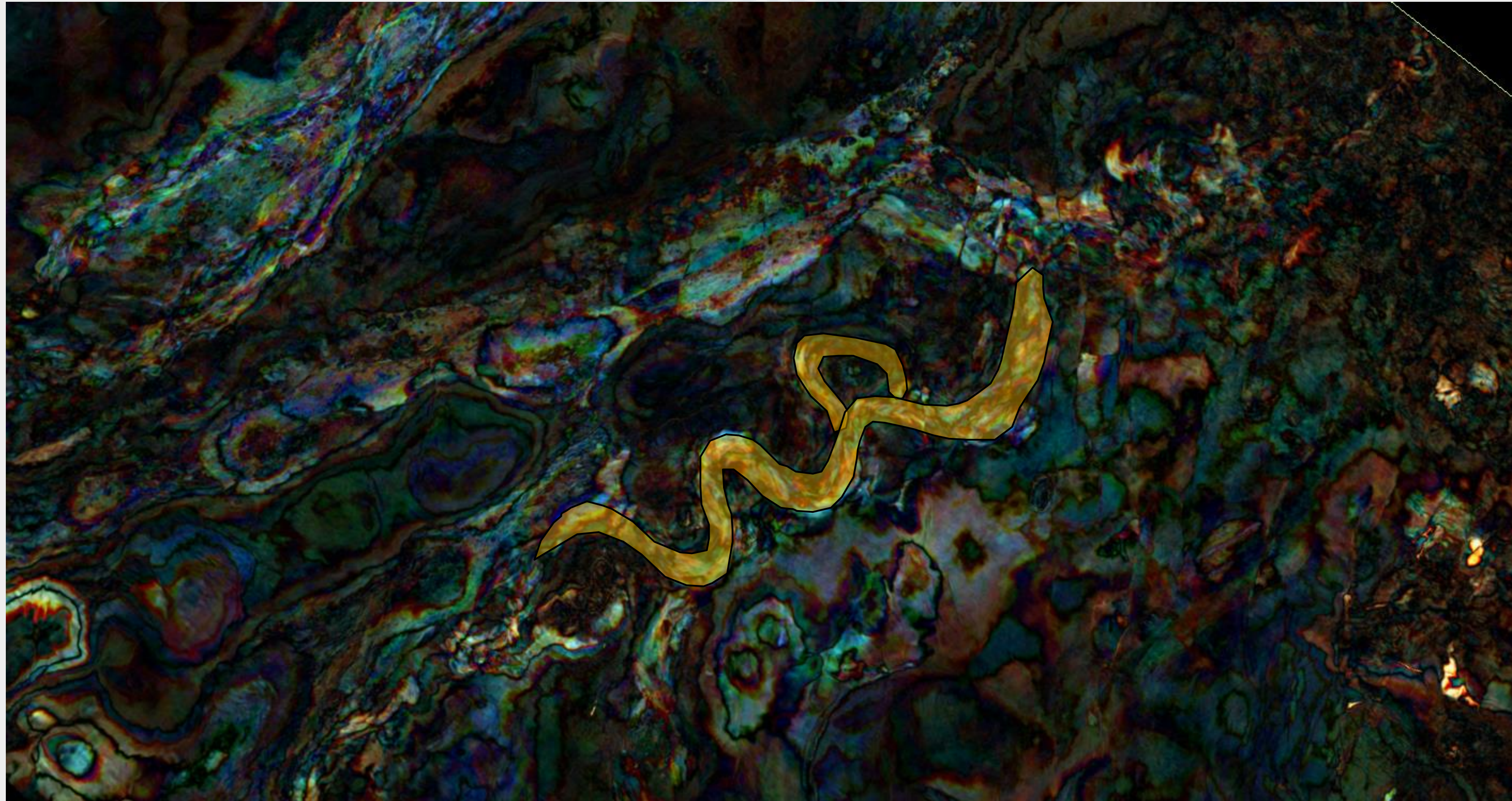


*Depth = Z*



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# Spectral Decomposition Attribute (RGB): Channels and Lobes Visualization



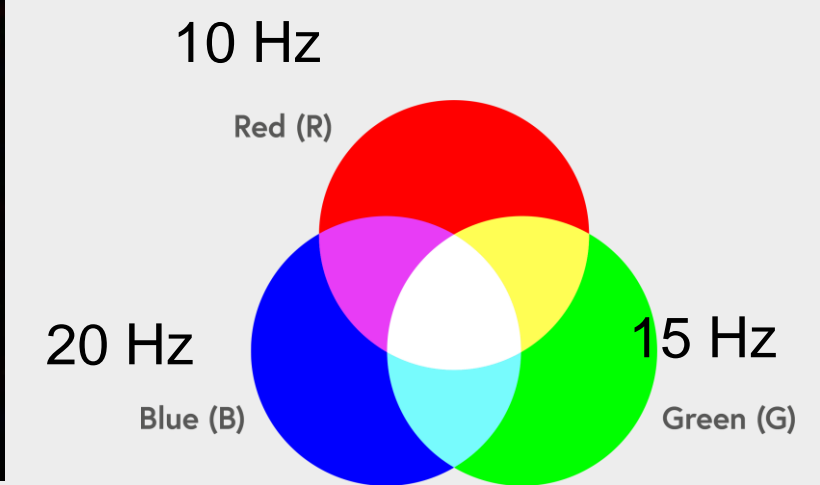
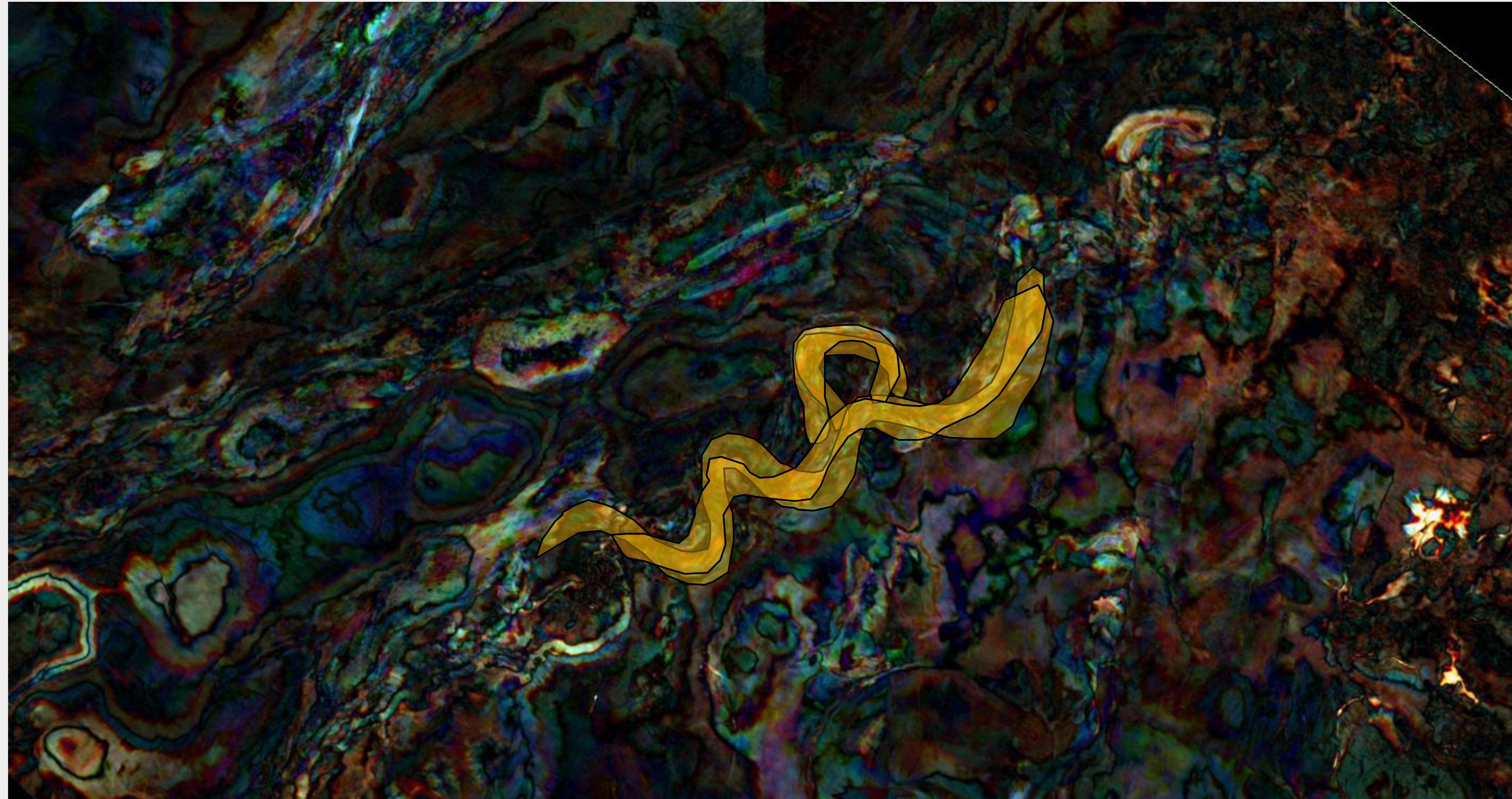
$$Depth = Z - 240(m)$$





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# Spectral Decomposition Attribute (RGB): Channels and Lobes Visualization



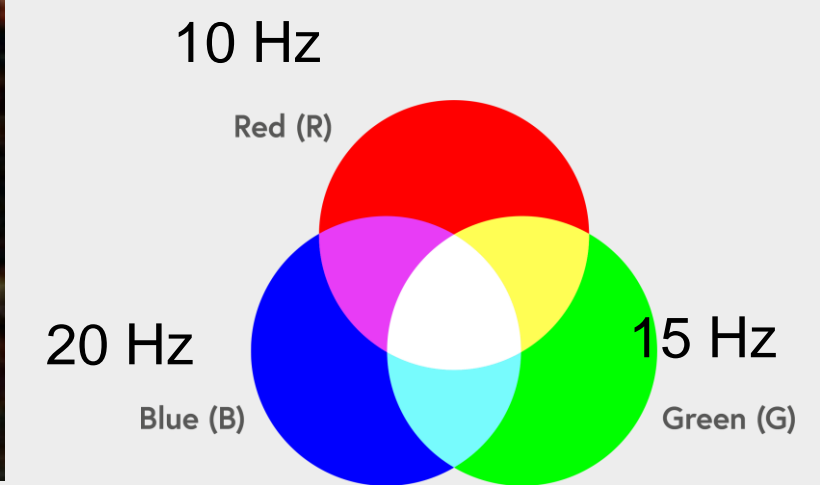
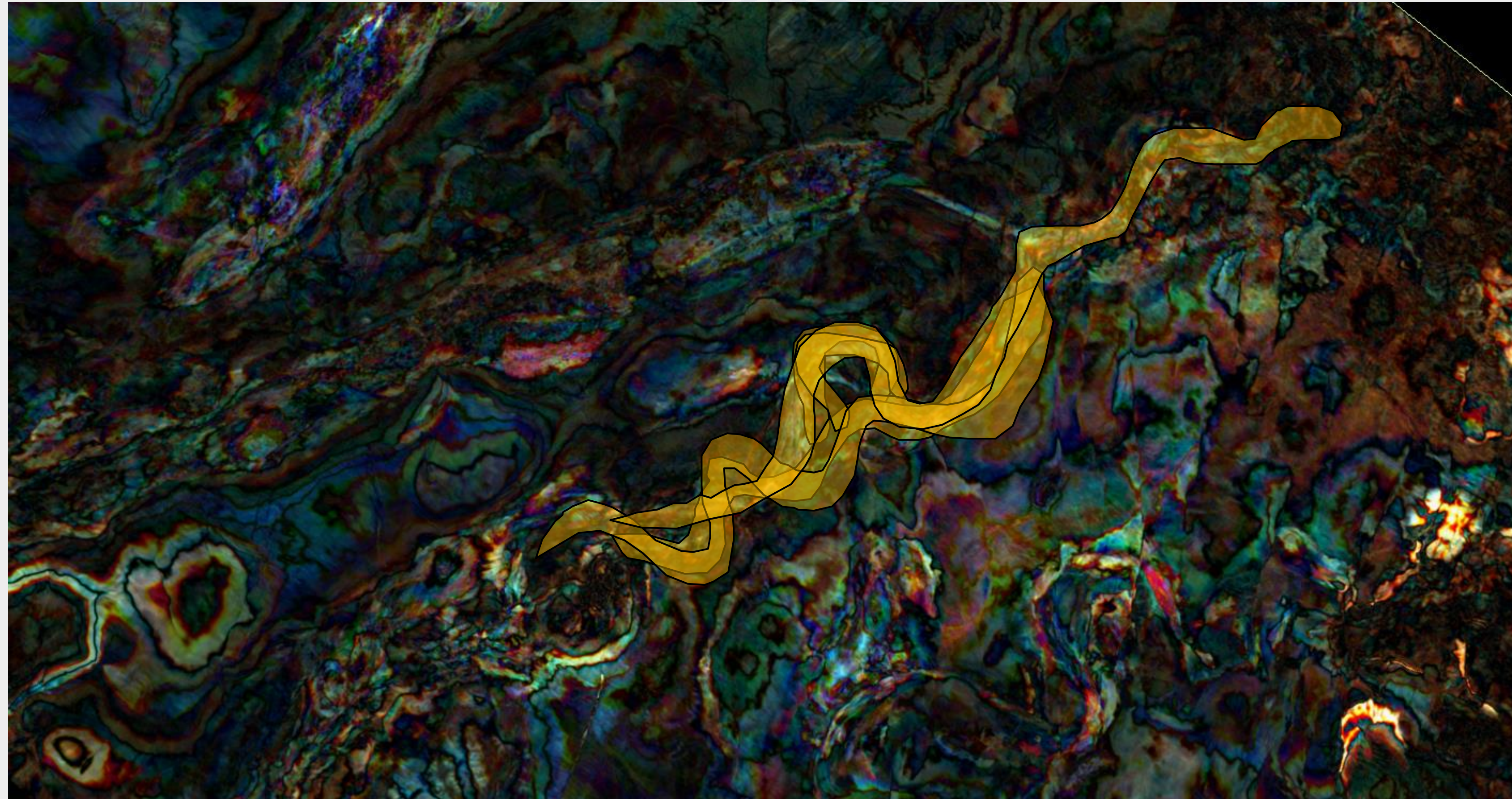
$$Depth = Z - 180(m)$$





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# Spectral Decomposition Attribute (RGB): Channels and Lobes Visualization



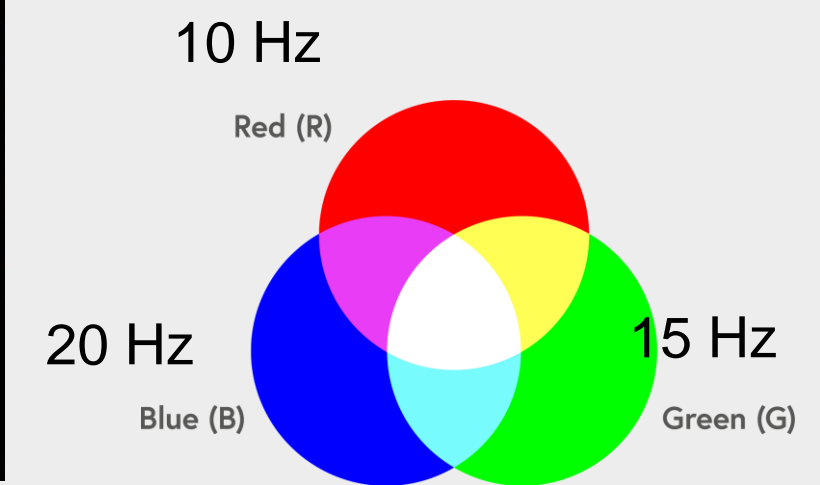
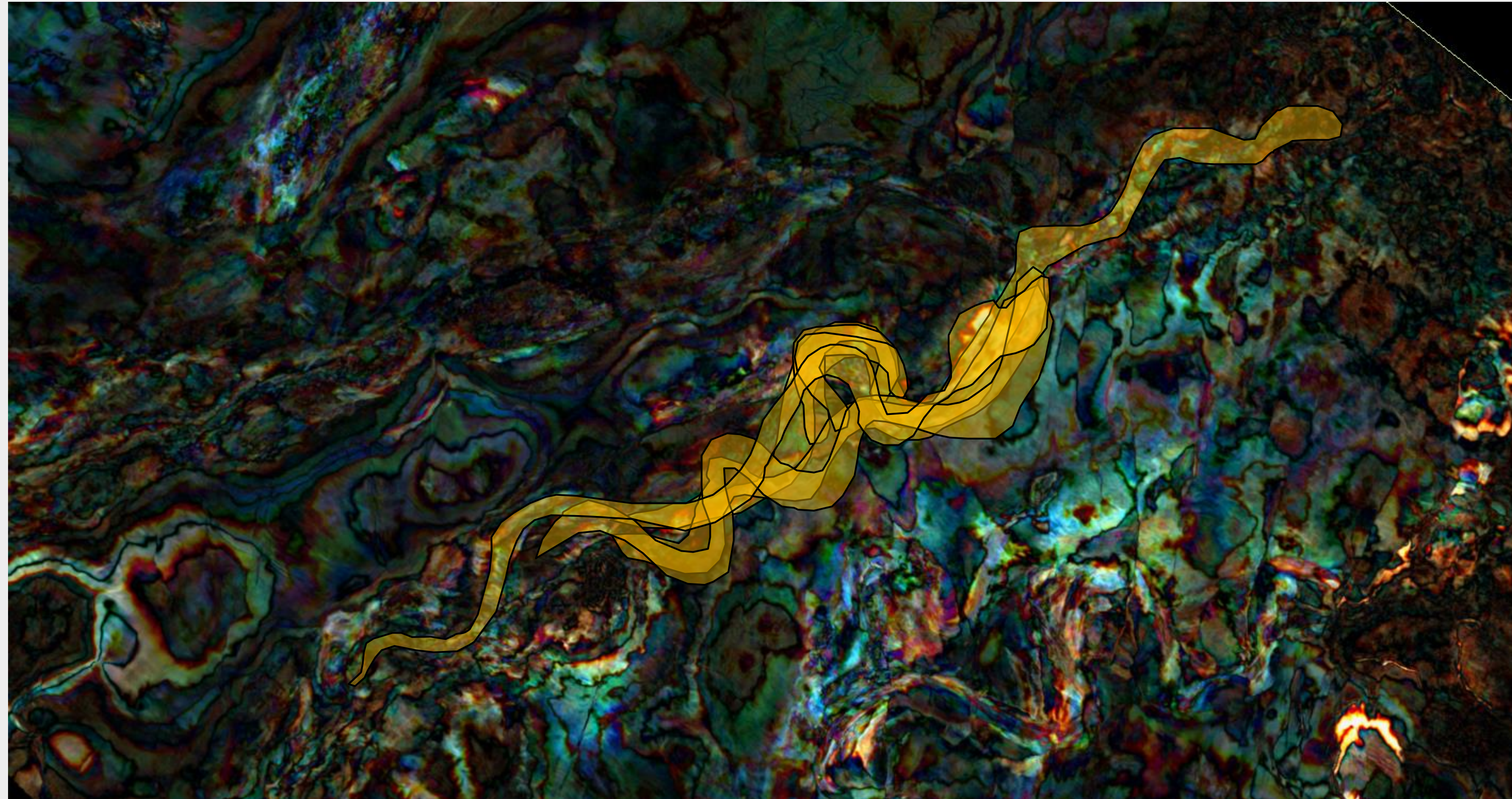
$$Depth = Z - 120(m)$$





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# Spectral Decomposition Attribute (RGB): Channels and Lobes Visualization



$$Depth = Z - 60(m)$$

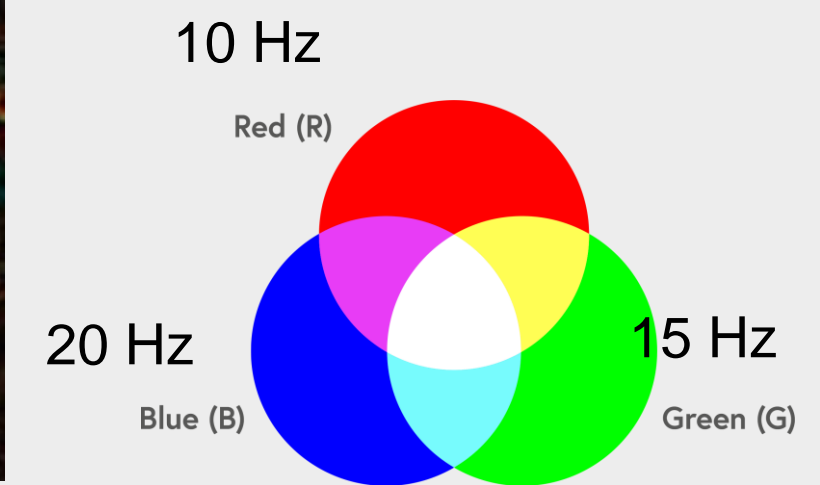
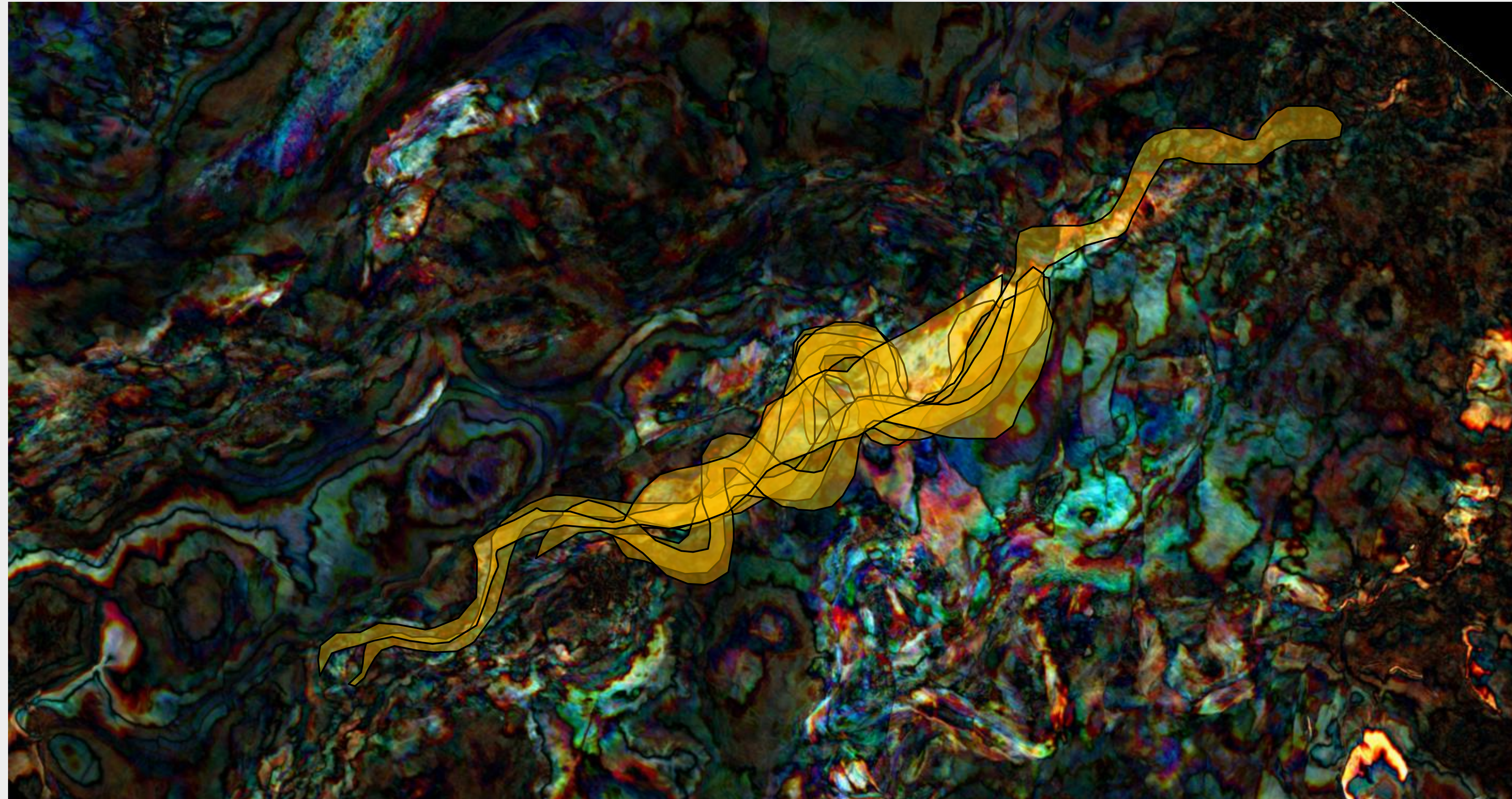






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# Spectral Decomposition Attribute (RGB): Channels and Lobes Visualization



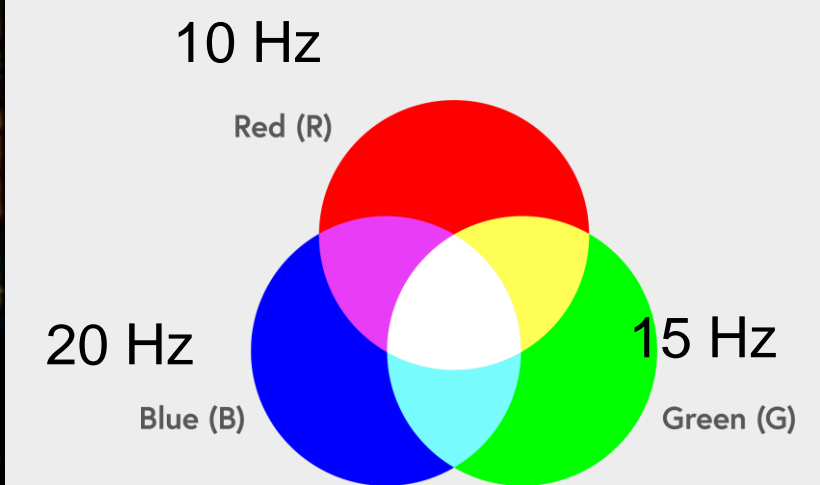
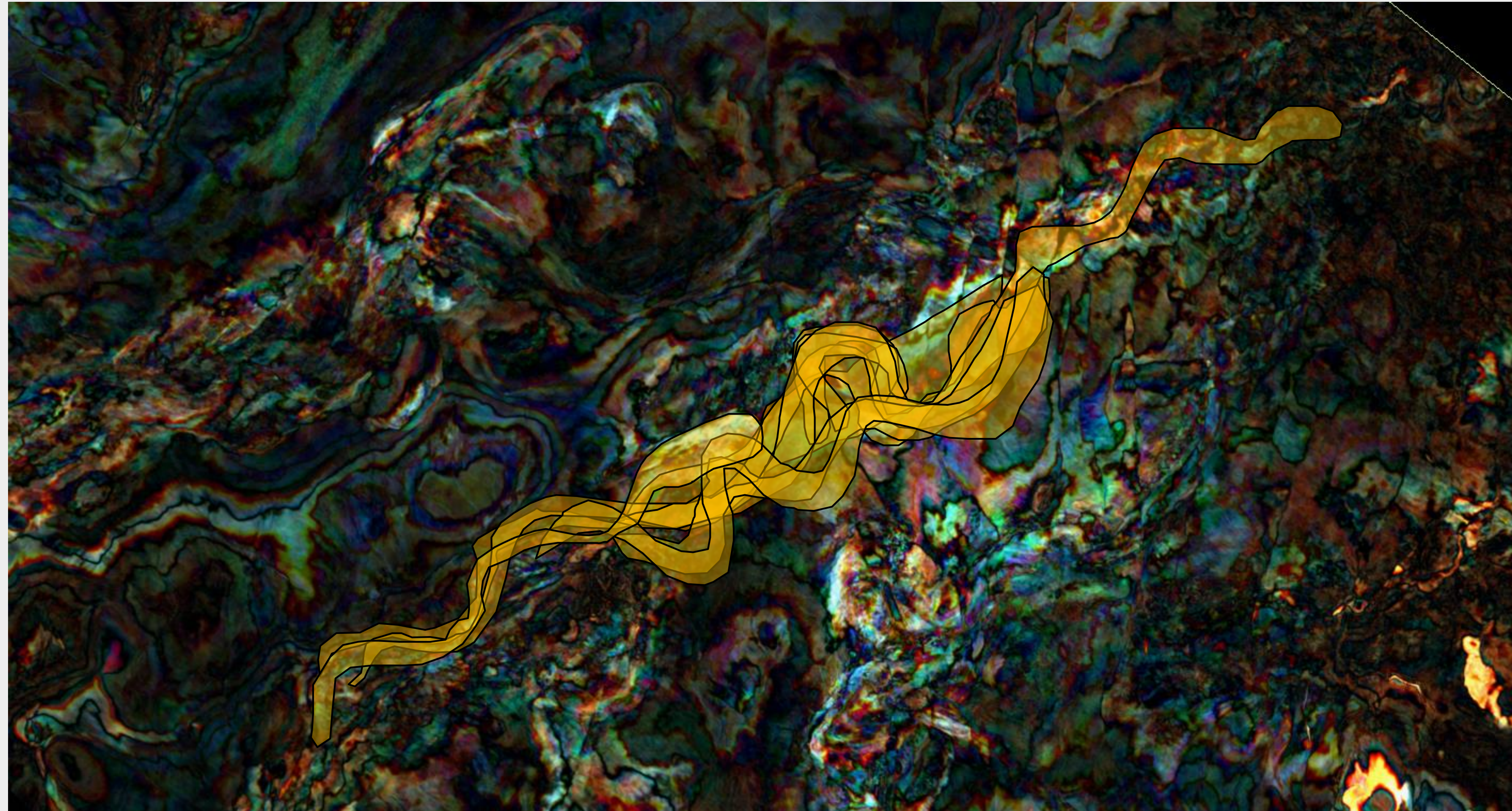
*Depth = Z*





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# Spectral Decomposition Attribute (RGB): Channels and Lobes Visualization



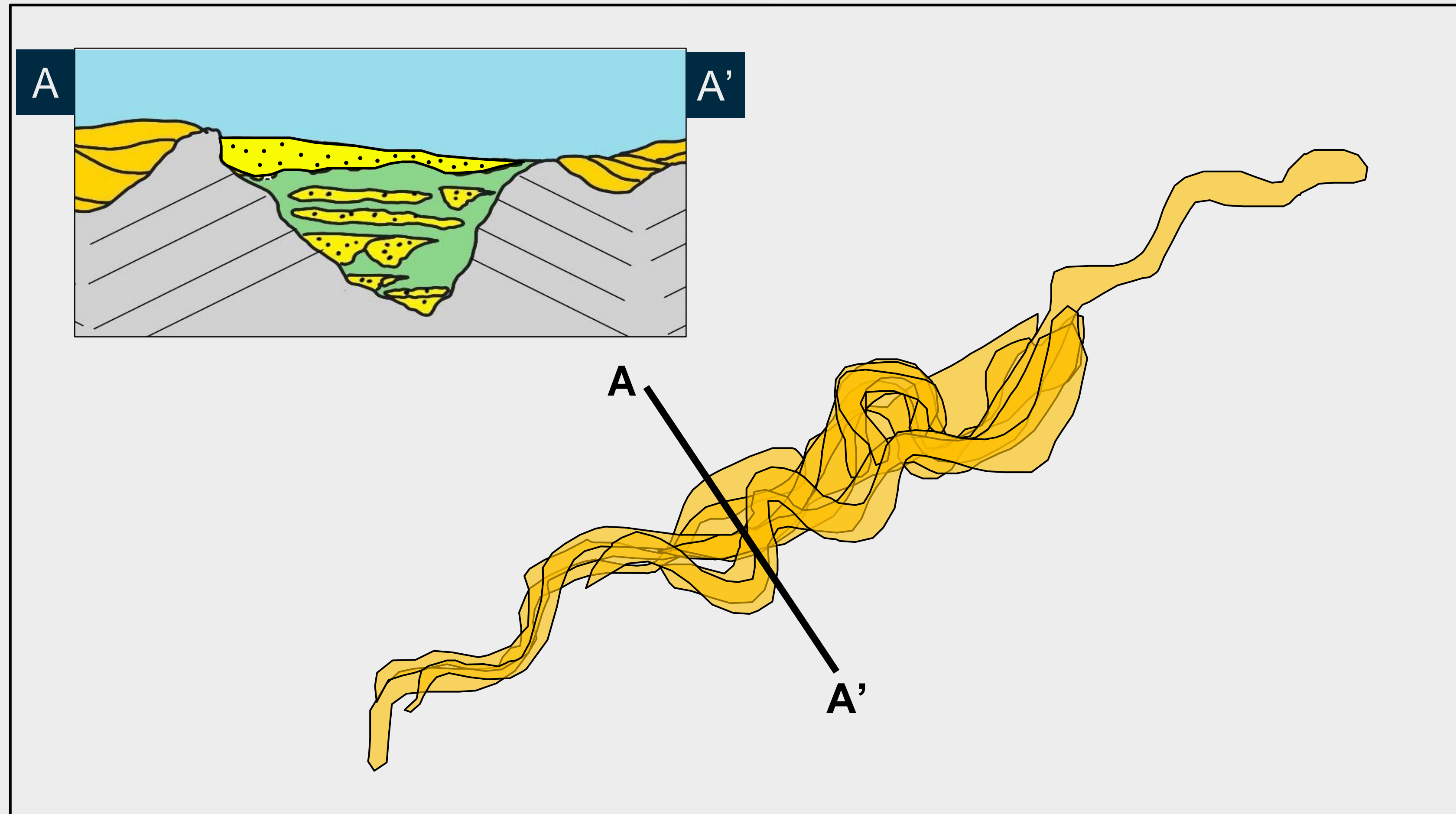
$$Depth = Z + 60 (m)$$





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# Stratigraphy of Upper Cretaceous Environment in Deep Waters



- INTRODUCTION
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- 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 Aptian age was identified below the reservoir interval through seismic interpretation .
- 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.

**Thank you!  
Obrigado!**

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*Special thanks: SBGF, all  
sponsors, ANP and PGS.*