# Structural Development and Depositional History of the Lower Congo and Kwanza Basins, Salt Tectonic Province, Angola*

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Search and Discovery Article #30116 (2010)
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*Adapted from oral presentation at AAPG International Conference and Exhibition, Rio de Janeiro, November 15-18. Please refer to related article, "The Subsalt Play in the Lower Congo and Kwanza Basins, Angloa: A Seismic Study," Search and Discovery Article #10239 (2010).

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## Abstract

The Angolan margin is a classic example of salt tectonics influencing subsequent sedimentation and reservoir architecture. The margin is dominated by post-Aptian salt movement brought about by the separation of Africa from South America in the Early Cretaceous and by Cenozoic sedimentation. Interpretation of 8 regional horizons over 24,000 km$^2$ of merged 3D seismic data located in blocks 15-19 and 34 in the deepwater Lower Congo and Kwanza basins, offshore Angola, has helped us understand how these processes have varied through time, with fluctuations of sediment input from the Congo Drainage Basin.

Northeast-southwest profiles across the area show that there is a series of northwest-southeast-trending structural zones characterised by variations in salt geometry. Grabens in the east formed by listric faults detaching in the salt layer are filled by Miocene sediments. The salt itself has largely been expelled from this zone. Towards the centre, salt pods begin to appear at high levels on the listric faults and may be disconnected from the triangular salt pedestals below them. Finally, in the southwest, salt domes extend continuously from the original salt layer upwards to shallow levels but their locations are still controlled by extensive listric faulting.

Mapping the interpreted horizons has given us an insight into the regional structural trends, tectonic evolution and the changing patterns of sand deposition, which give rise to numerous large oil and gas fields and discoveries in blocks 15 - 18. The Tertiary

turbidite channels affected by these structures are well imaged on RMS amplitude maps on which their variable relationships with the structures can be deciphered. Isochrons through each interval indicate the change through time of depocentres and sediment sources.

## References


Brownfield, M.E., and R.R. Charpentier, 2006, Geology and total petroleum systems of the west-central coastal province (7203), West Africa: U.S. Geological Survey Bulletin 2207-B, 60p.

Karner, G.D., N.W. Driscoll, and D.H.N. Barker, 2003, Syn-rift regional subsidence across the west African continental margin: The role of lower plate ductile extension, *in* T.J. Arthur, D.S. MacGregor, and N.R. Cameron, eds., Petroleum geology of Africa: New themes and developing technologies: Geological Society (London) Special Publication 207, p. 105-129.

Marton, G.L, G.C. Tari, and C.T. Lehmann, 2000, Evolution of the Angolan passive margin, West Africa, with emphasis on post-salt structural styles, *in* W. Mohriak and M. Talwani, eds., Atlantic Rifts and Continental Margins: American Geophysical Union, v. 115, p. 129-149.

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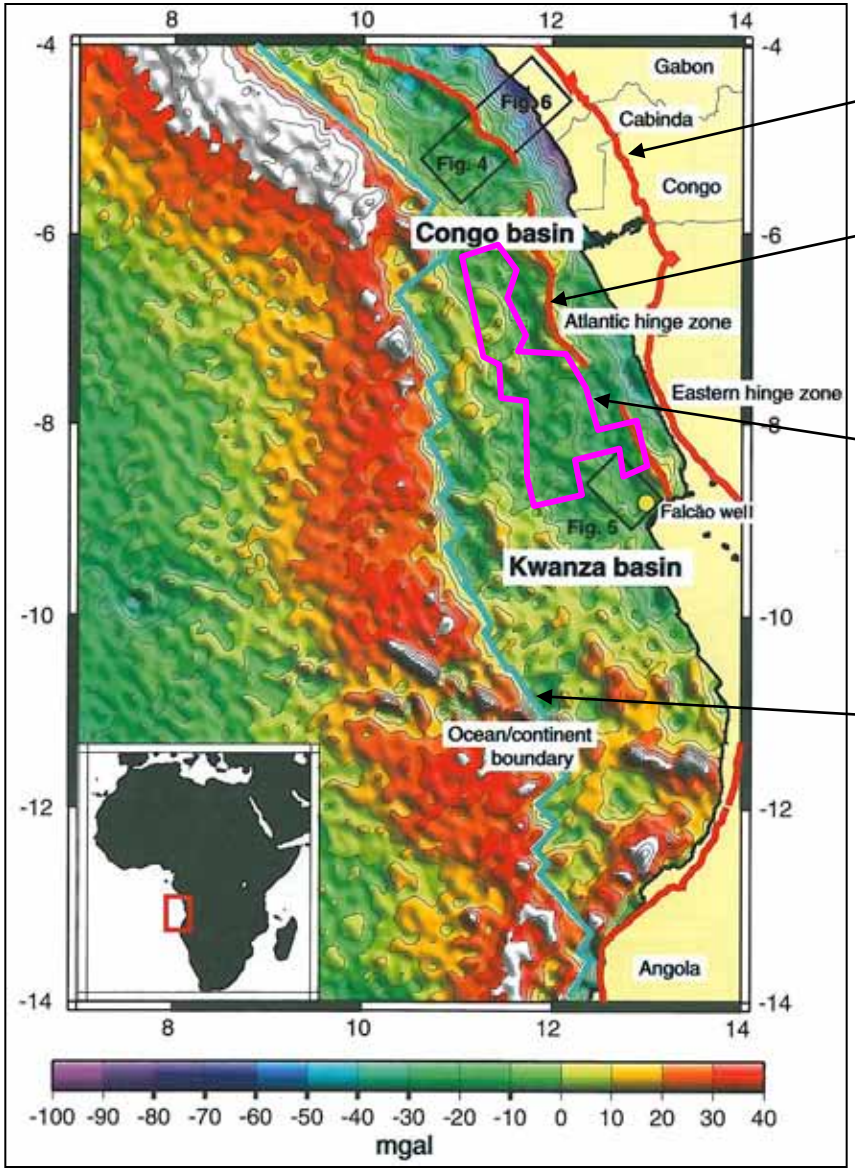
Presented by: William Jones

# Merged 3D survey: structural setting

Bouguer gravity map (Karner 2003), showing the ocean/continent boundary and the Atlantic Hinge Zone




Edge of basement outcrop (red)

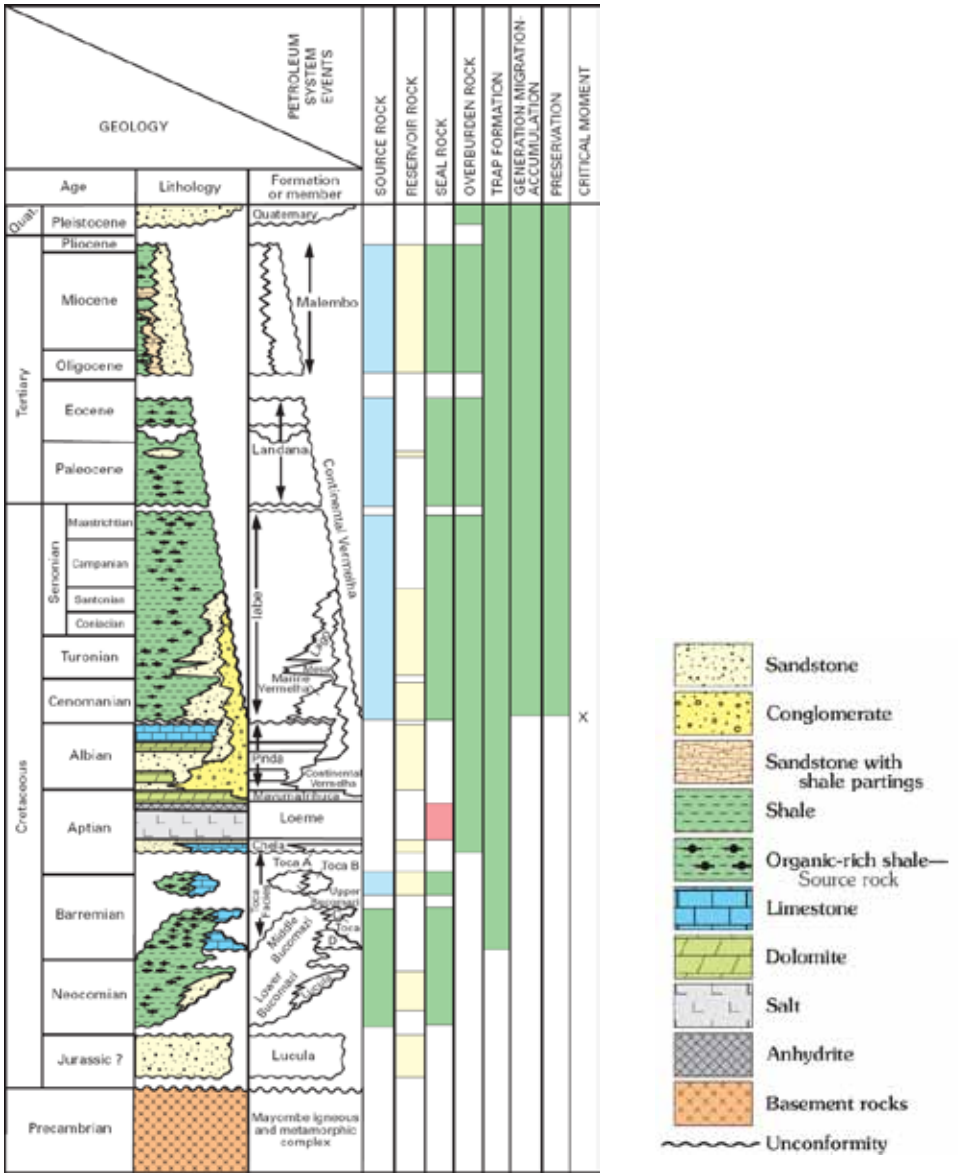
Atlantic Hinge zone (red)

Merged 3D survey (purple)

Ocean/continent boundary (Blue)

The 23 000 km$^2$ merged 3D survey lies on stretched continental crust between the Atlantic Hinge Zone basement high and the ocean/continent boundary.

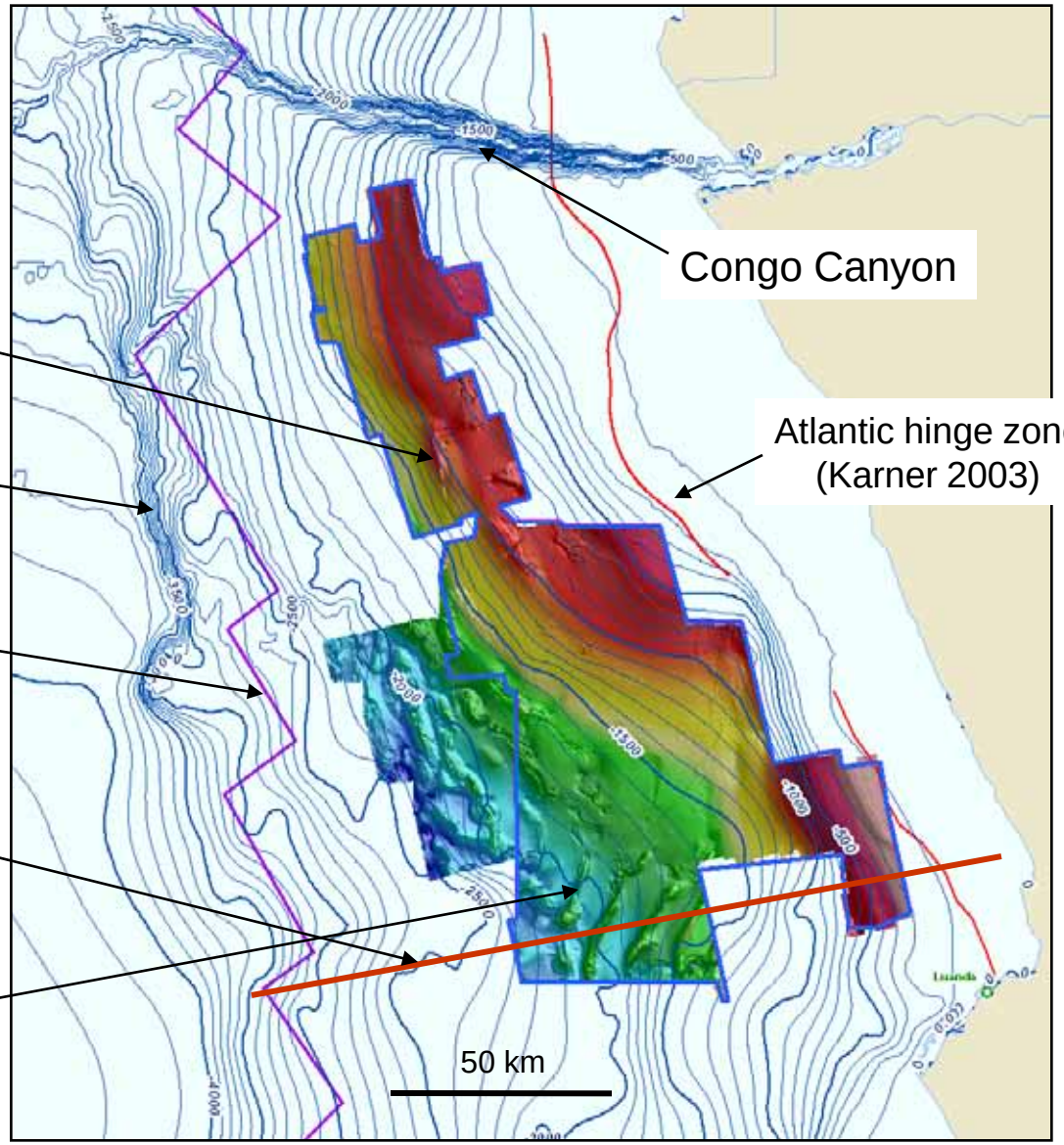
# Congo Basin Stratigraphy



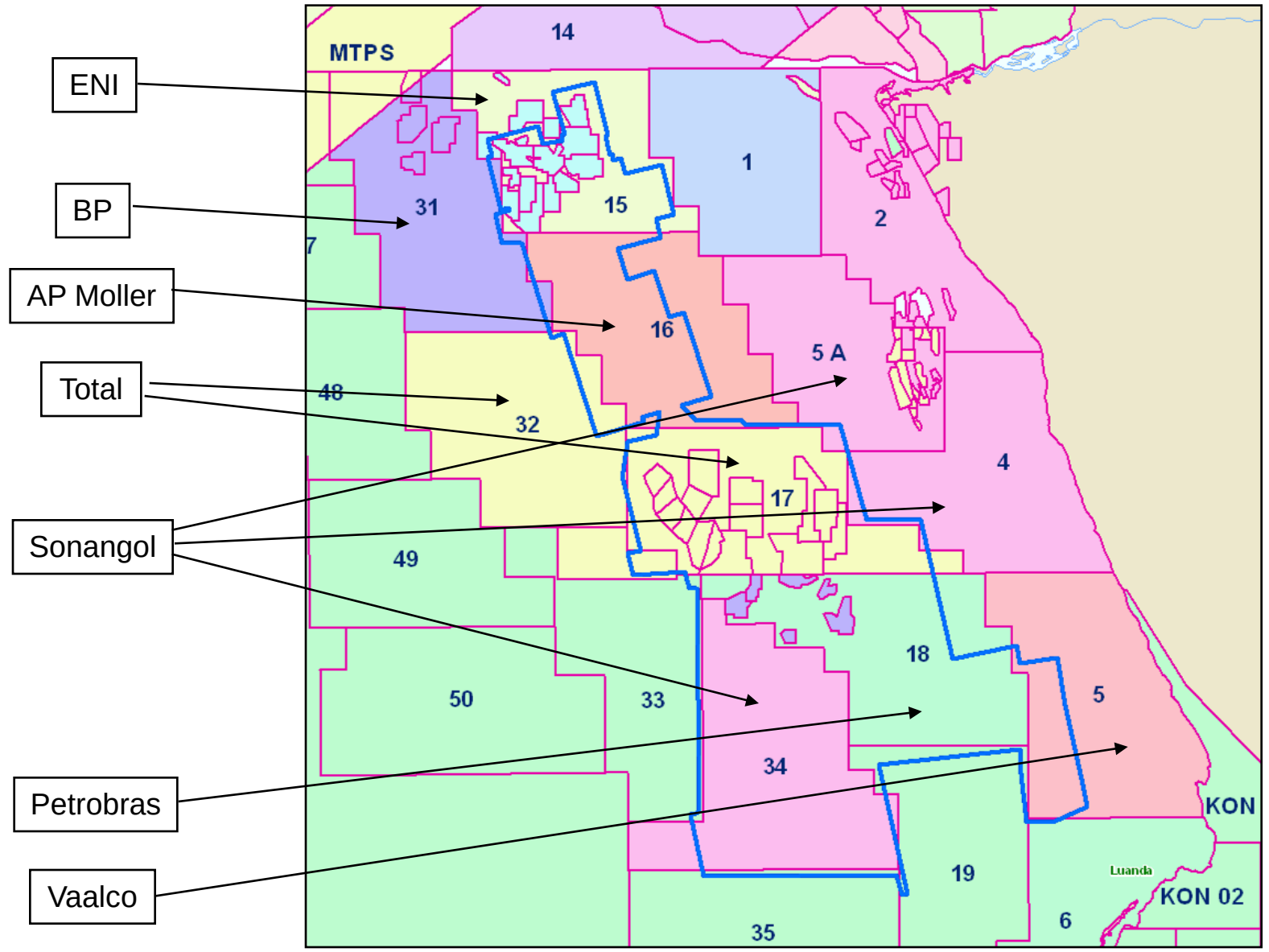

(USGS 2006)

# Merged 3D survey: bathymetry

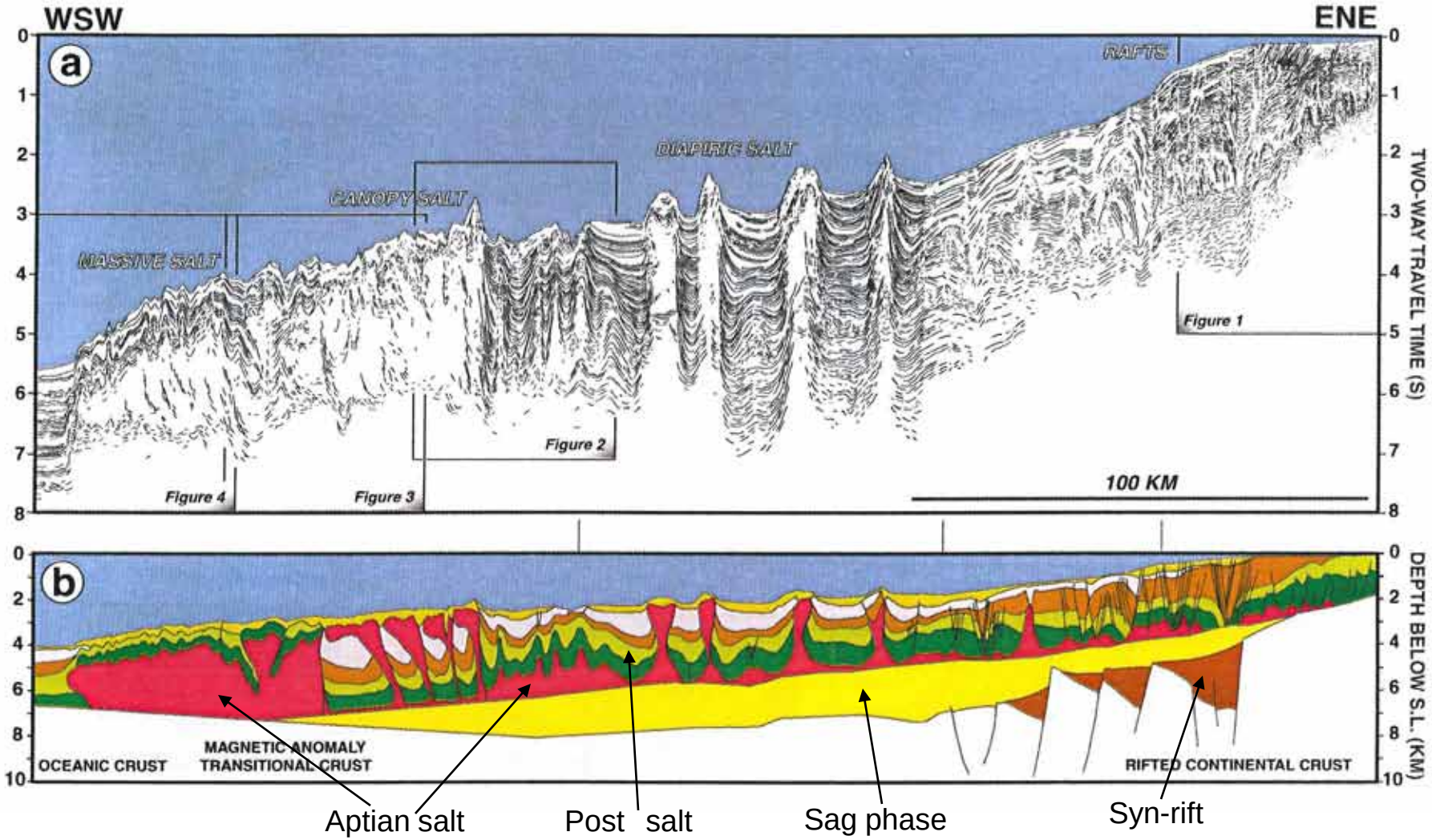
3D seabed interpretation superimposed on seabed contours (GEBCO)



# Merged 3D survey compared with licence blocks

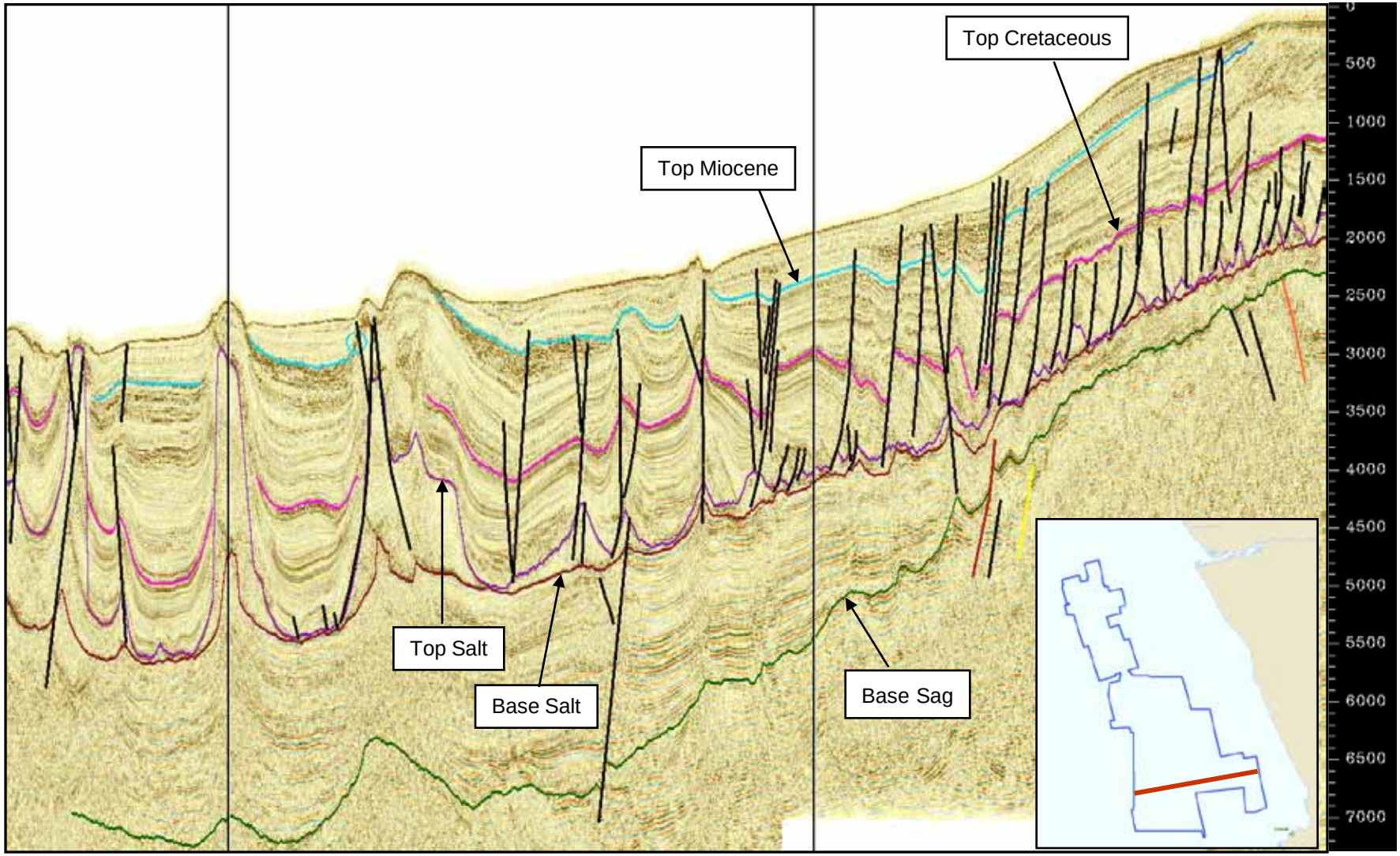


# Regional 2d Seismic Profile

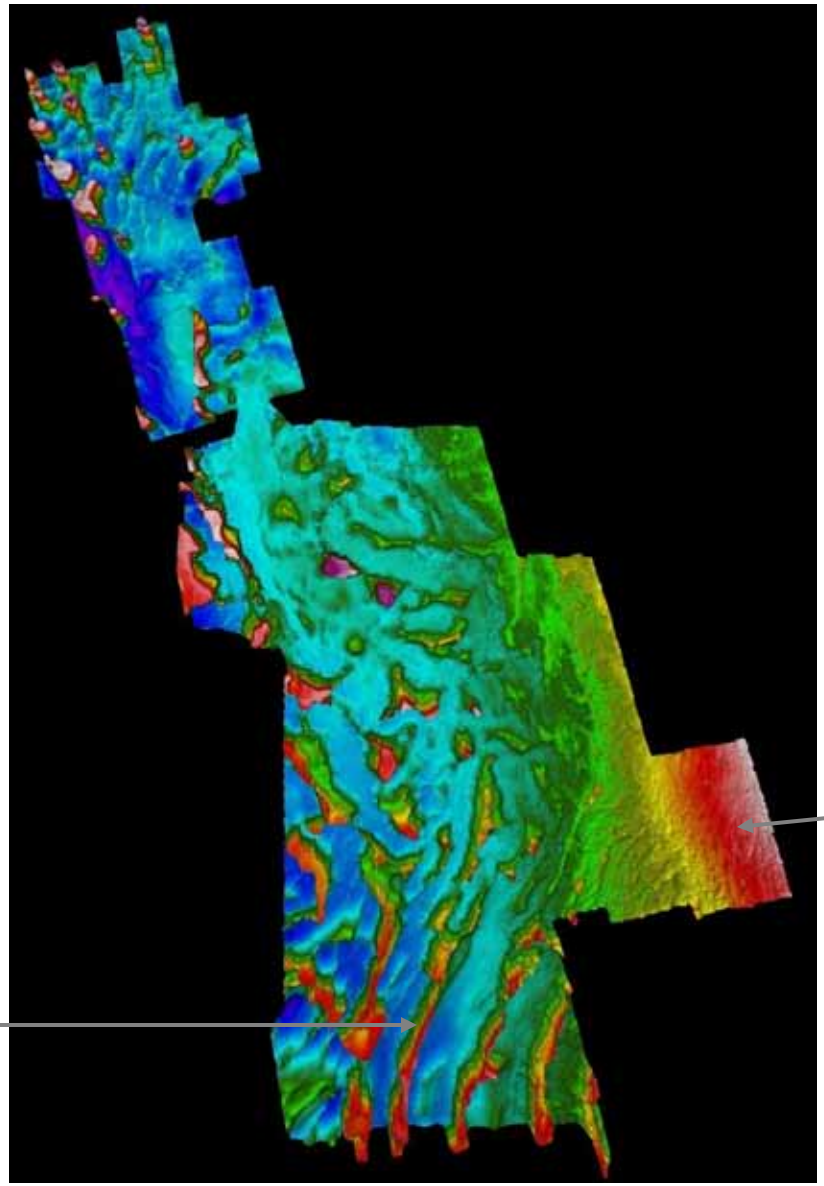



(Marton et al., 2000)

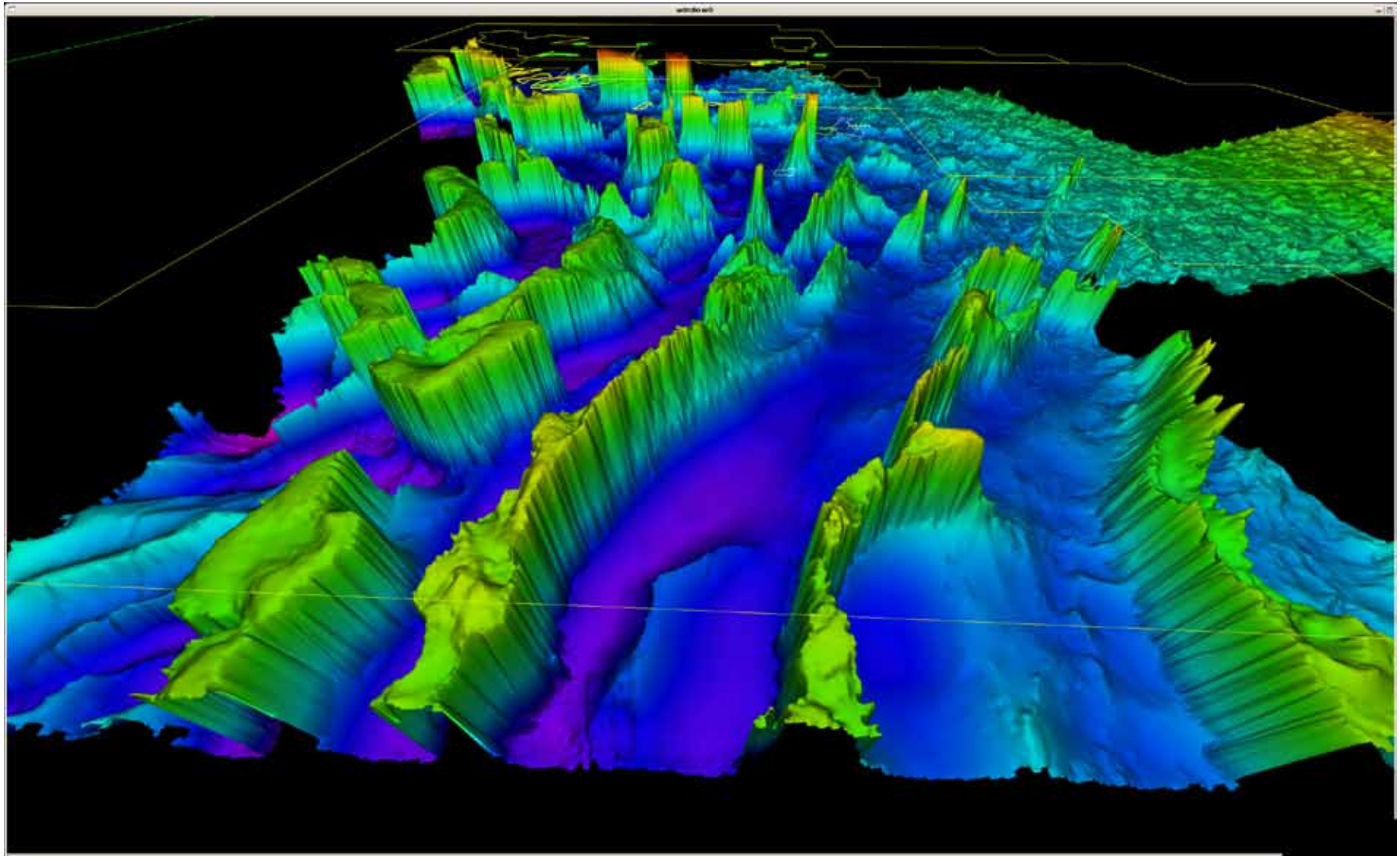
# West – East section across Bl 34,18 & 5



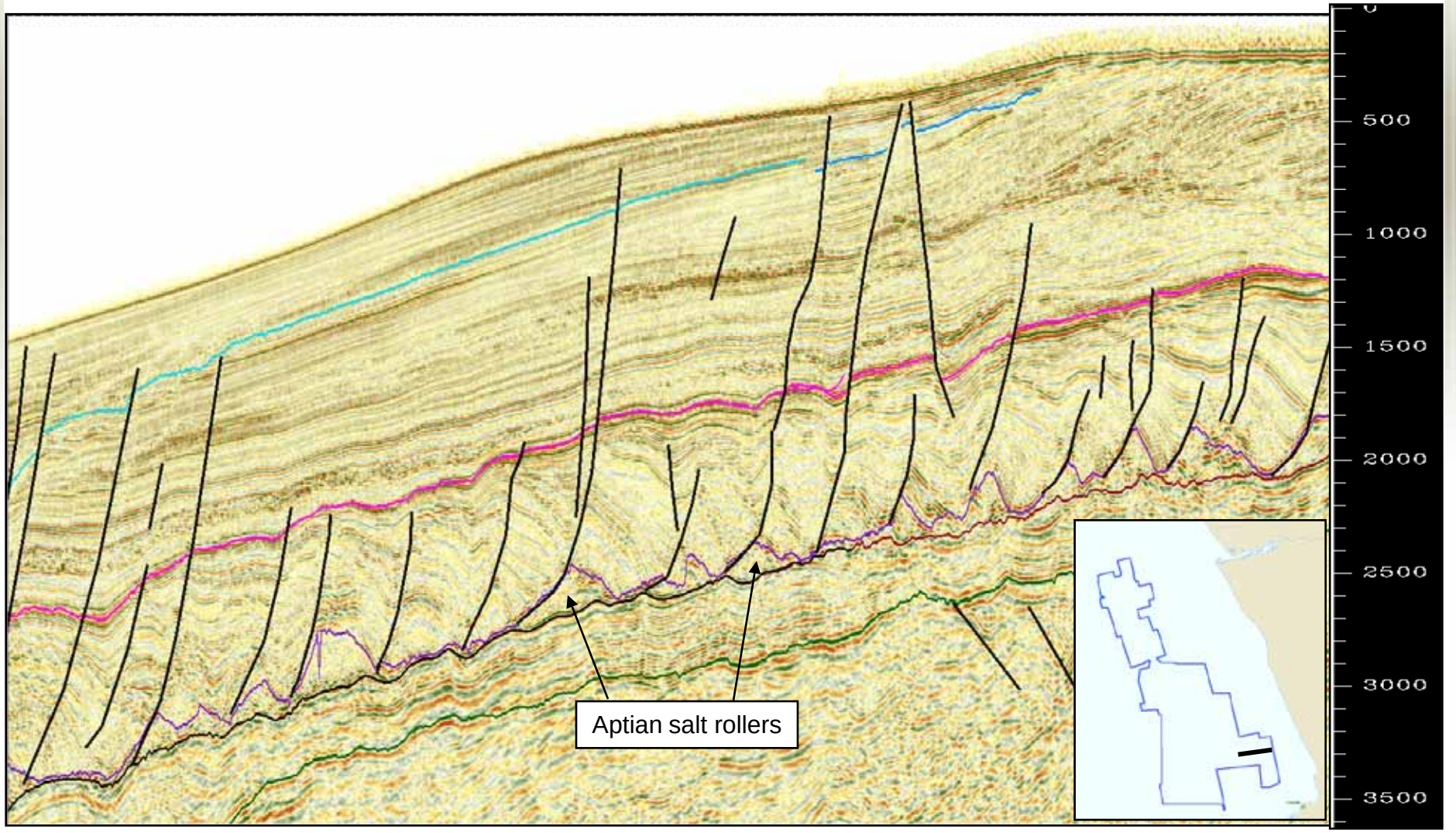
# Top Salt TWT, Bl 15 – 18, 34



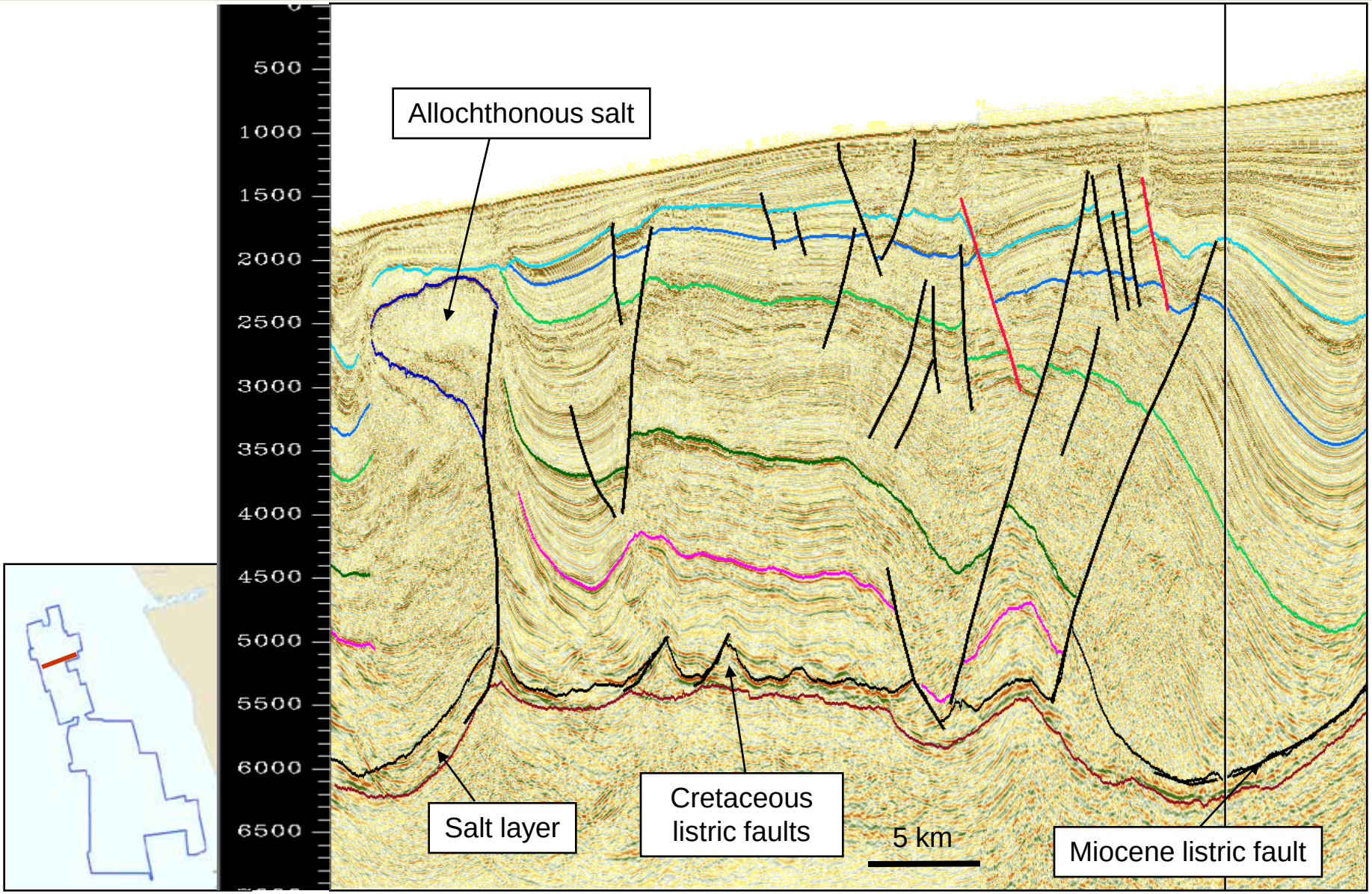
# Top salt seen from the south of Bl 34



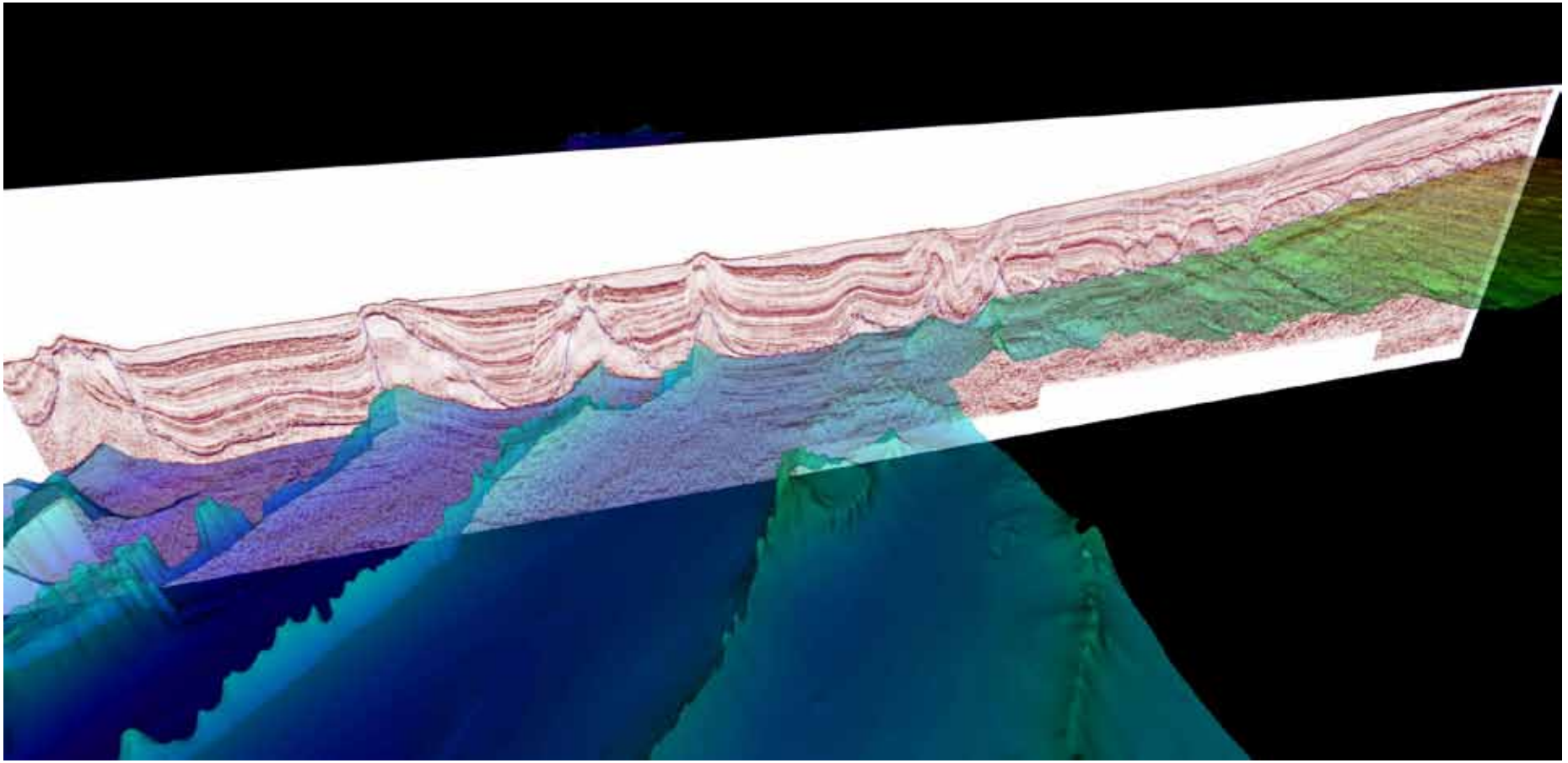
# Upper Cretaceous listric faulting



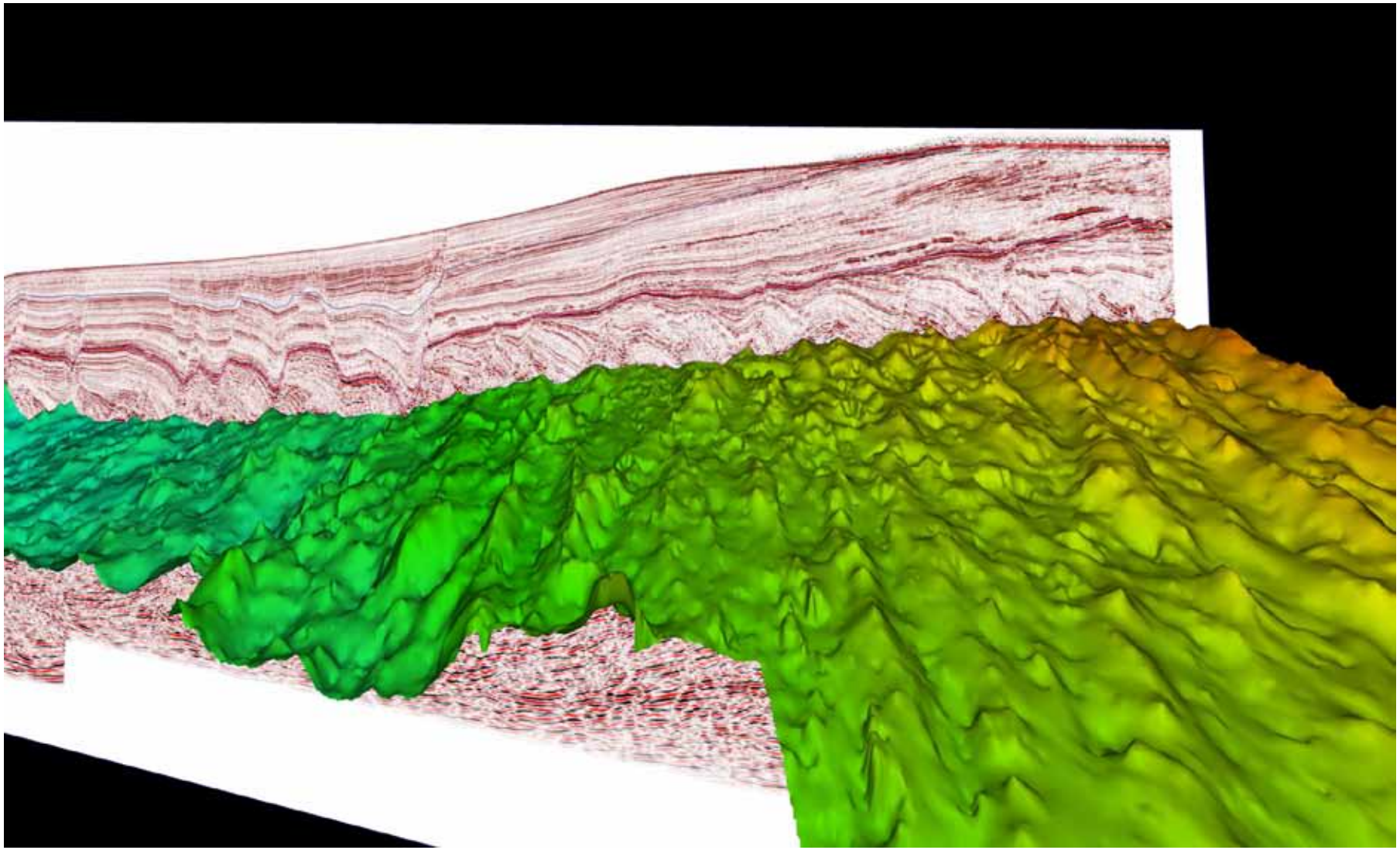
# Allochthonous salt



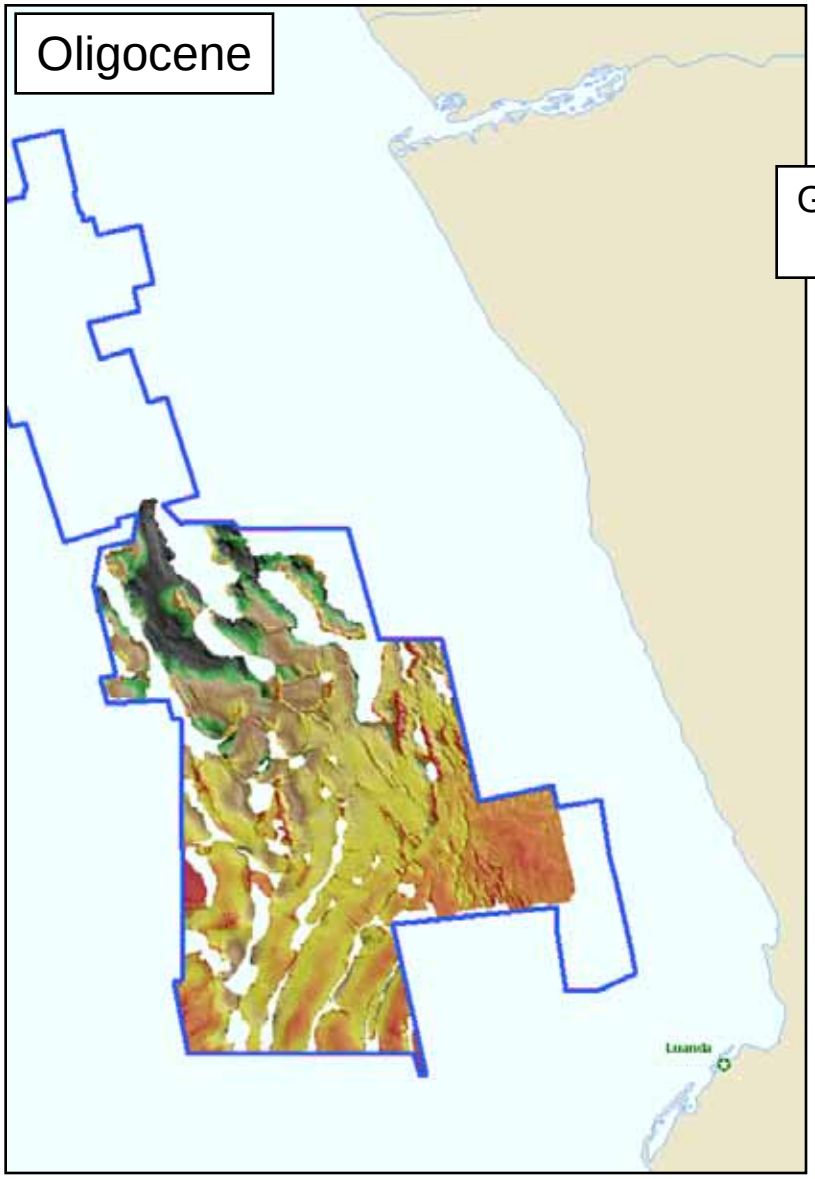
# Base Salt Bl 34 & 18



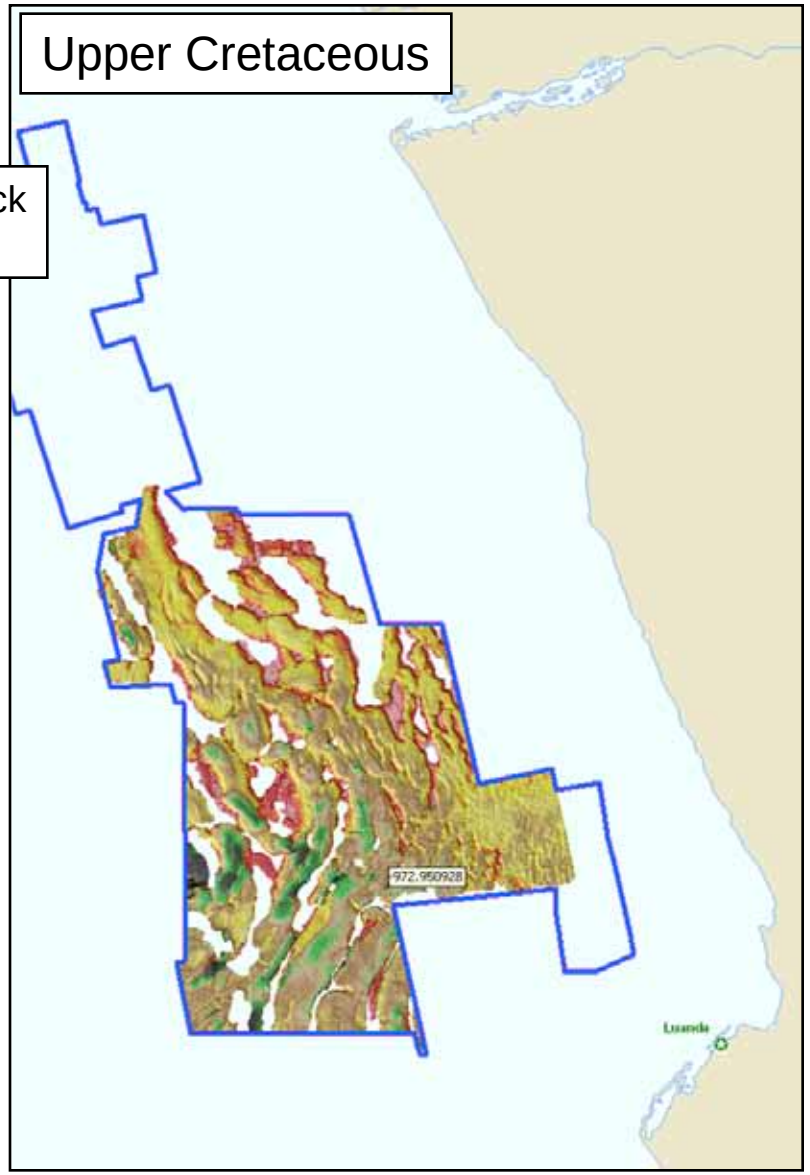
# Top salt in Bl 18 & 5



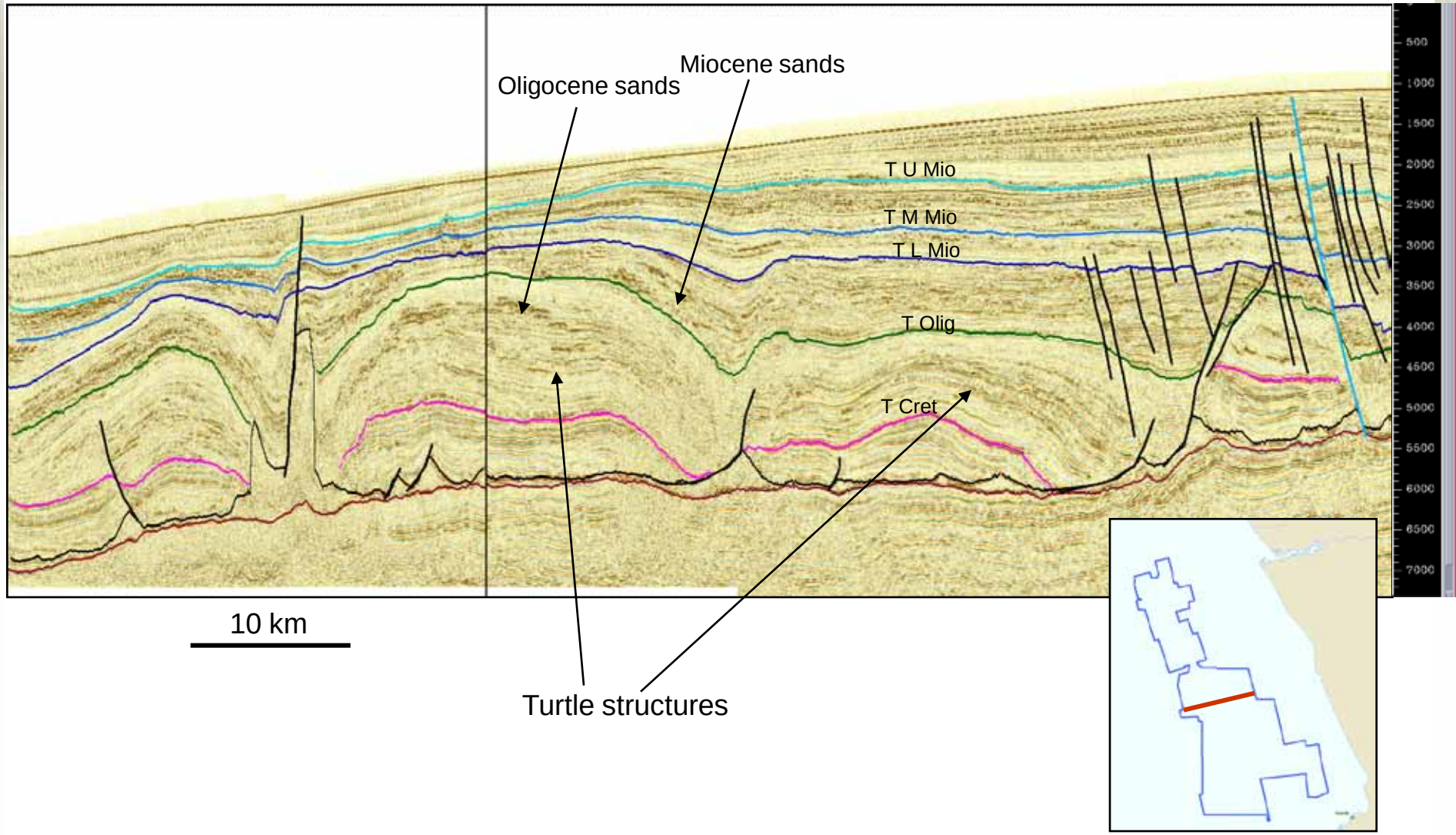
# Upper Cretaceous and Oligocene isochrons



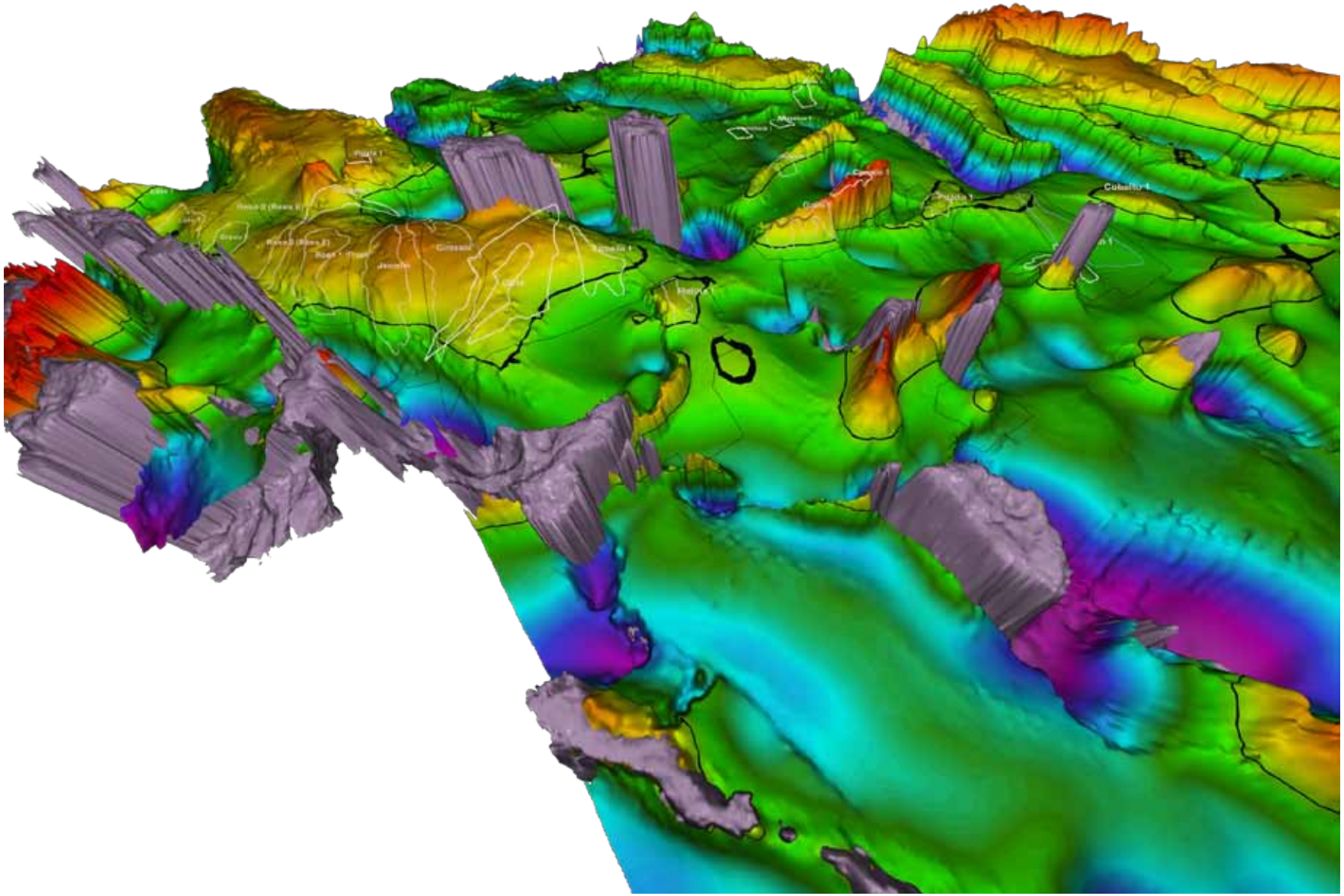

Green = thick
Red = thin



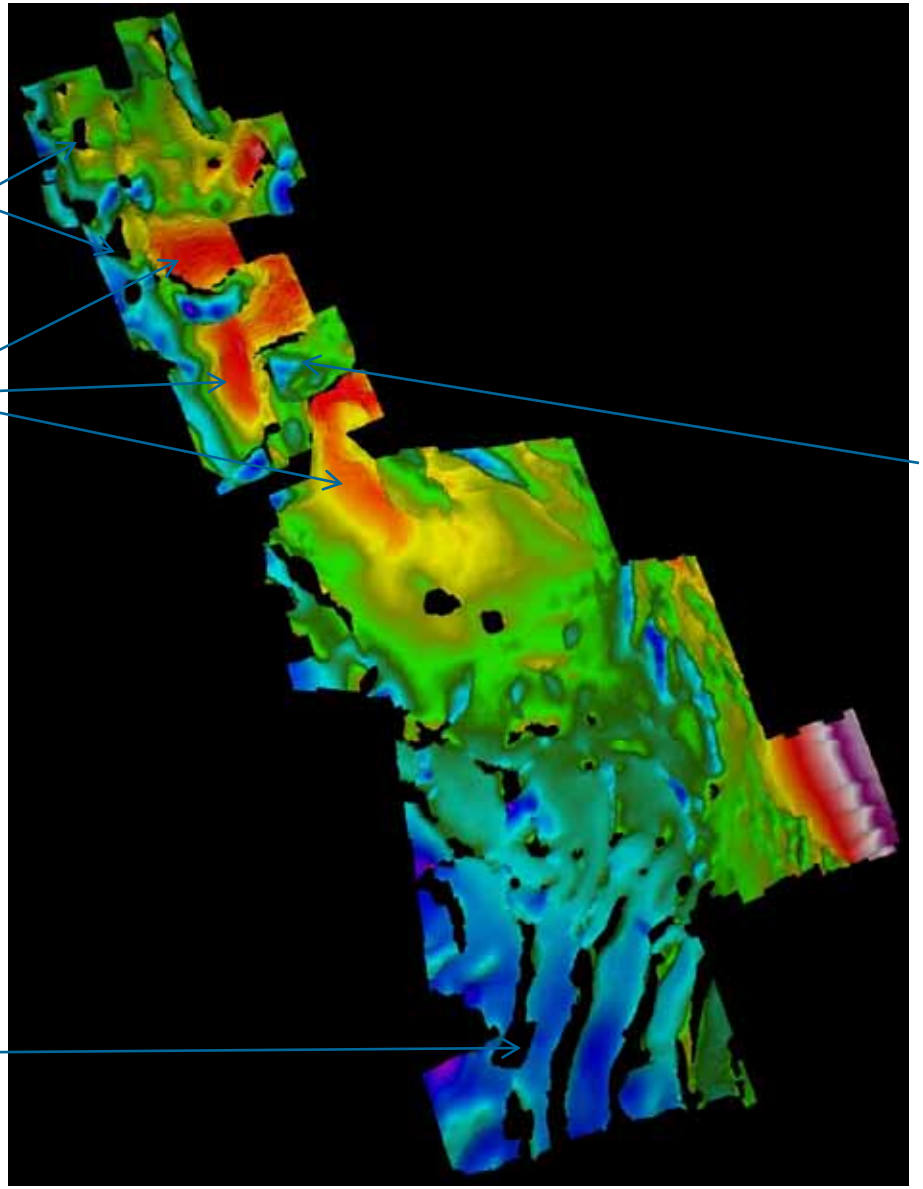
# Turtle structures in Bl 17



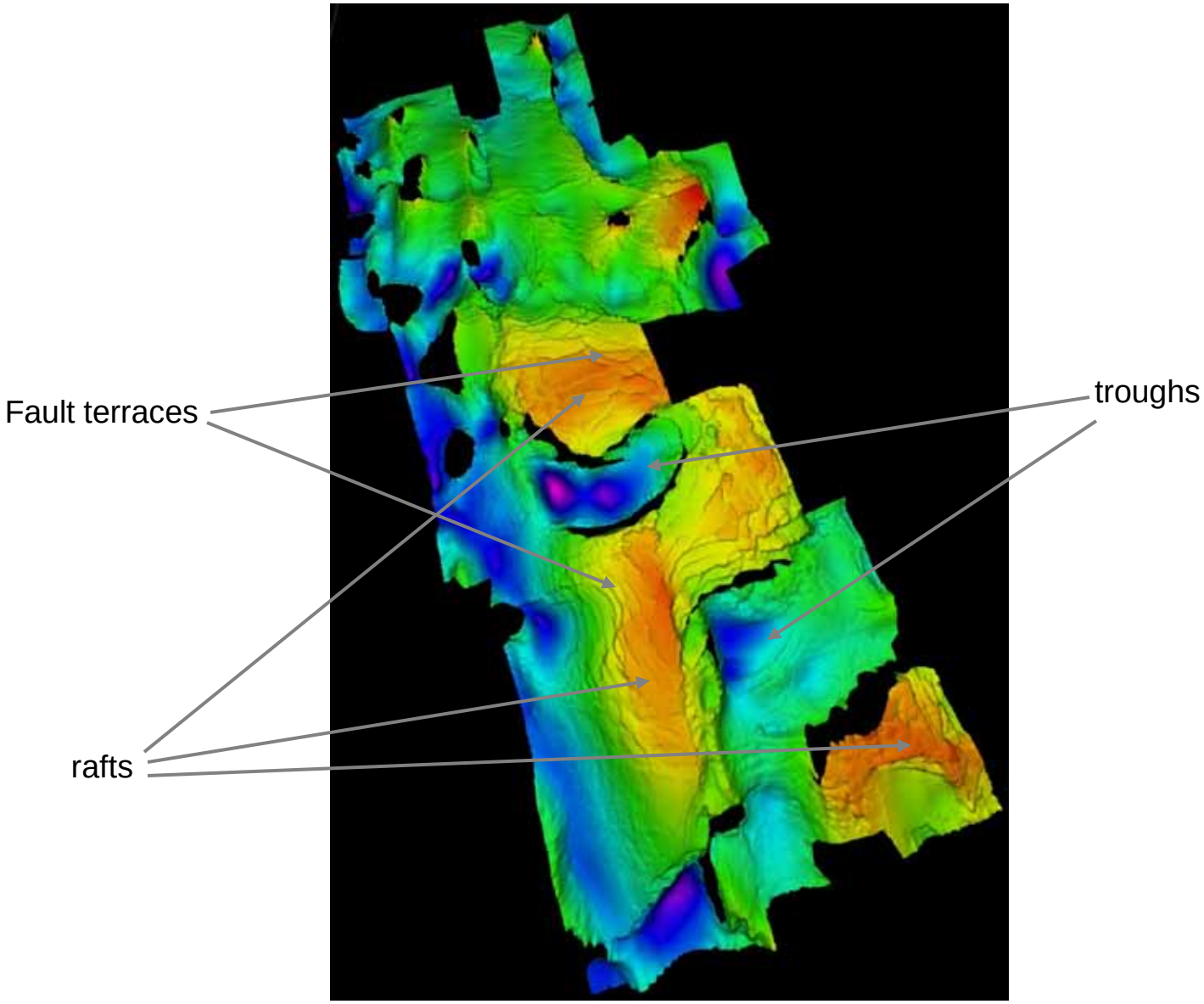
# Bl 17: Top Oligocene with salt and fields



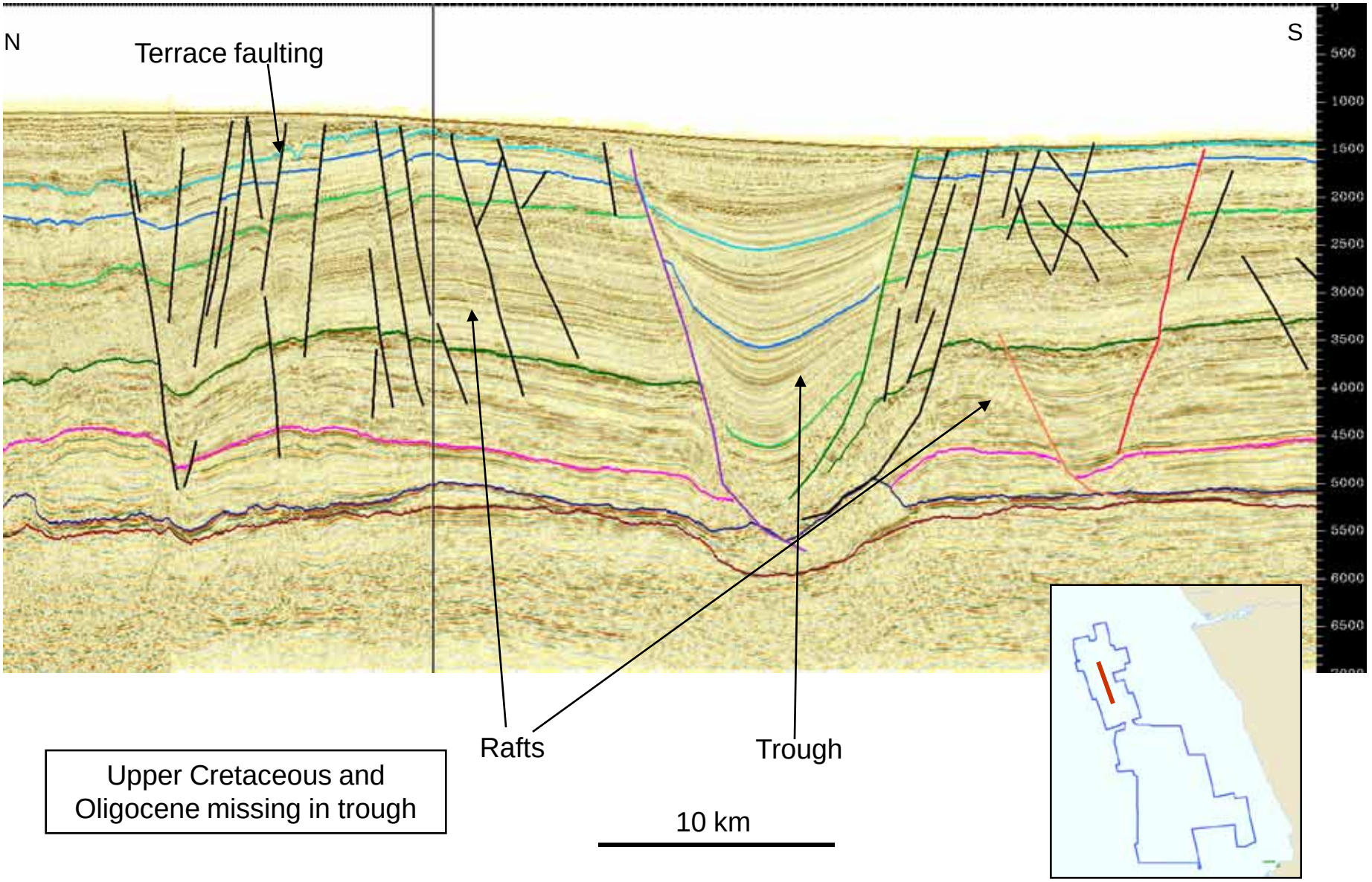
# Top Middle Miocene TWT



# Block 15/16 Top Middle Miocene TWT

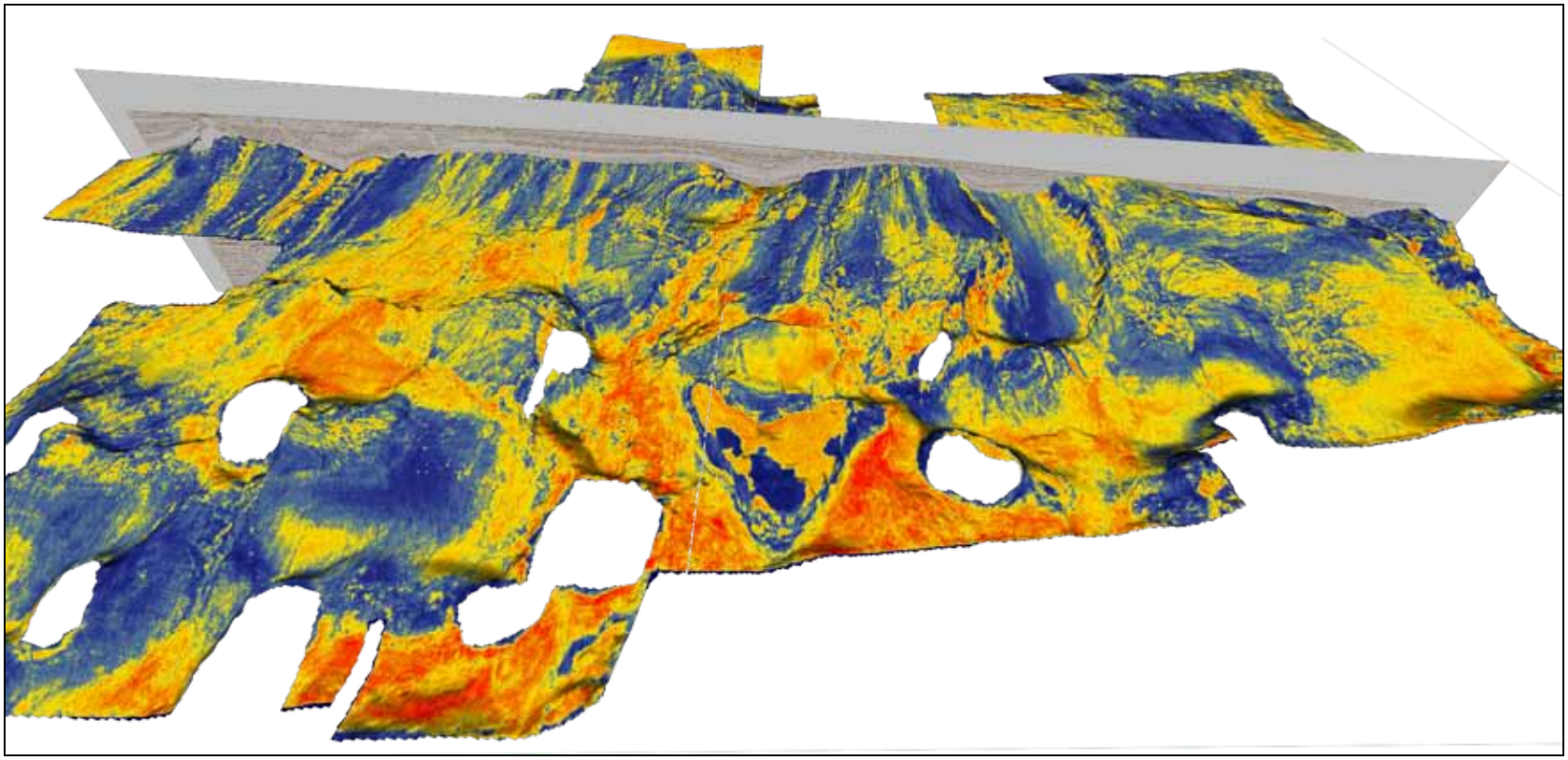


# Trough and rafts



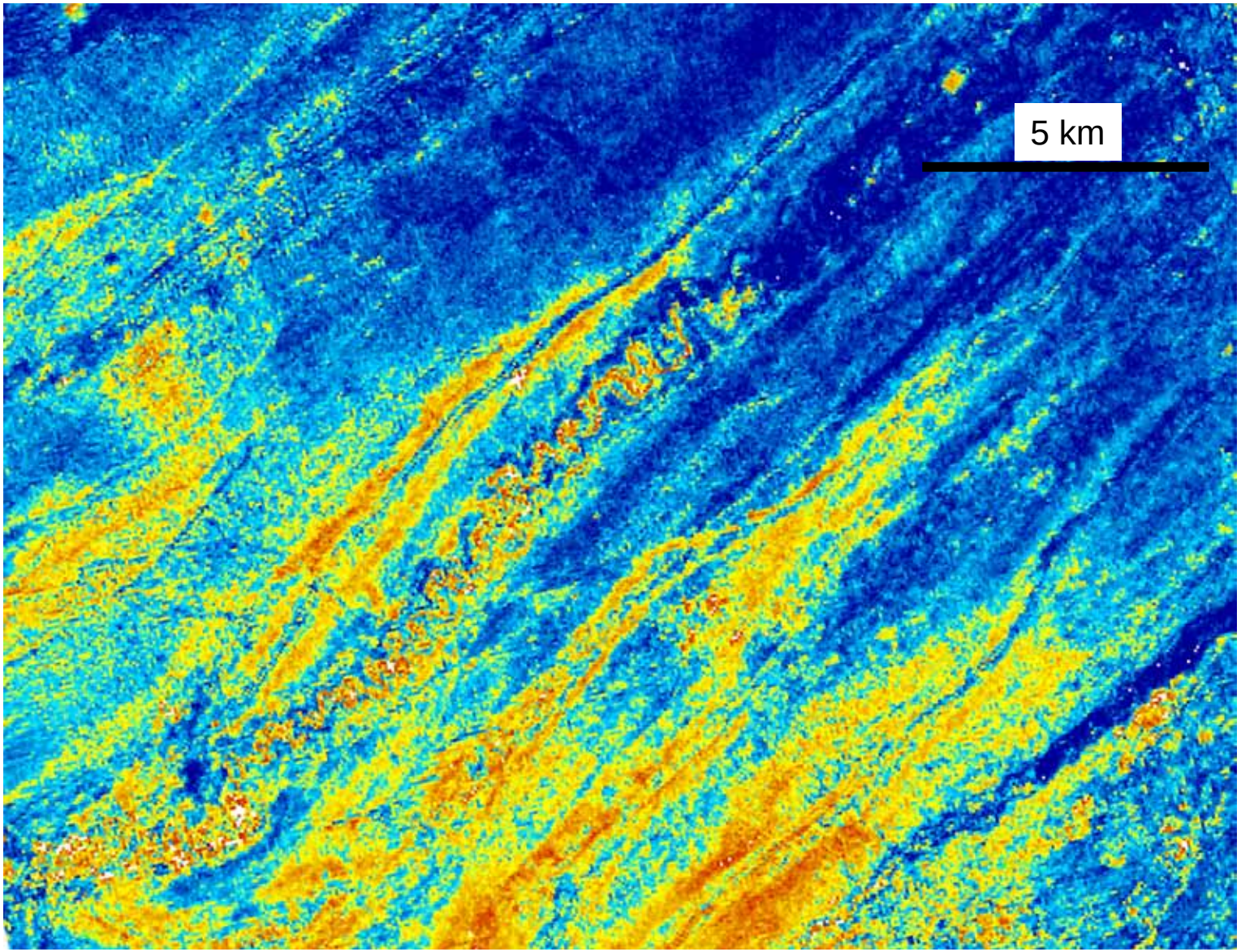

Upper Cretaceous and Oligocene missing in trough

# Upper Miocene Sands in Bl 15/16

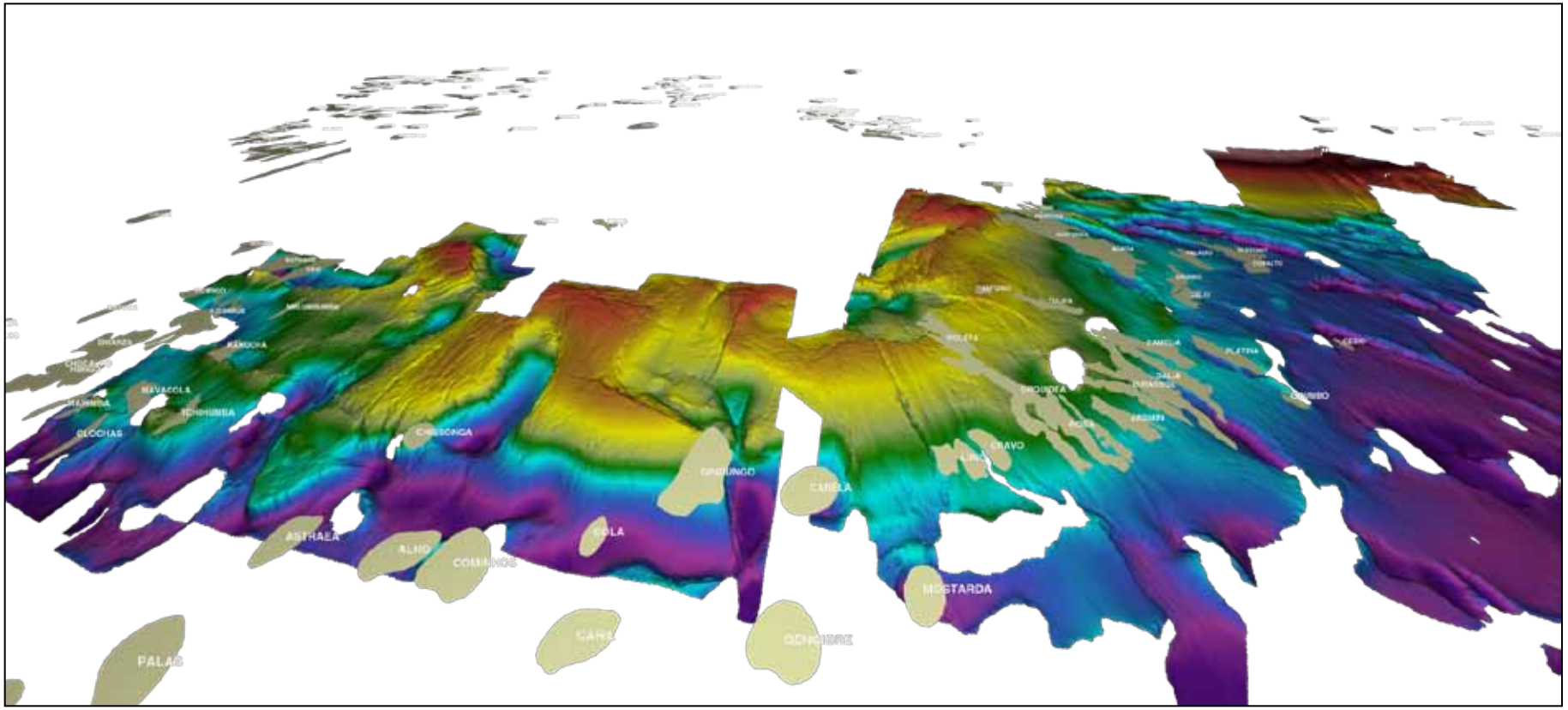


RMS amplitude 200ms interval below top Miocene

# Top Miocene sand channels,Bl 17



# Top Miocene Structure with Fields



# Thank you for listening

Please refer to related abstract:

The Subsalt Play in the Lower Congo and Kwanza Basins, Angola: A Seismic Study