



Geomorphology of Deep Marine Sediments, Northwest Borneo

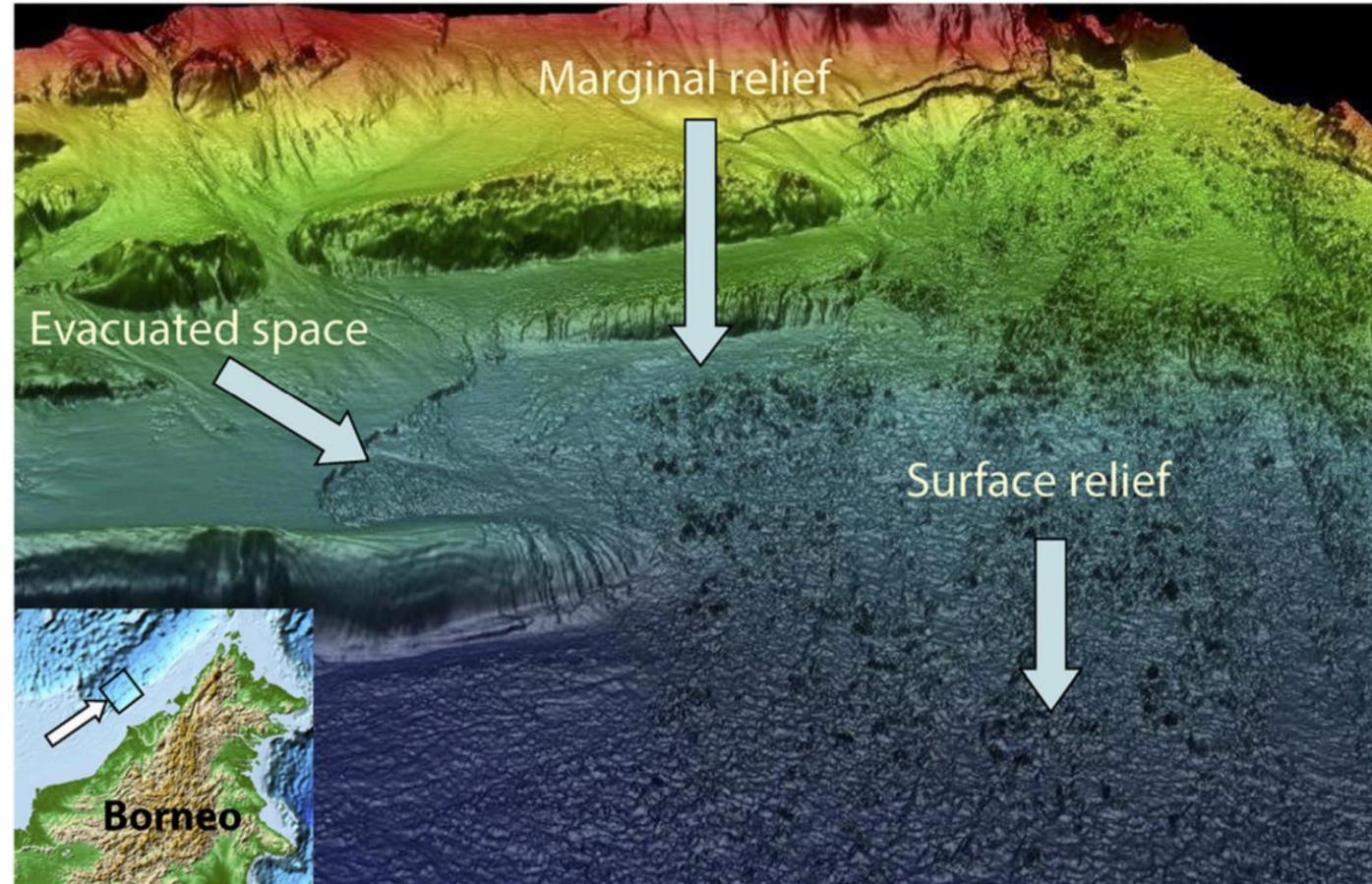
JOHANSSON, M., VAN DOORN, J., STOW, D.A.V., ROBERT, I., PHILLIPS, J. & FARAQ, S.



Talk Outline

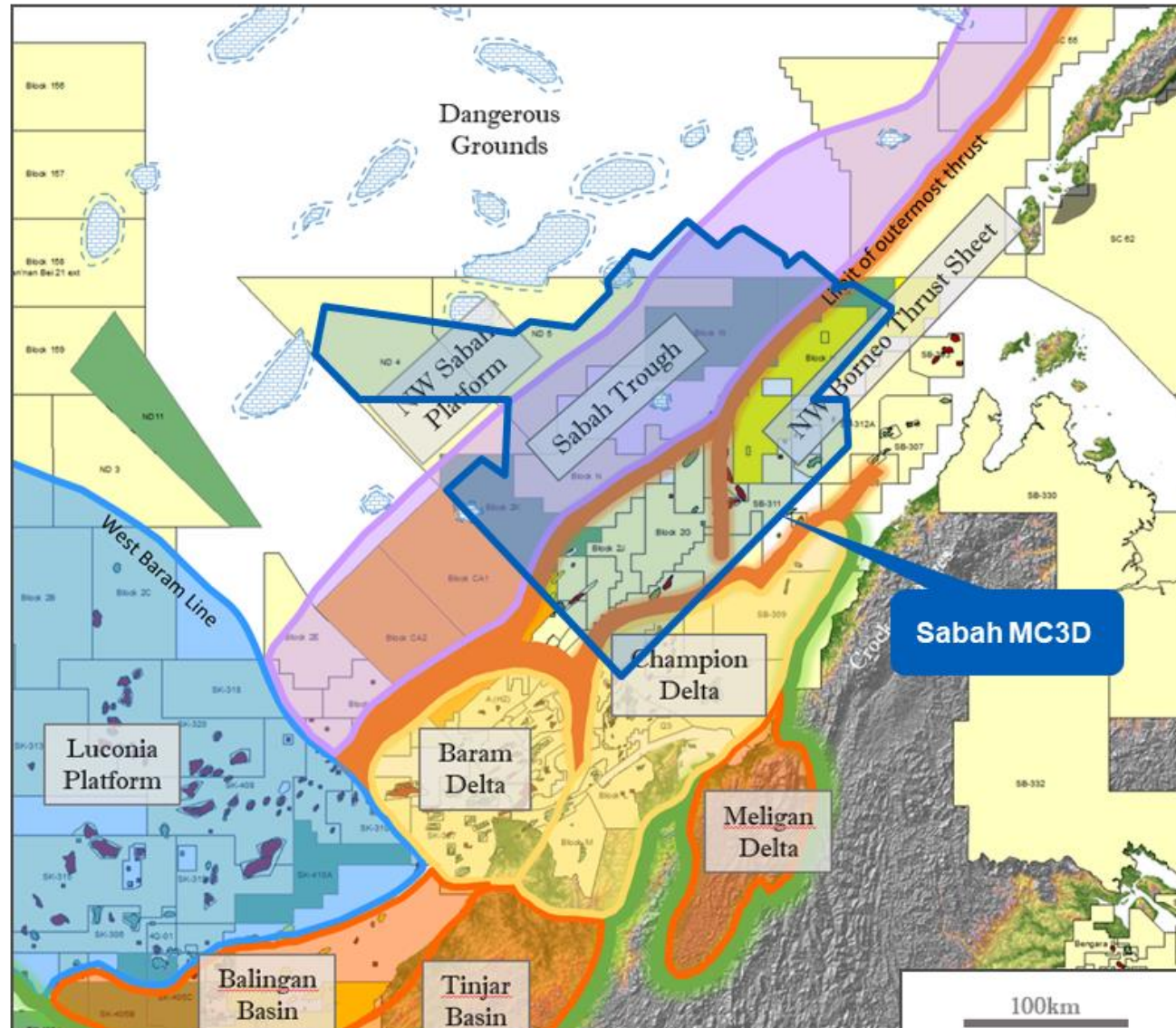
- Stratigraphy
- Geological Setting of Northwest Borneo
- Petroleum Systems of Sabah basin
- Geomorphology of:
 - Sabah/Brunei Shelf
 - Sabah Inboard
 - Sabah Trough
 - Sabah Outboard High (Dangerous Ground)
- Summary

Example in offshore Brunei of the creation of diverse types of topography on the modern sea floor by mass transport



AAPG Bulletin, v. 100, no. 2 (February 2016), pp. 213–235

Locality Map



Seismic Sections
courtesy of PGS



Sabah MC3D



Sabah Basin Petroleum Systems

Sabah Basin has a proven petroleum system within the fold and thrust belt in the Miocene turbidites, with many hydrocarbon discoveries and consists of various geologic terranes:

- **Fold and Thrust belt**

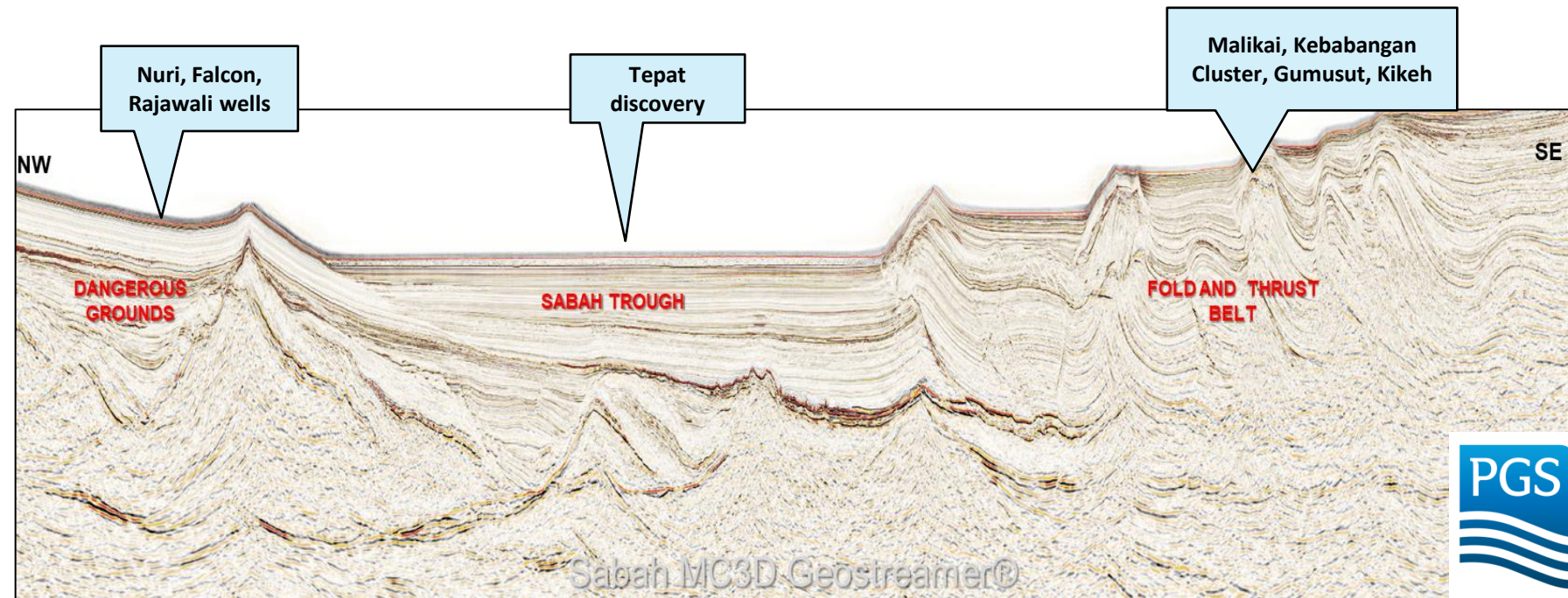
- Miocene-Pliocene turbidites (Baram, Meligan, Champion deltas) compressional setting, proven Play in the toe-thrusts.

- **Sabah Trough**

- Pre-Miocene rift clastics, carbonates, younger clastics, strat traps.

- **Dangerous Grounds**

- Extensional tilted fault blocks formed during opening of SCS (Eocene-Oligocene), Rift/Syn-rift clastics, carbonates.



Sabah/Brunei Slope



Sabah
Outboard

Sabah
Trough

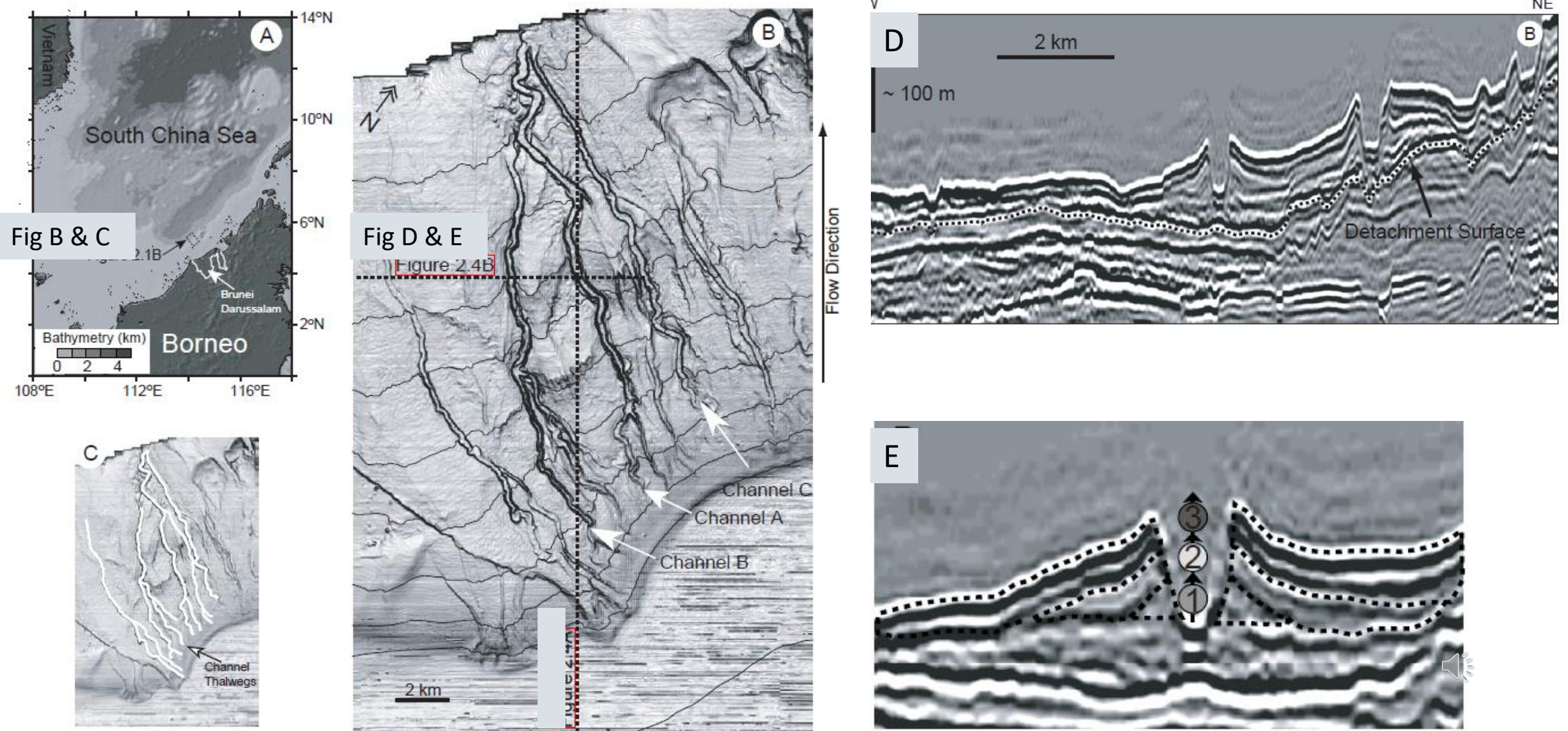
Sabah
Inboard

Sabah
Slope

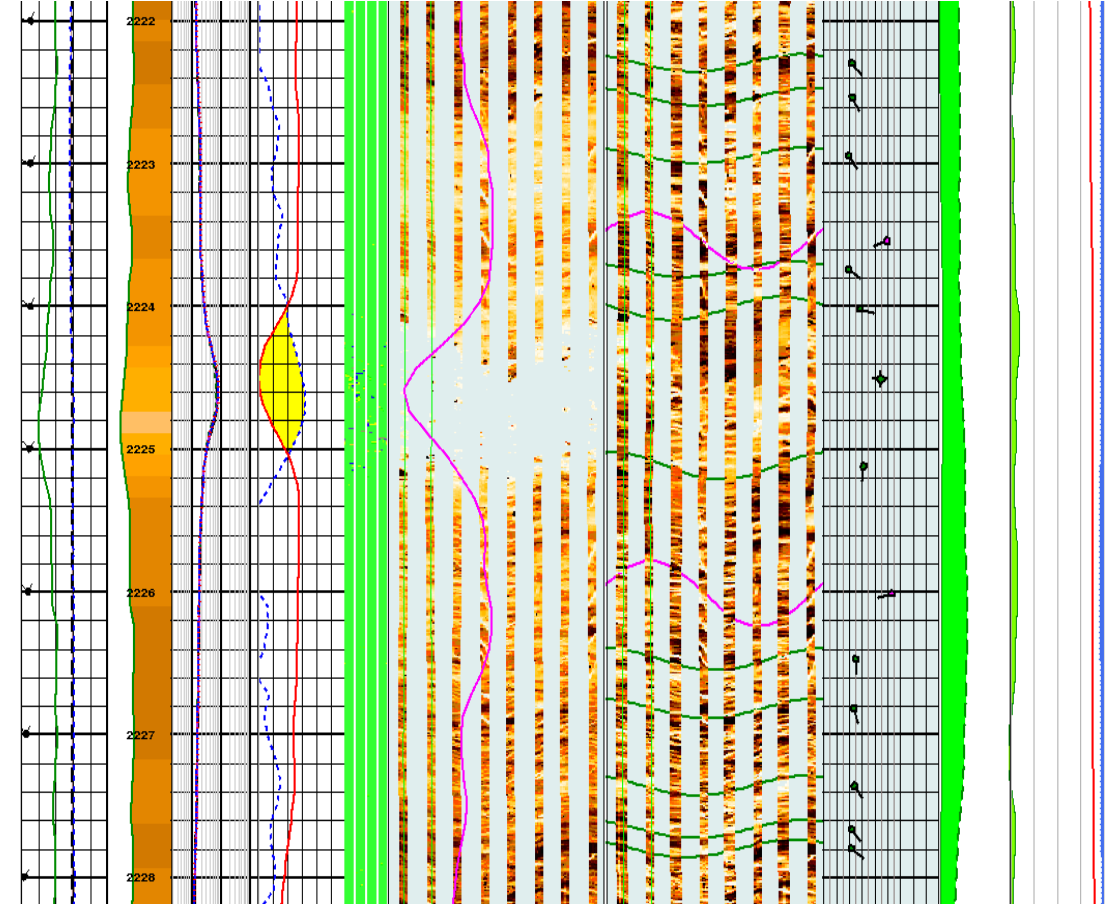
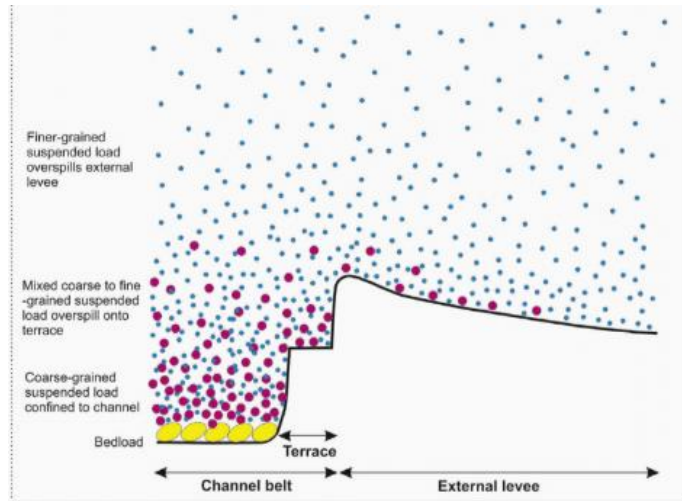
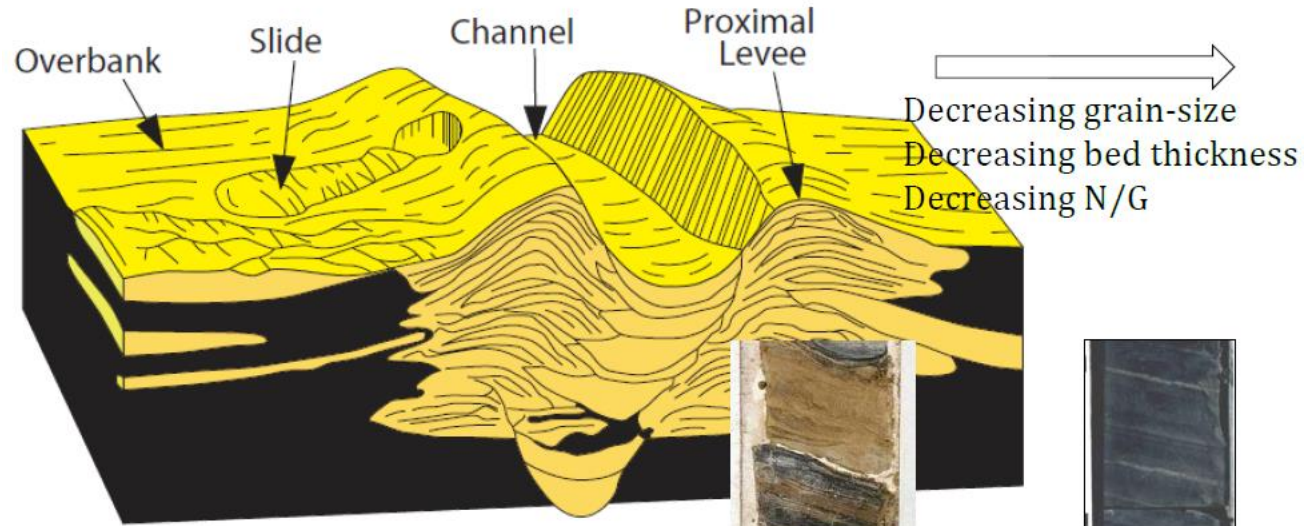


Large height differential of 7km over 200km between sedimentary hinterland and base of continental slope, offshore West Sabah

Submarine Levees Offshore Borneo



Levee Overbank Characteristics



Sabah Inboard

Sabah
Outboard

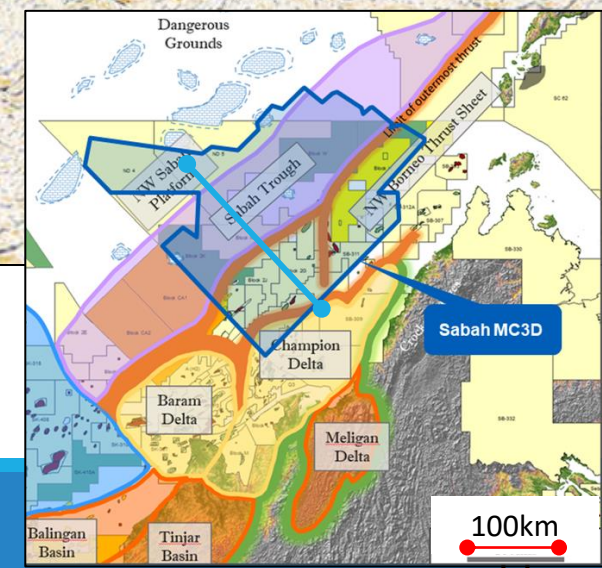
Sabah
Trough

Sabah
Inboard

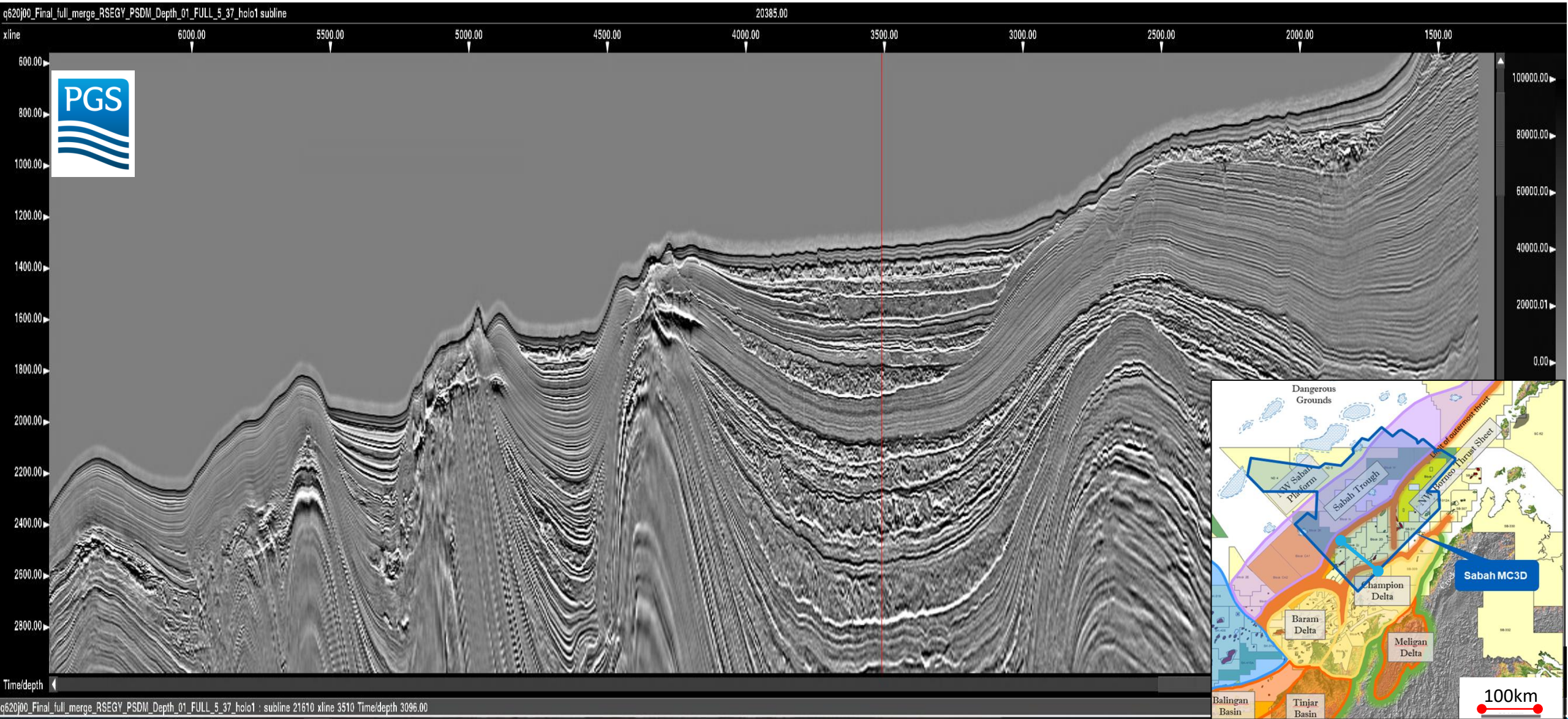
Sabah
Shelf



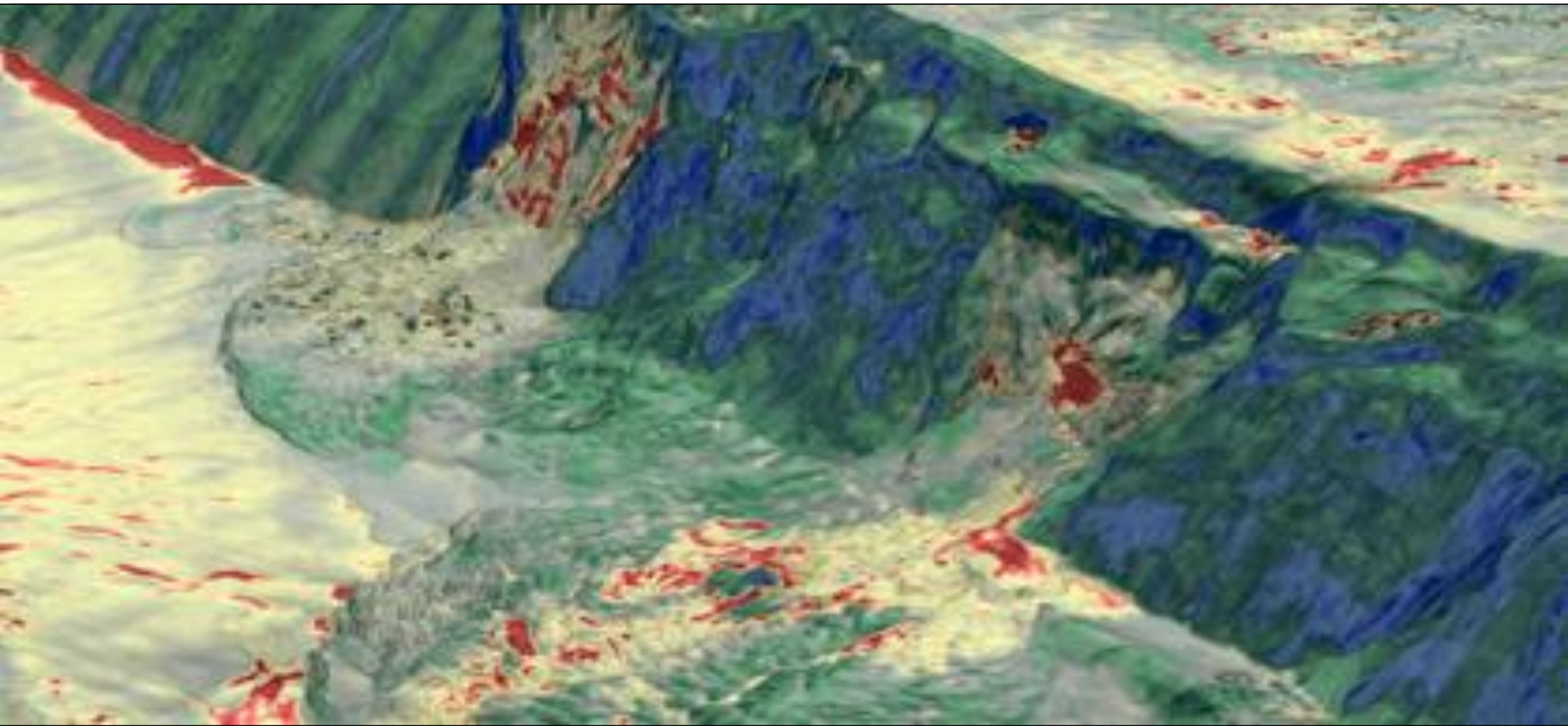
Large height differential of 7km over 200km between sedimentary hinterland and base of continental slope, offshore West Sabah



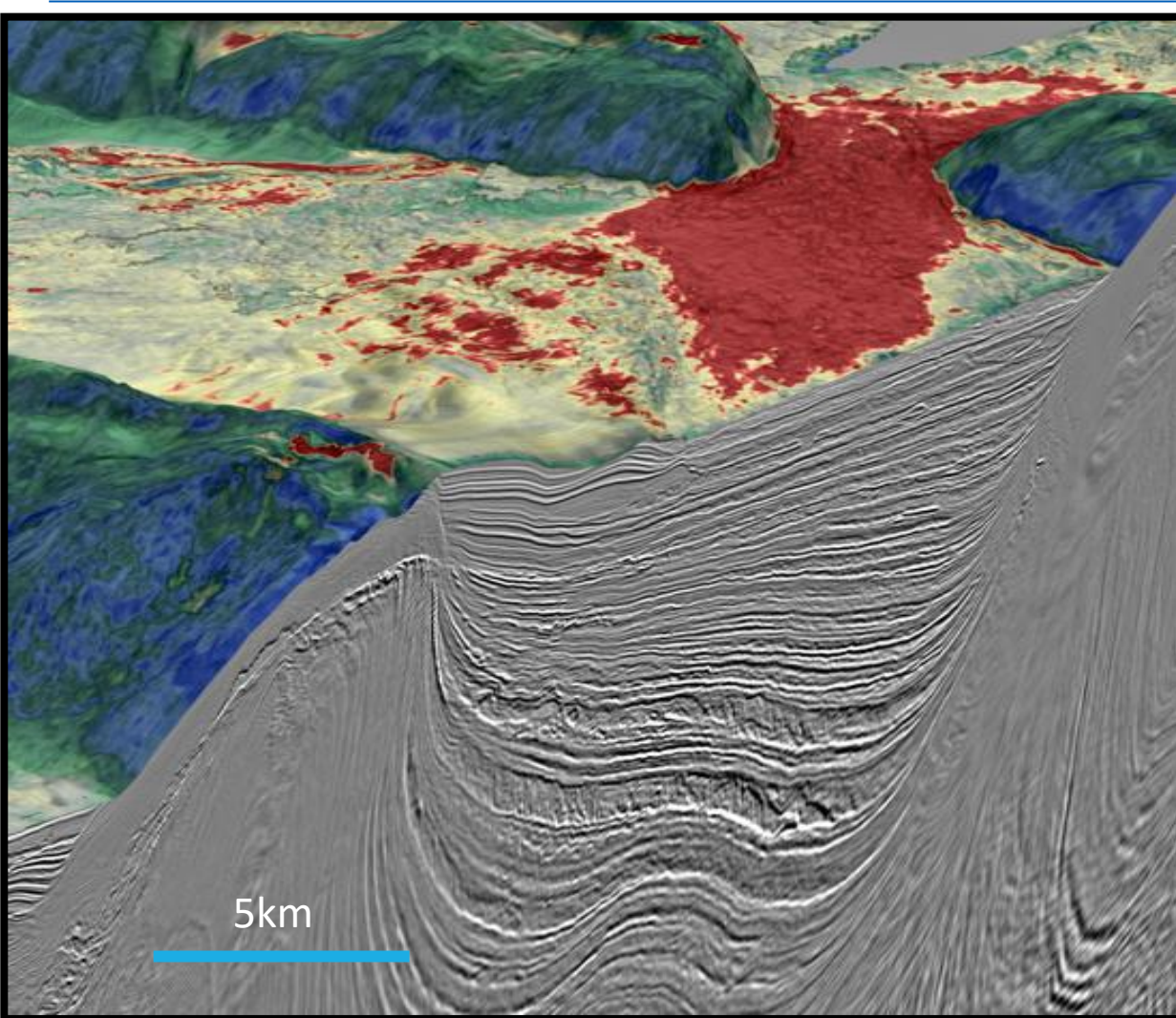
Sabah Inboard



Localized Mud Slides



Topography of MTD



1. Clinoforms downlapping into slide scar

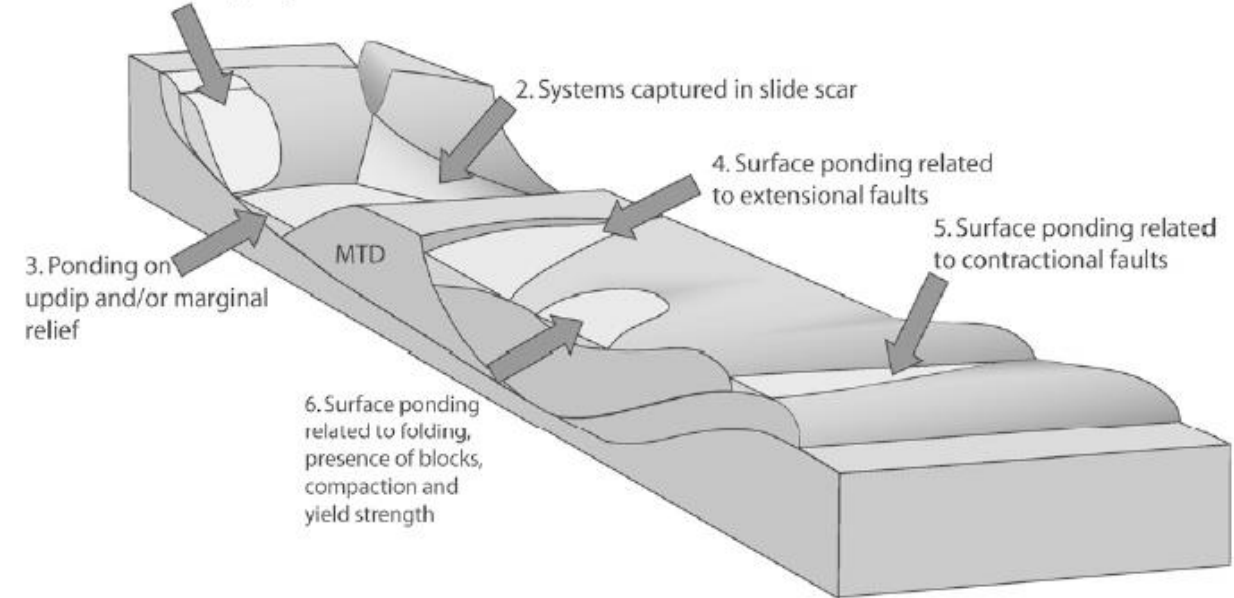


Illustration of styles of accommodation associated with mass-transport deposits (MTDs)

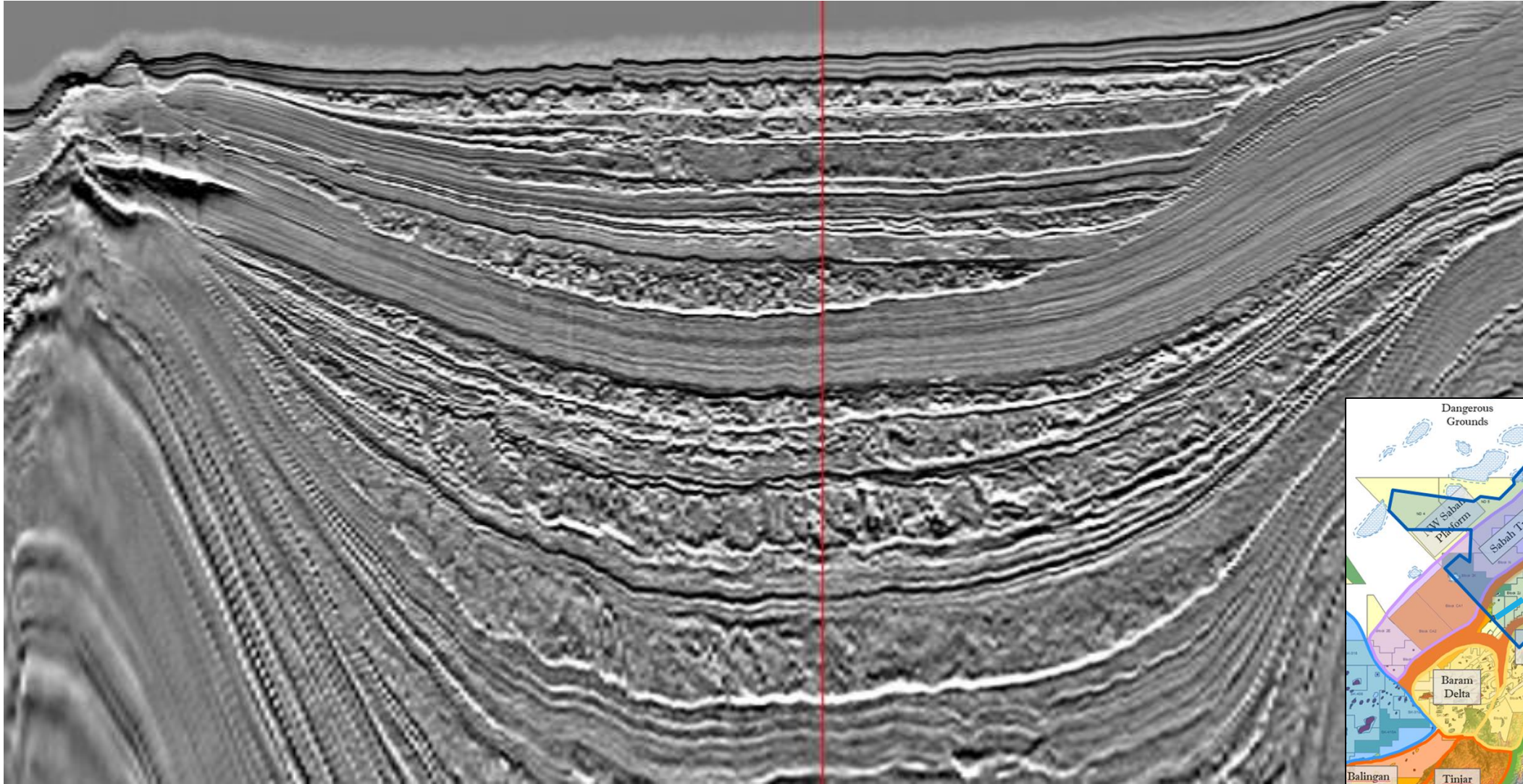
Kneller, et al. AAPG Bulletin, v. 100, no. 2 (February 2016), pp. 213–235

SW

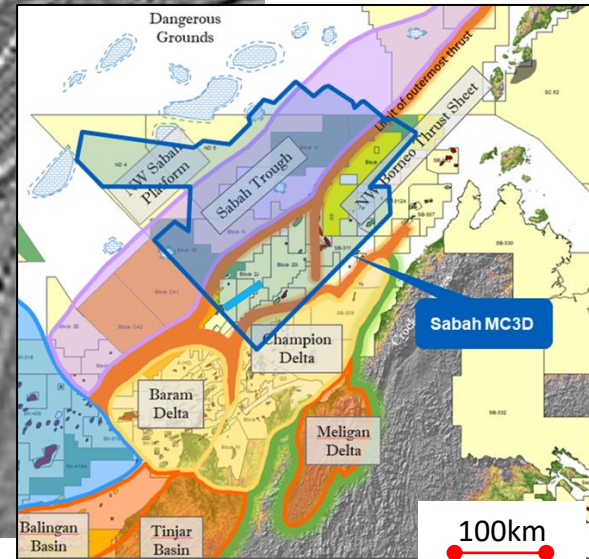
Stacking Patterns of Ponded Fill

NE

Brunei Border



Approx 25km across



Mudwall / Dispir
leading anticline

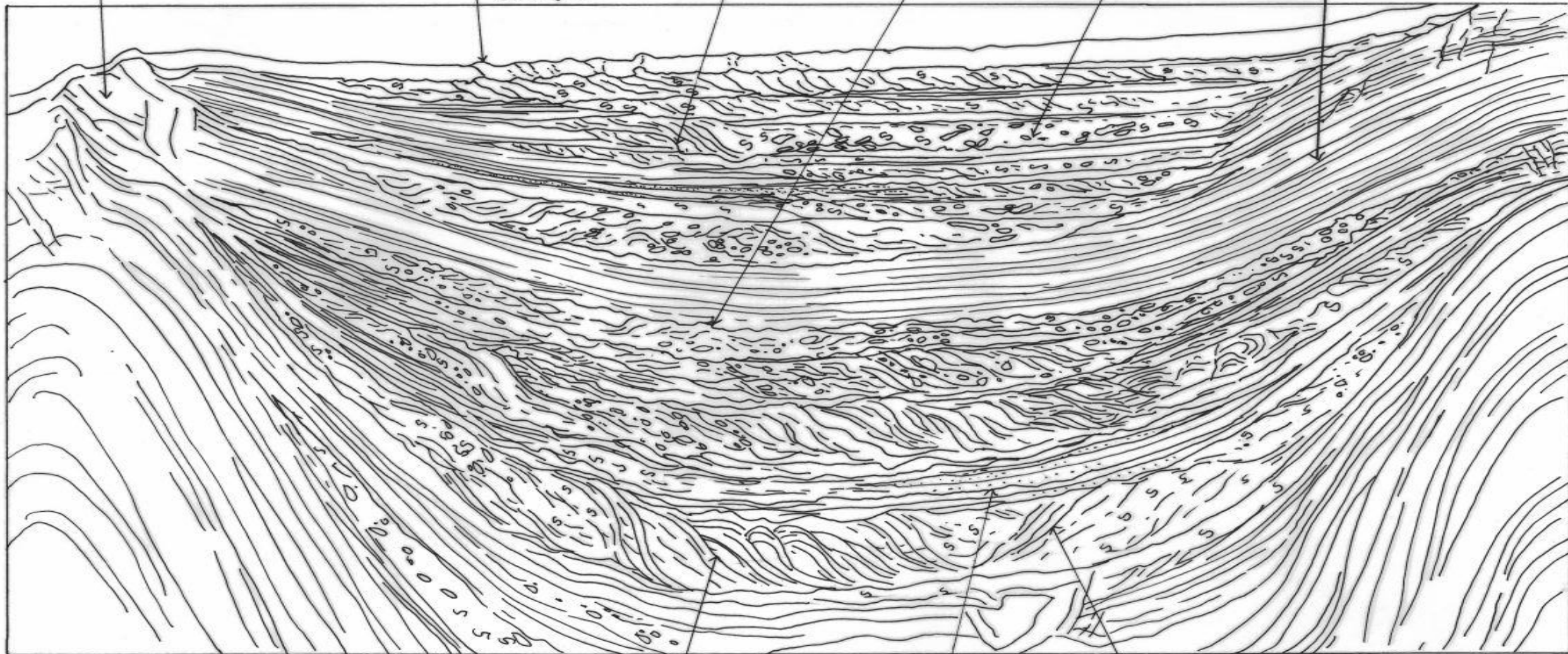
Compressional too Thrusts
on seafloor

MTD basal erosional
'bull-dozing'

Rugose MTD top

MTDs w, chaotic
transparent seismic
facies are
debris

Tramline low reflectivity
slope shales + heterolithics



SW
← BRUNEI
BORDER

Lateral MTD attenuation
due to pinchout on growing
structure pinned
by mobile substrate

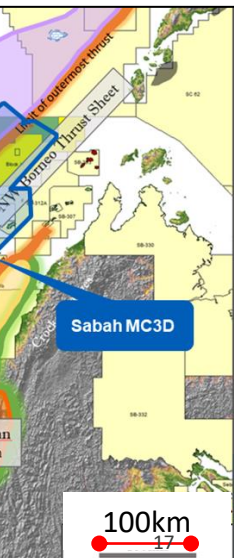
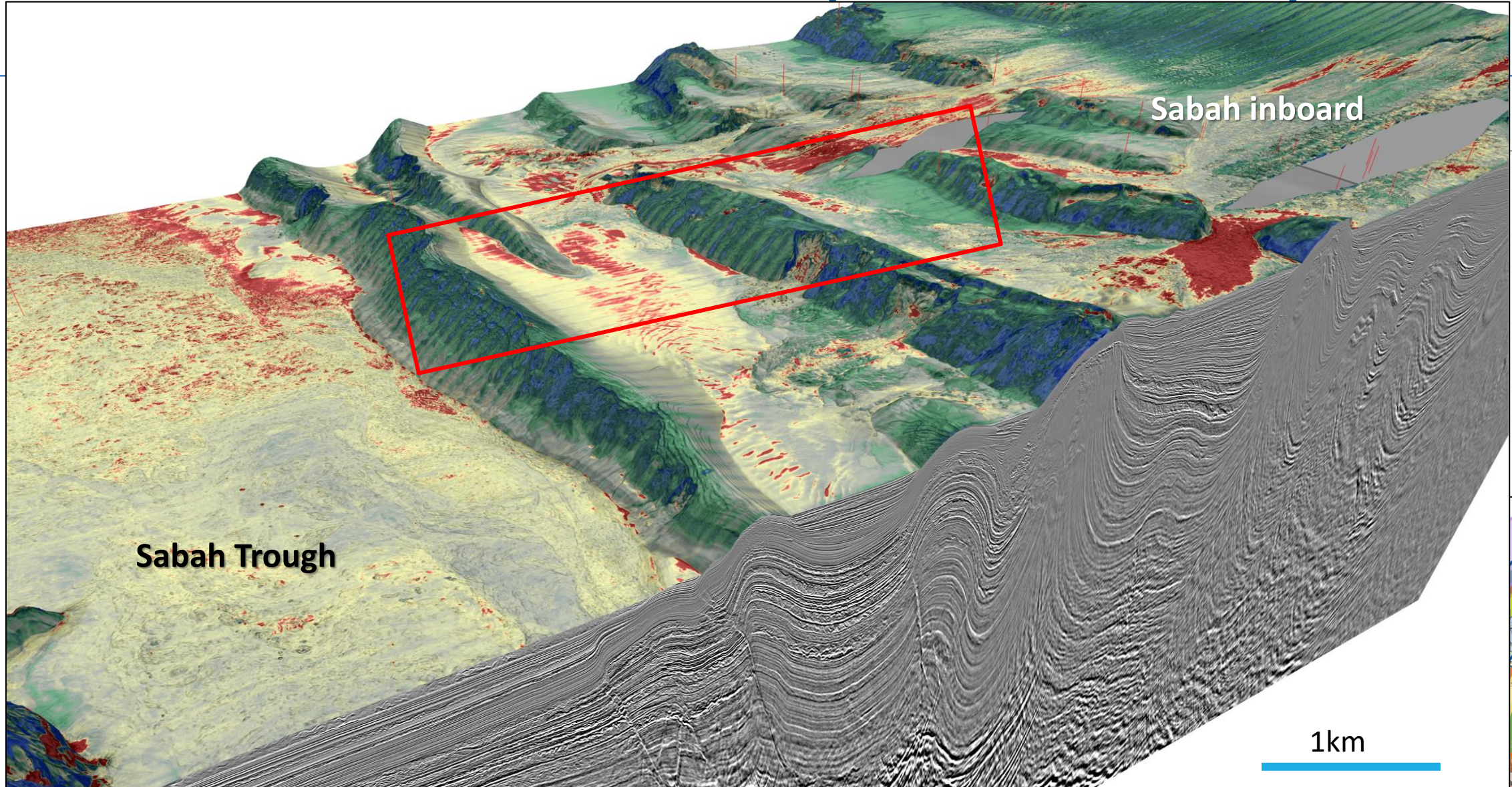
MTD
Internal compressional
thrusting

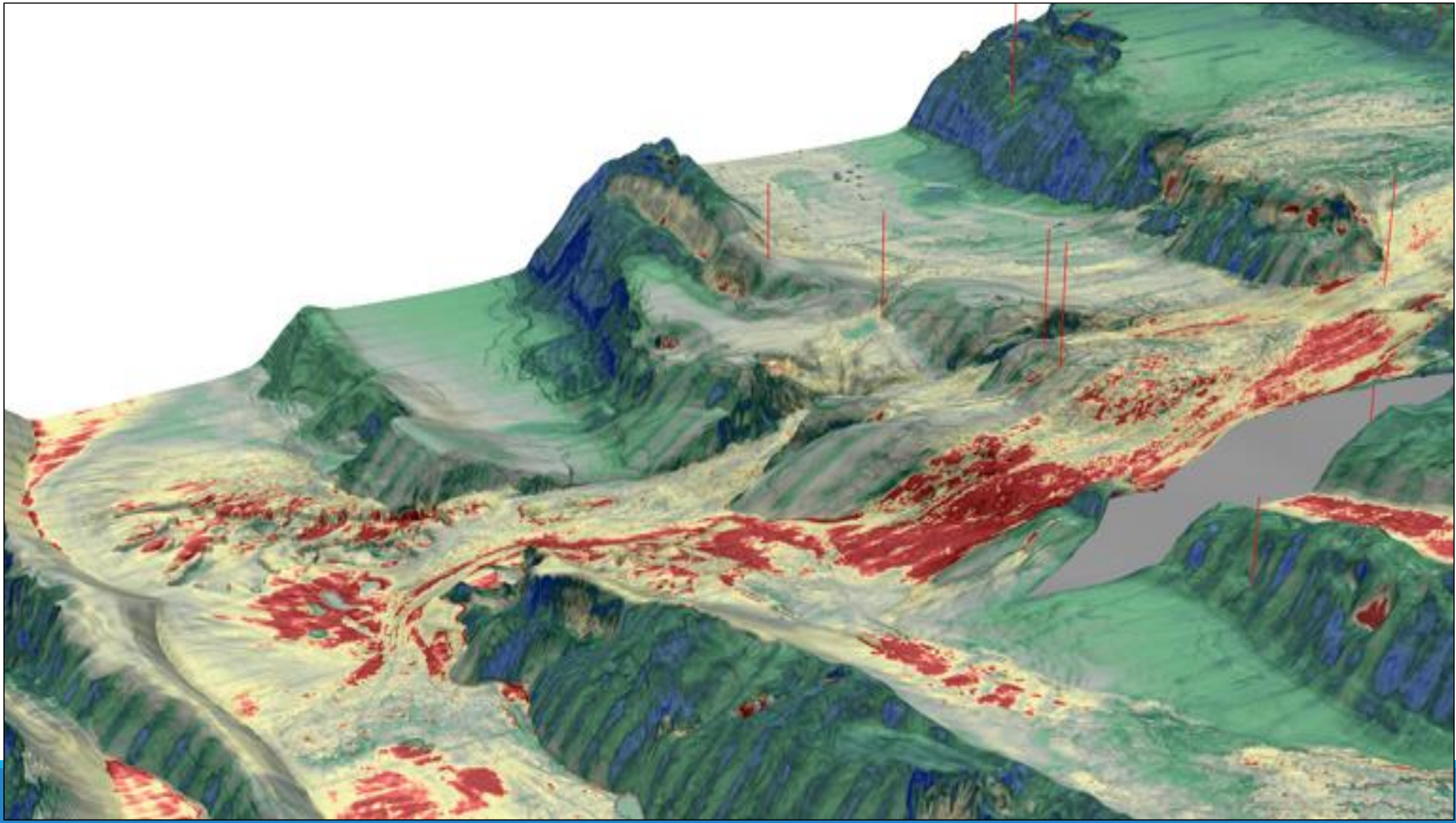
Potential MTD
top-ponded
sand sheets

Potential extensional
detachments

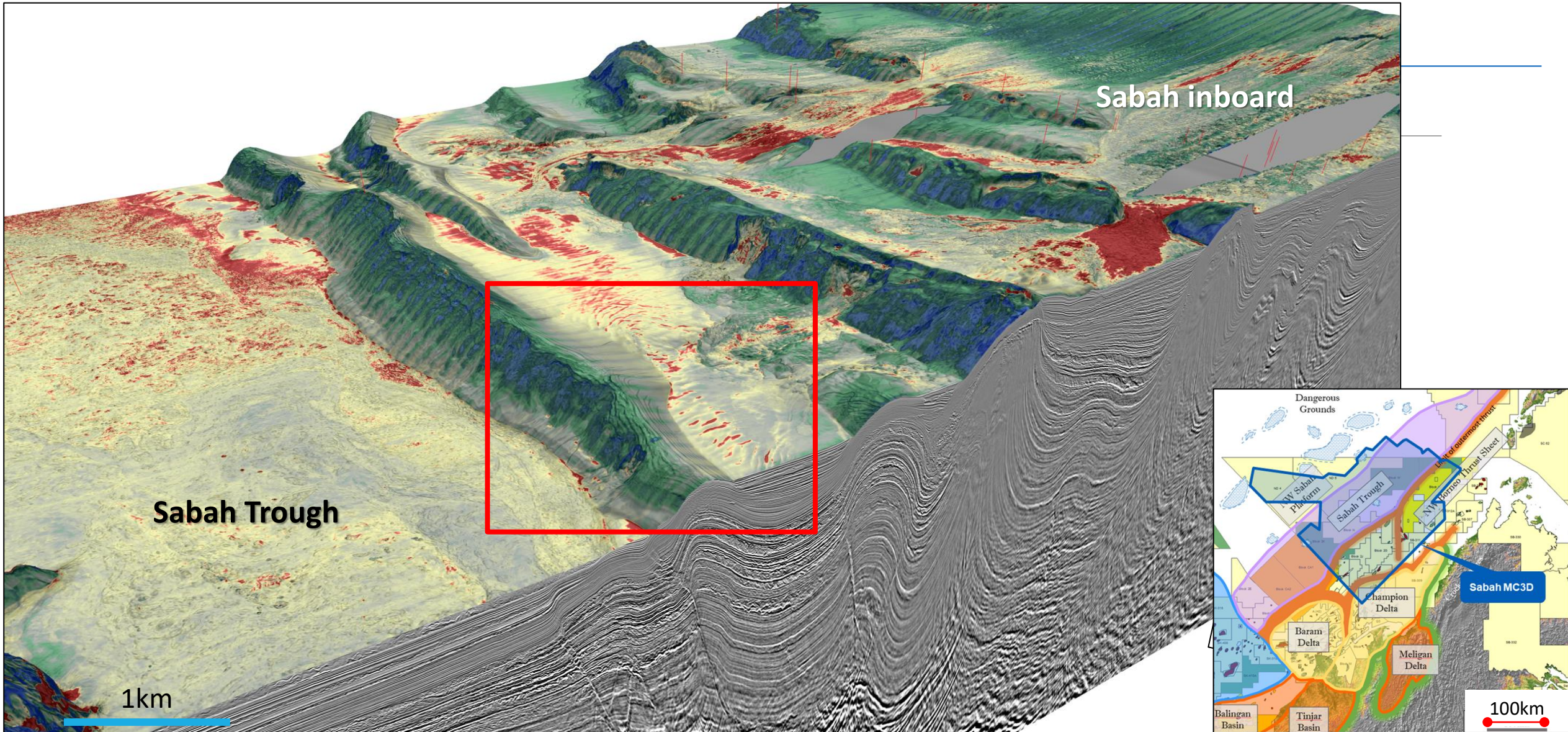
NE

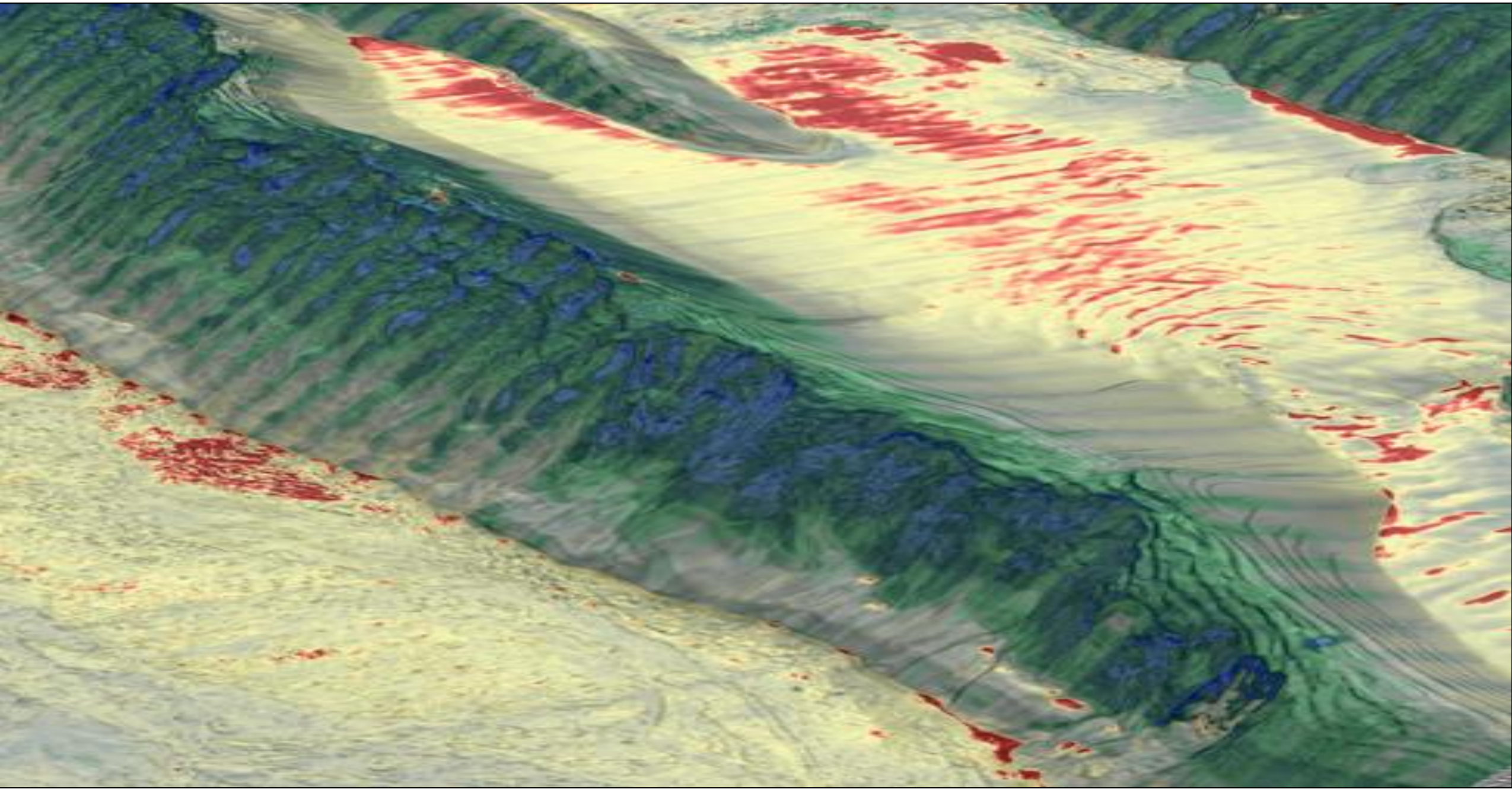
Submarine Fans (View from NW)



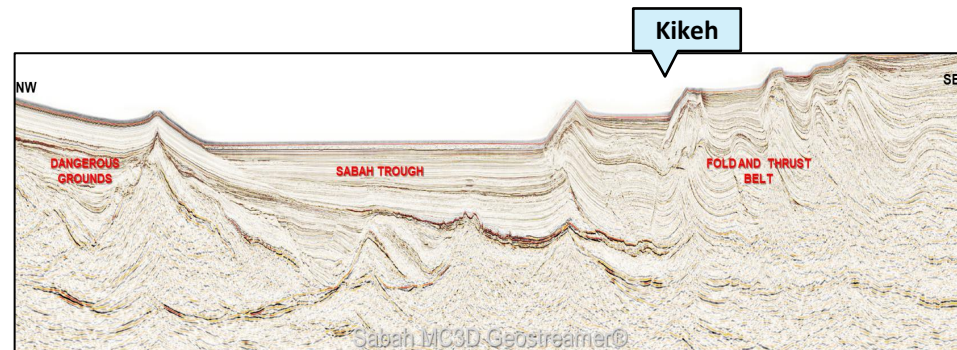
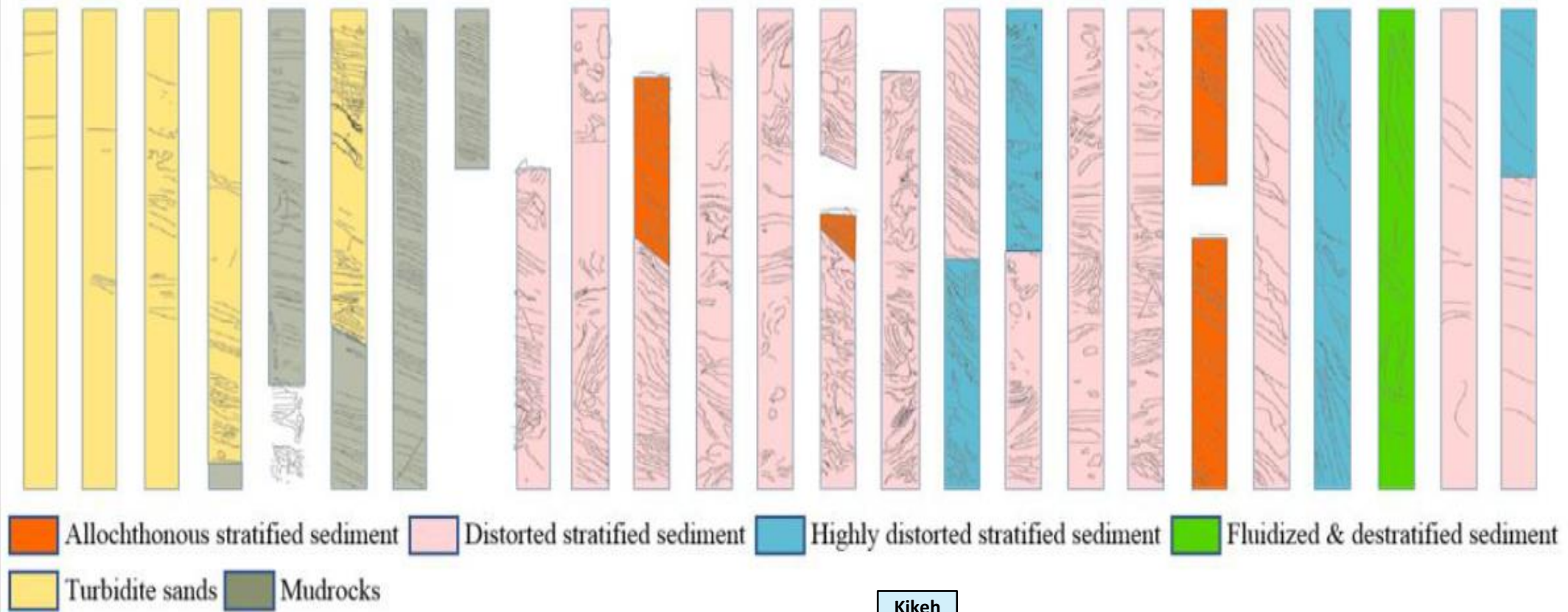
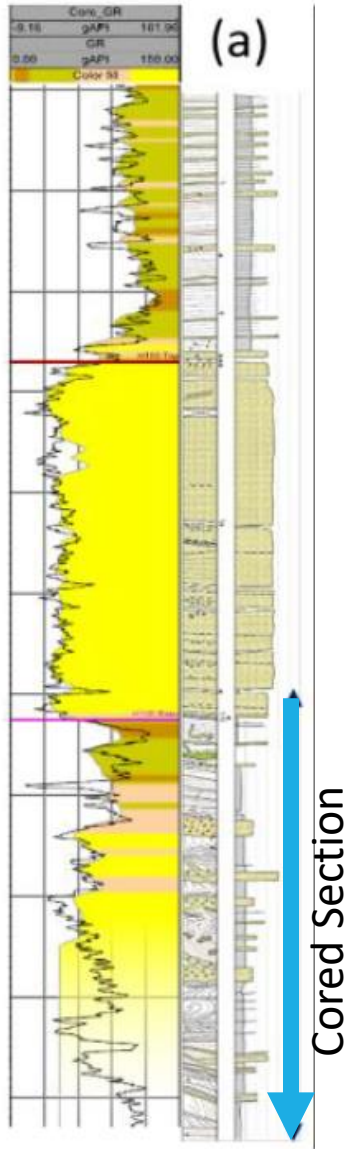


Intraslope Axial Flow

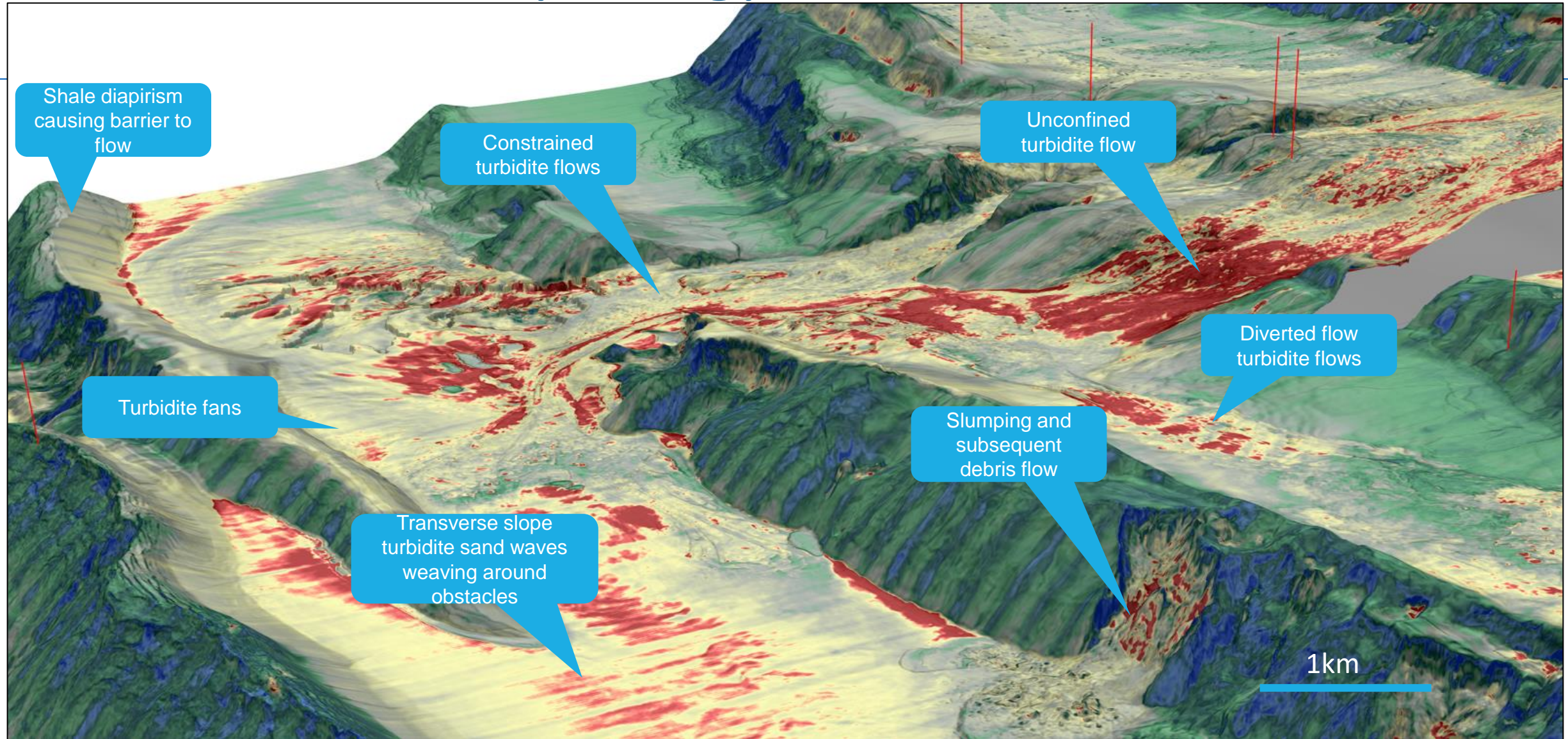




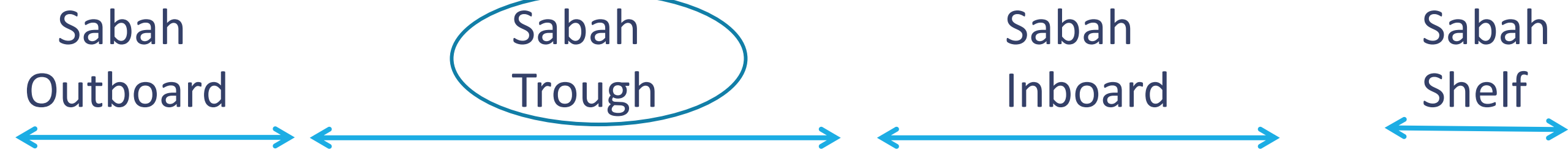
Facies: Kikeh Field



Geomorphology of Sabah Inboard



Sabah Outboard



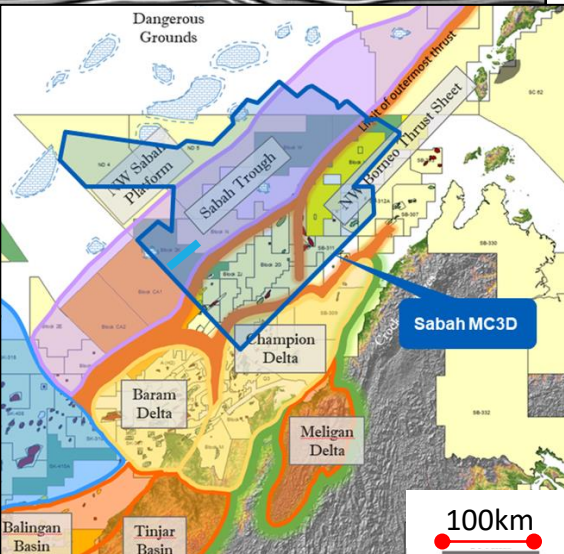
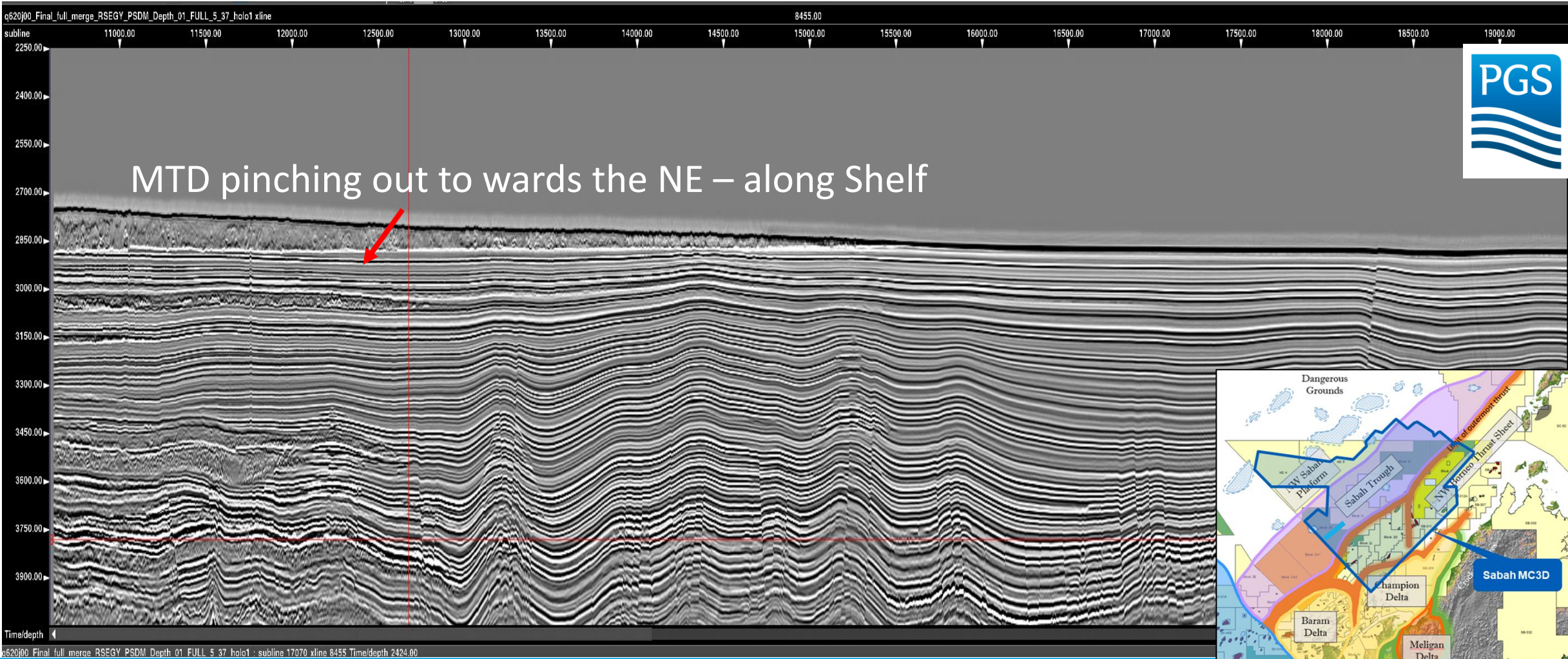
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Cross-Section of Sabah Trough

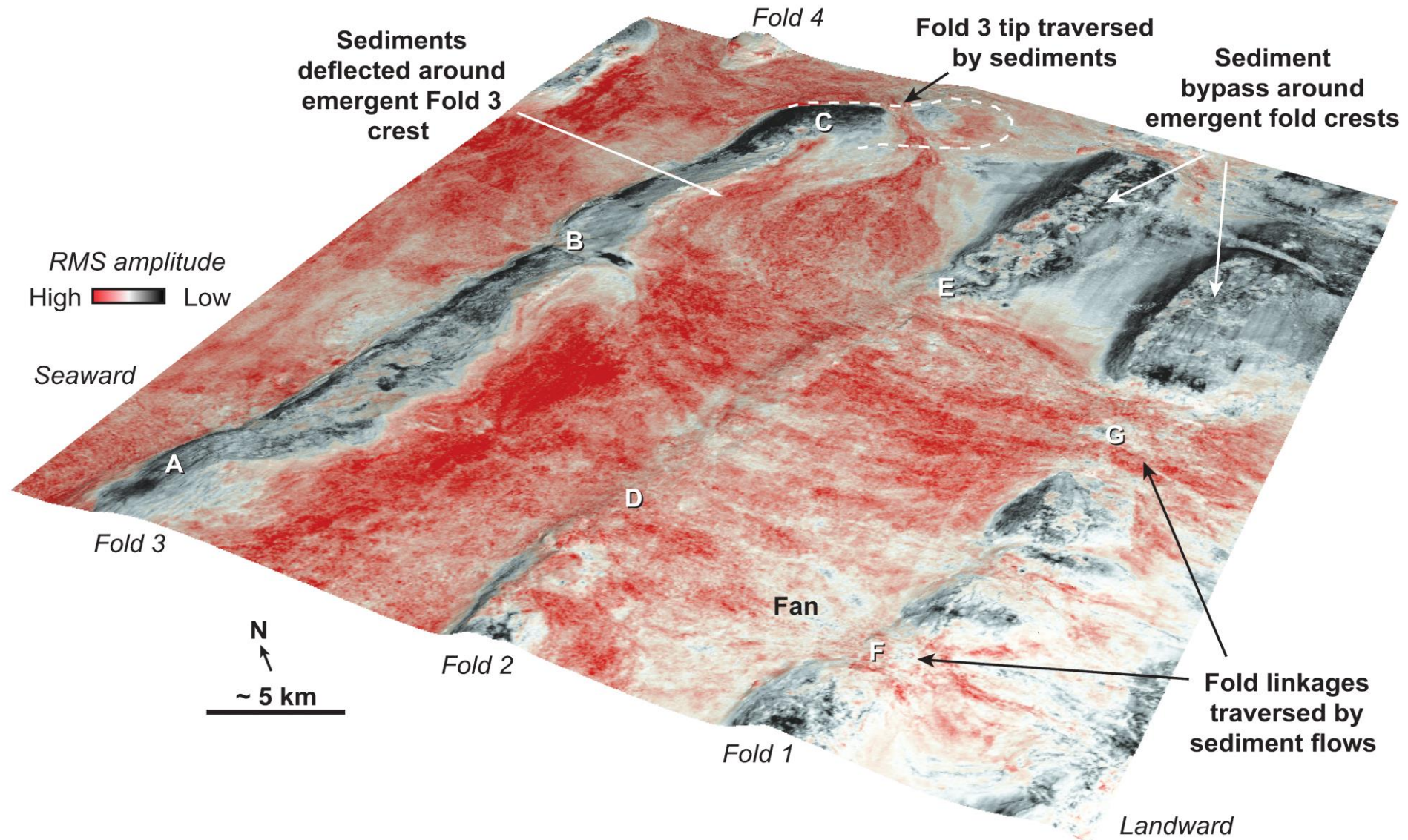
SW

NE

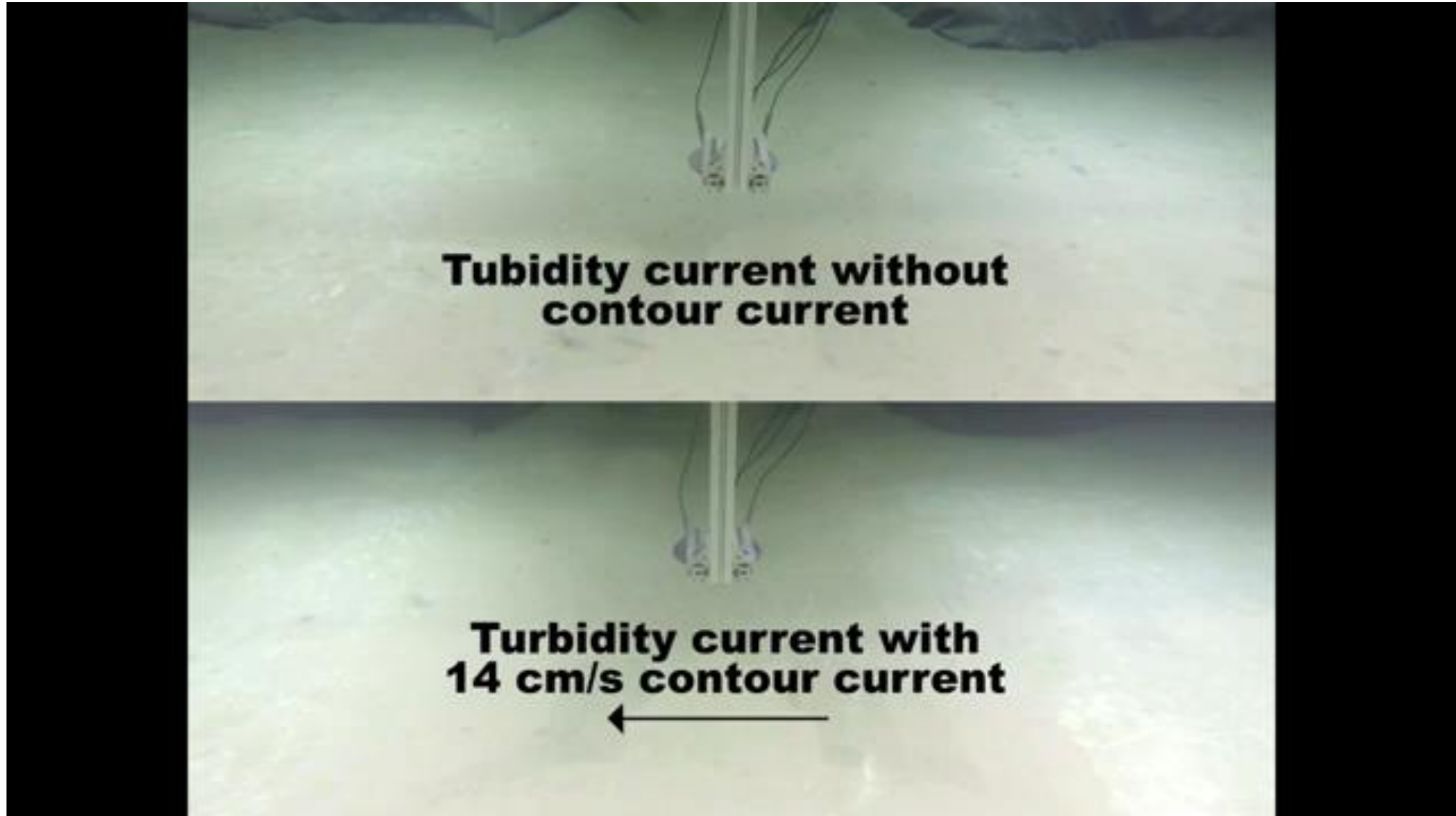
Brunei Border



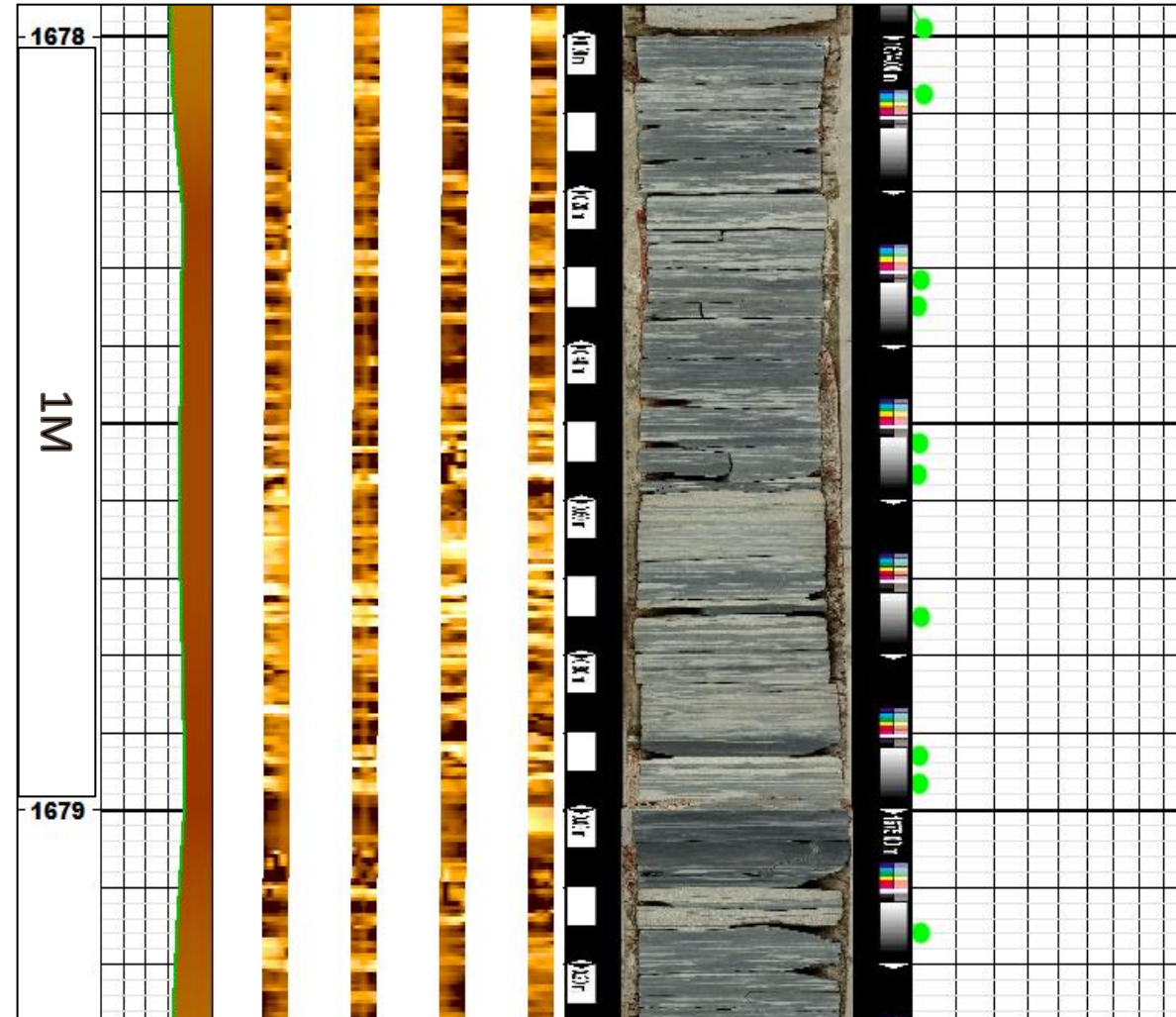
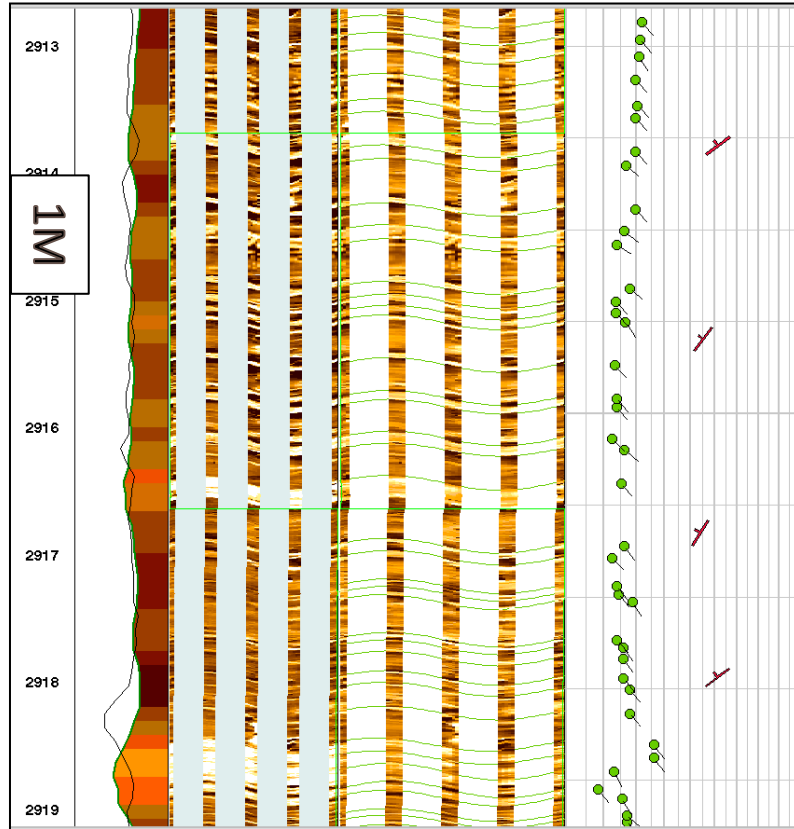
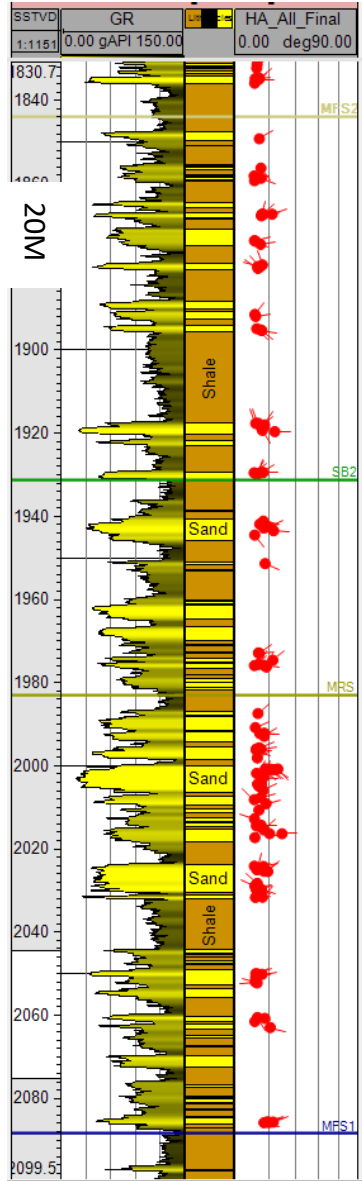
Distal Turbidites, Offshore Sabah



Influence of Contour Currents on Turbidites

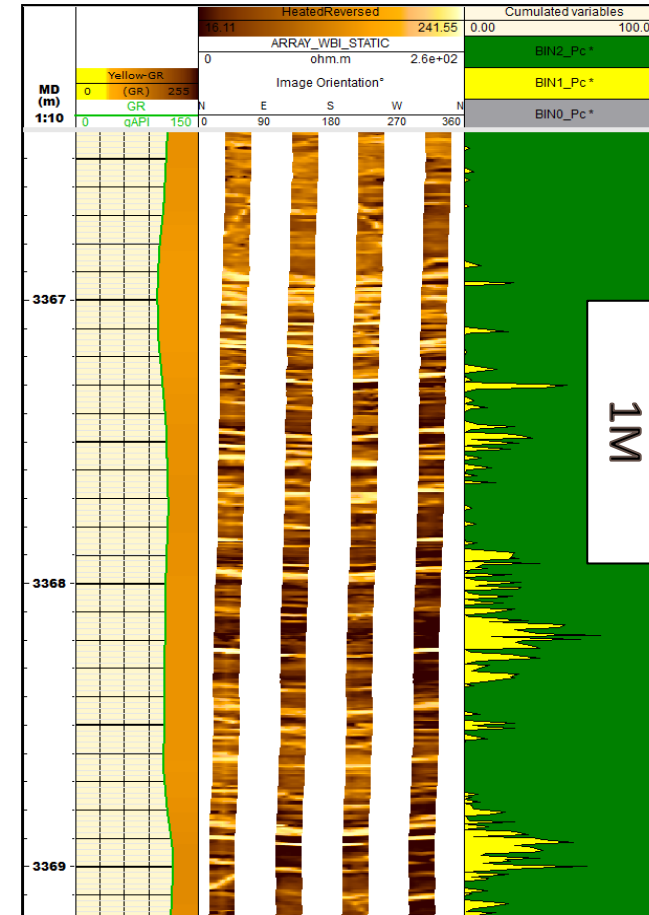
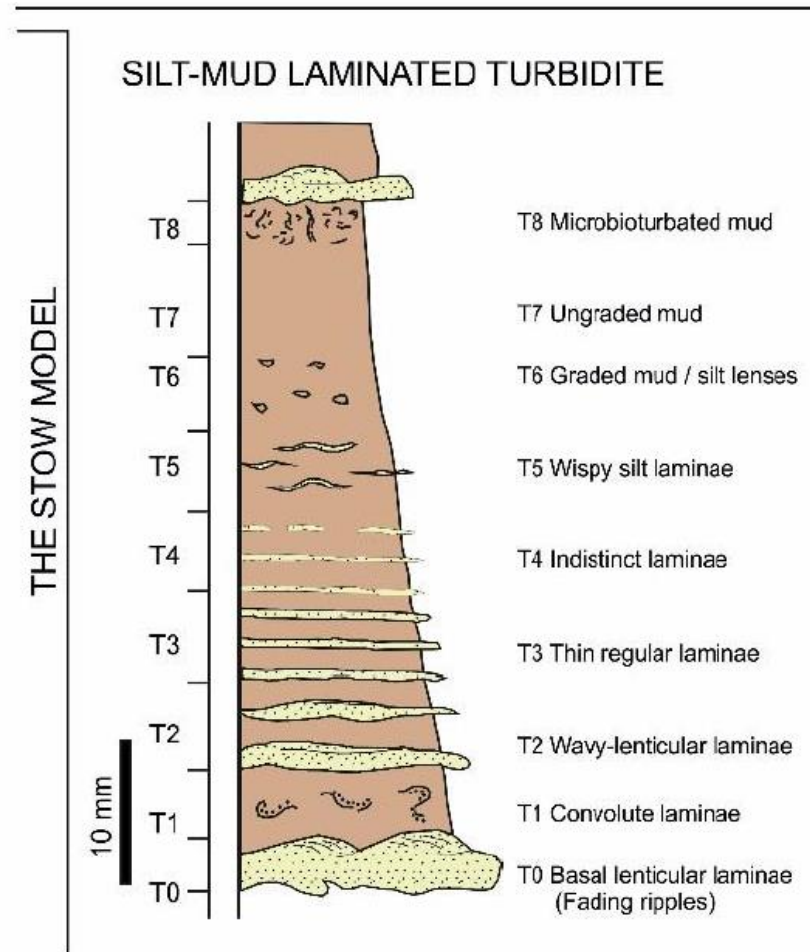


Facies Characteristics of Sandy Turbidites



Laminated heterolites

Facies Characteristics of Muddy Turbidites

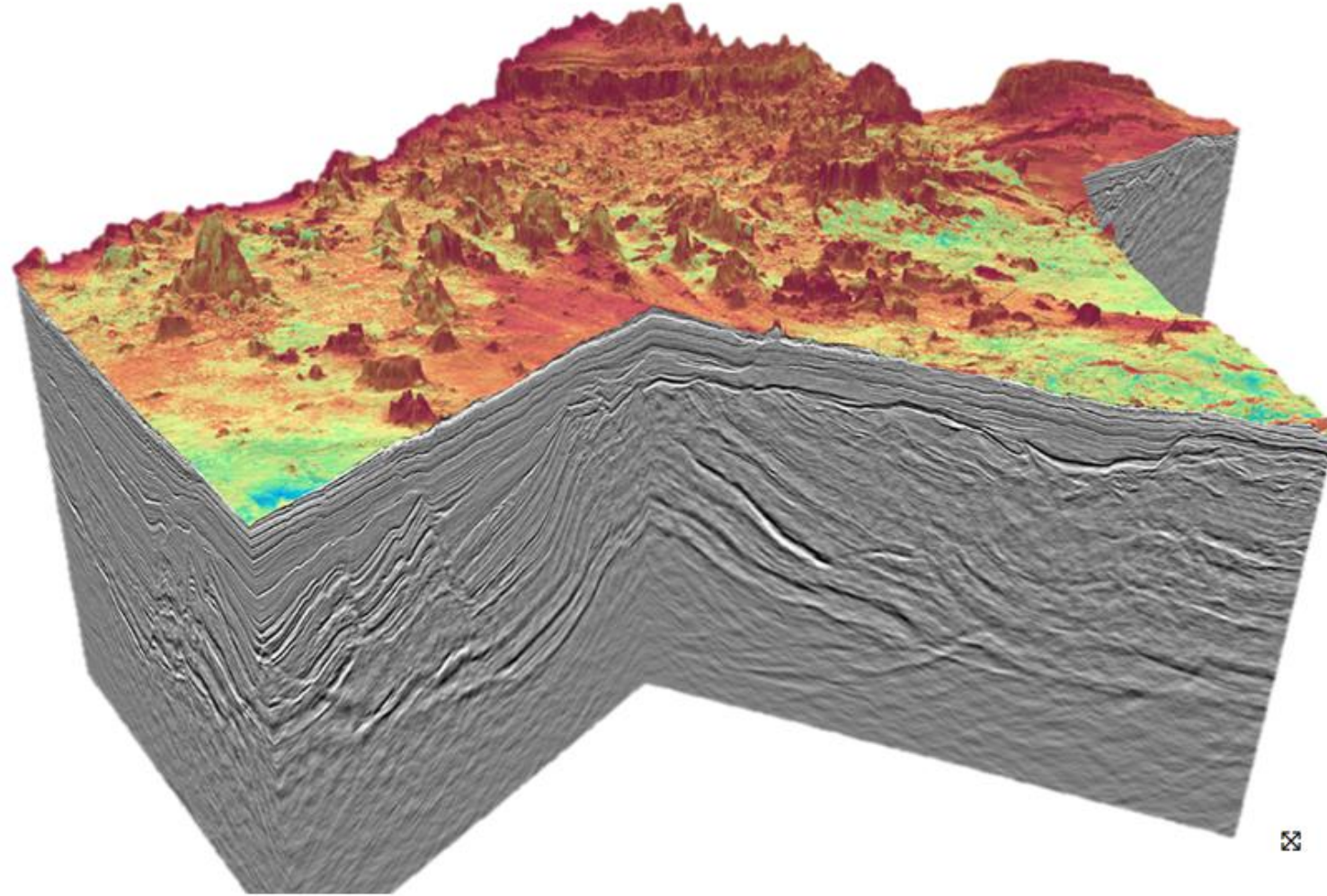


Sabah Platform Outboard High



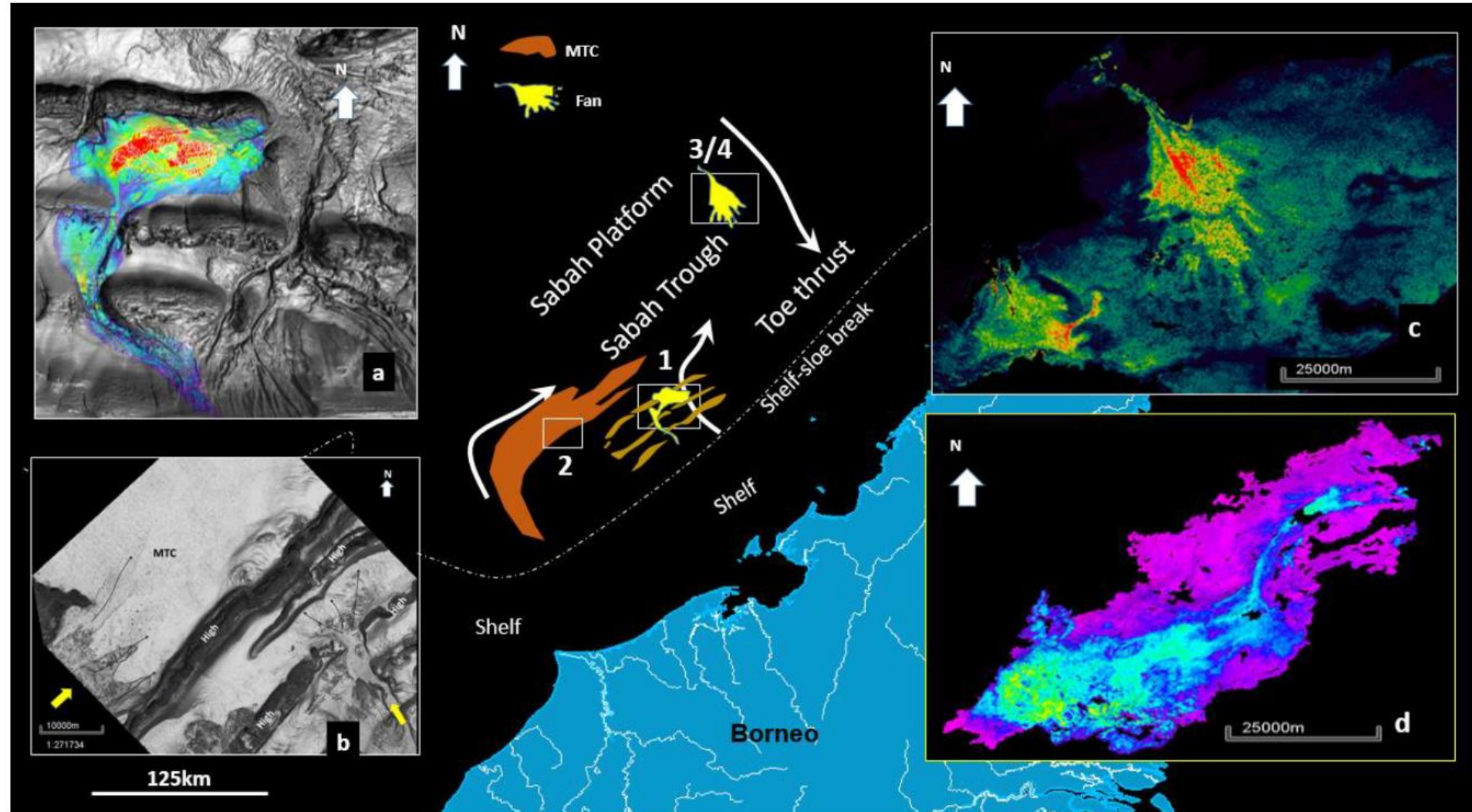
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Sabah Trough and Dangerous Grounds



[Geology](#) | [Sabah](#) | [Offshore Oil and Gas Exploration](#) | [Seismic](#) | [PGS](#)

Deep Water Sabah Trough



Summary

- **MTD's create additional complex accommodation space in slope scars and rugose surfaces.**
- **Sabah/Brunei Slope are areas of sediment bypass apart from the levees, which potentially could comprise coarse sand.**
- **Turbidites are sensitive to topography and control reservoir geometry on the Sabah Inboard.**
- **Sabah Trough sediments are characterised by continuous thin turbidites with asymmetrical lobes and levees.**
- **Sabah Trough MTDs are sourced from Sabah, Sarawak Shelf and Dangerous Grounds.**
- **Sabah Trough sediments have been interpreted as reworked from contourites.**

Acknowledgements



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MC3D Sabah Geostreaming

and

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