

# **A Regional Approach to Understanding Basin Evolution and Play Systematics in Brunei - Unearthing New Opportunities in a Mature Basin\***

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## **Abstract**

The structural evolution and fill history of the Brunei area of the NW Borneo margin has been revised as part of a regional study aimed at exploration portfolio rejuvenation. Particular areas of focus have been:

- What is happening at depth? New insights into the deep mechanical basement architecture have helped develop a better understanding of high order deformation and deposition controls. These observations also highlight the potential for deep plays.
- What was the structural evolution of the basin and what controlled deformation? Understanding the interaction between gravity-driven delta deformation and regional compressional tectonics is key.
- What is driving the sedimentary sequence architecture? The interplay between deformation, eustasy and sedimentation is critical for understanding the sequence architecture.

Reinterpretation of the tectonostratigraphic architecture was achieved by integrating multiple data sets (esp. 2D/3D seismic, well data, gravity, DEM) and by comparisons to regional and global analogues. Reconstruction of basin deformation and fill history for key intervals is captured in a series of paleogeographic maps that show active structural and sedimentary features for a given time interval, linked to 2D structural restorations and mapped key seismic horizons. Together, these products provide a basis for the development of a robust, internally consistent geological model from which new plays and prospects have been defined and assessed.

The approaches used and findings of the work are likely to be applicable to regional evaluations of deltas deposited in compressional settings or where a complex interaction between deformation and sedimentation occurs.

### **Selected Reference**

Simons, W.J.F., A. Socquet, C. Vigny, B.A.C. Ambrosius, A.S. Haji, C. Prothong, C. Subarya, D.A. Sarsito, S. Matheussen, P. Morgan, and W. Spakman, 2007, A decade of GPS in Southeast Asia; resolving Sundaland motion and boundaries: *Journal of Geophysical Research*, v. 112/B6, p. B06420.

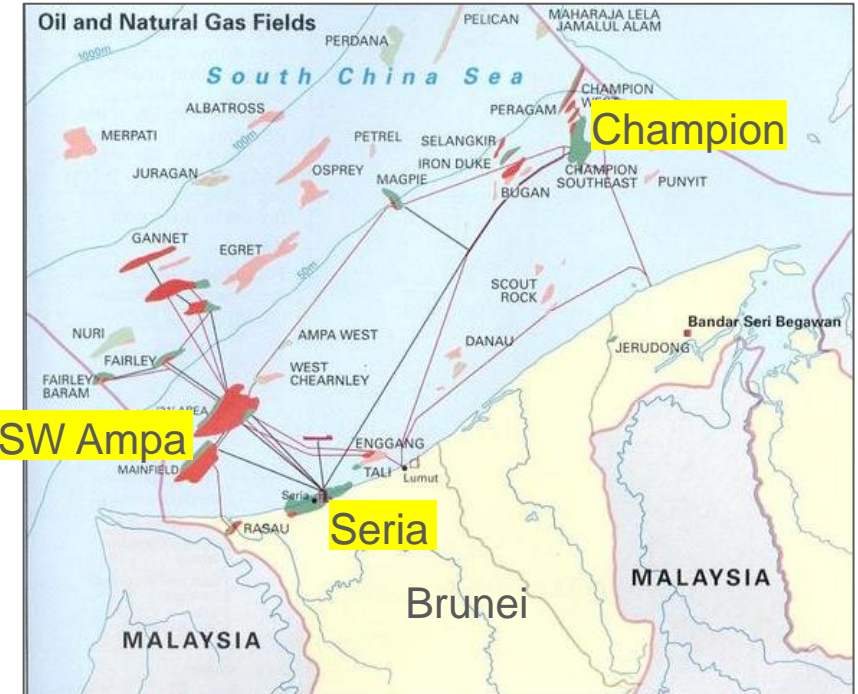
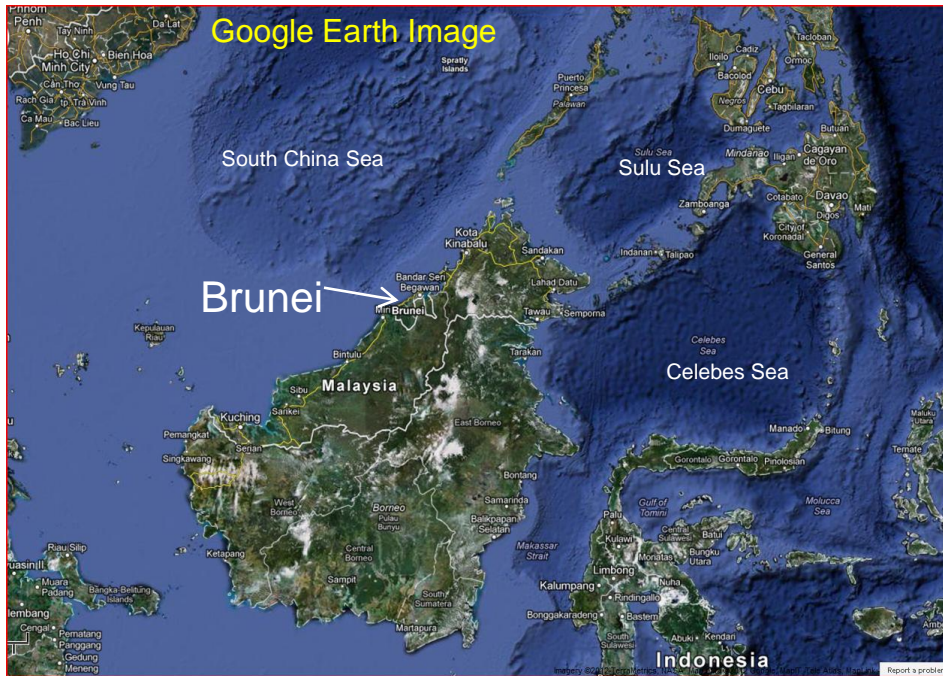
# A REGIONAL APPROACH TO UNDERSTANDING BASIN EVOLUTION AND PLAY SYSTEMATICS IN BRUNEI - UNEARTHING NEW OPPORTUNITIES IN A MATURE BASIN

Anthony Gartrell<sup>1,2</sup>, Jose Torres<sup>1,2</sup> & Nick Hoggmascall<sup>1</sup>

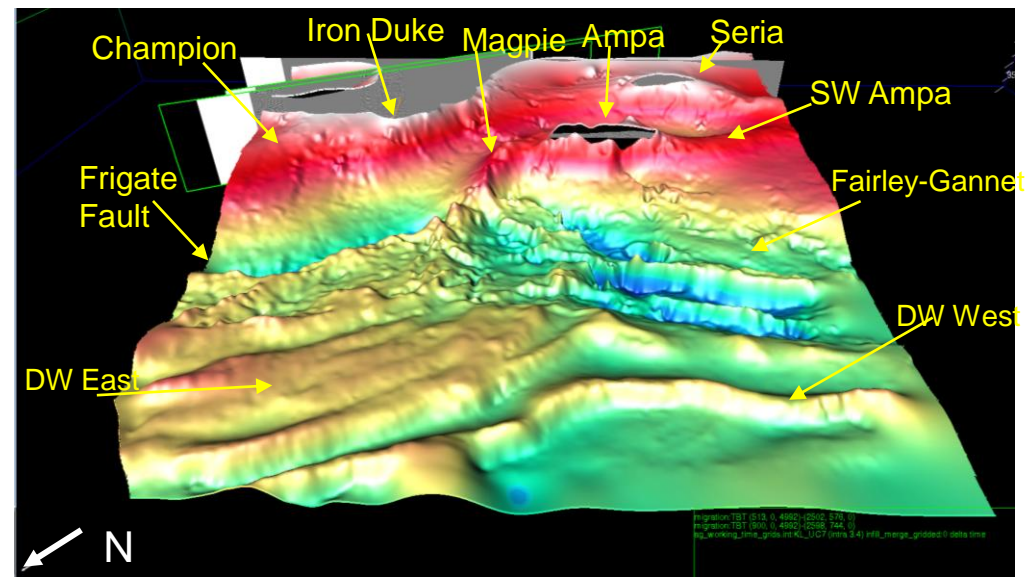
<sup>1</sup> Brunei Shell Petroleum

<sup>2</sup> Now at Shell Development Australia

# INTRODUCTION

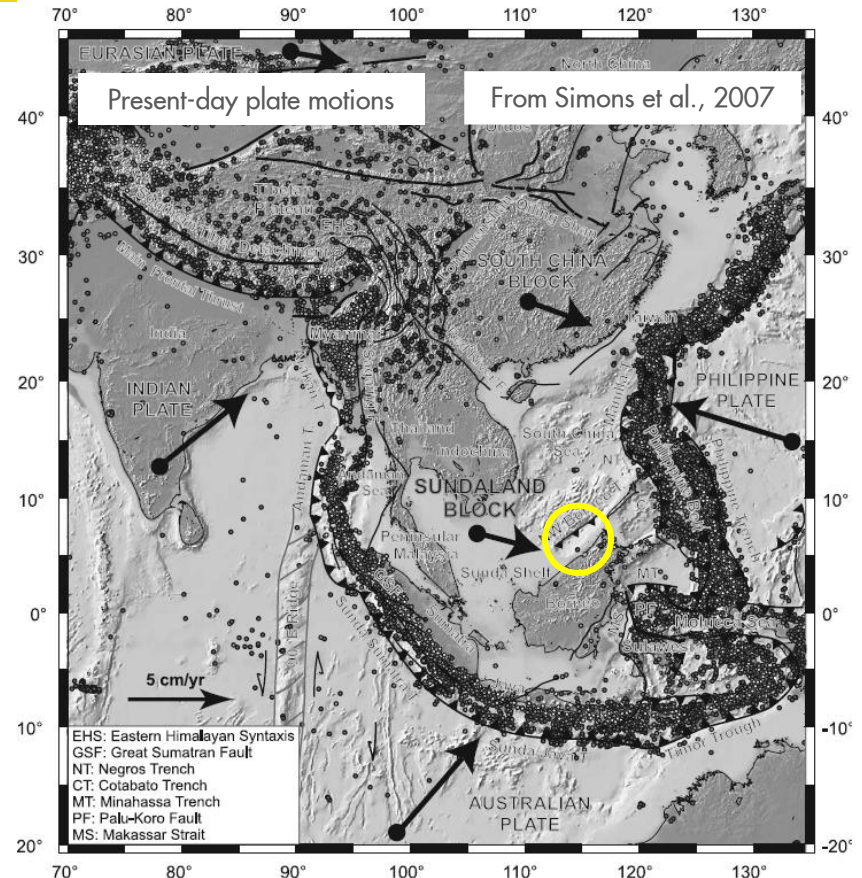
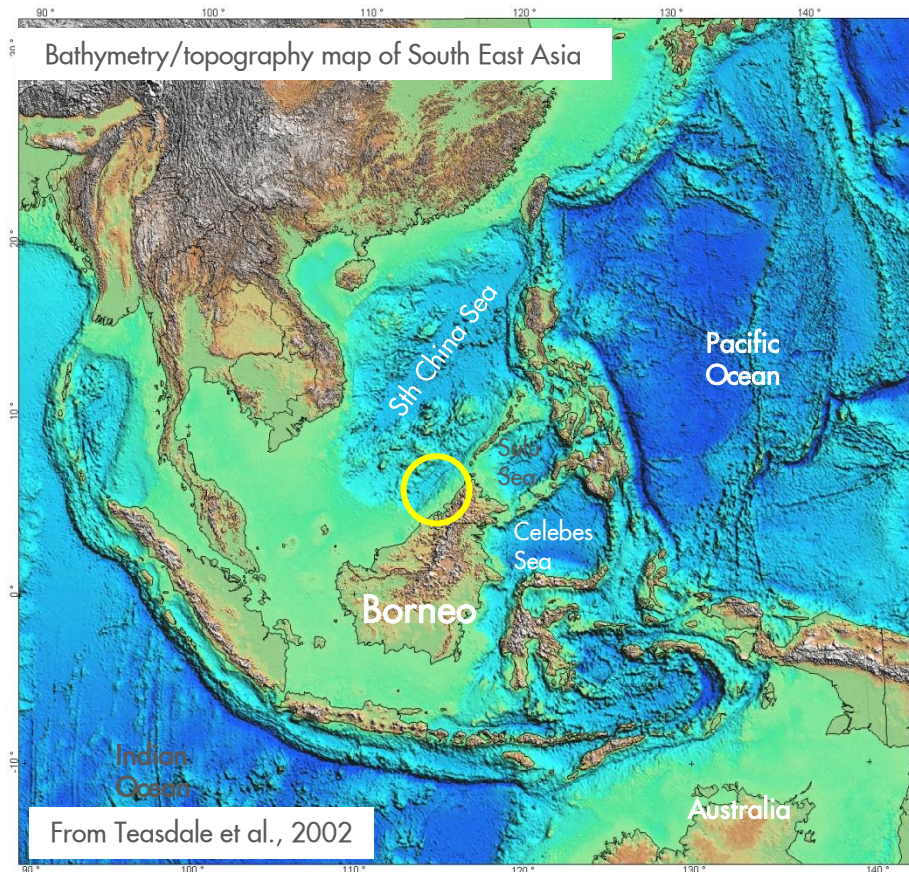


- Brunei Darussalam is currently the 3rd largest oil producer and 4th largest producer of LNG in South East Asia.
- Oil and gas production active for over 80 years and accounts for more than 90% of exports.





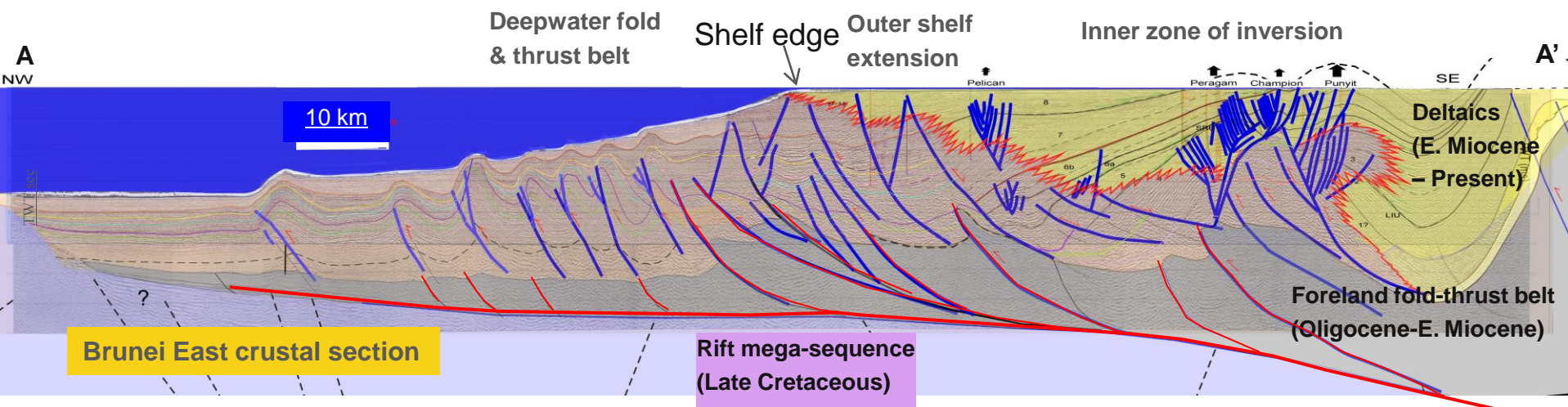
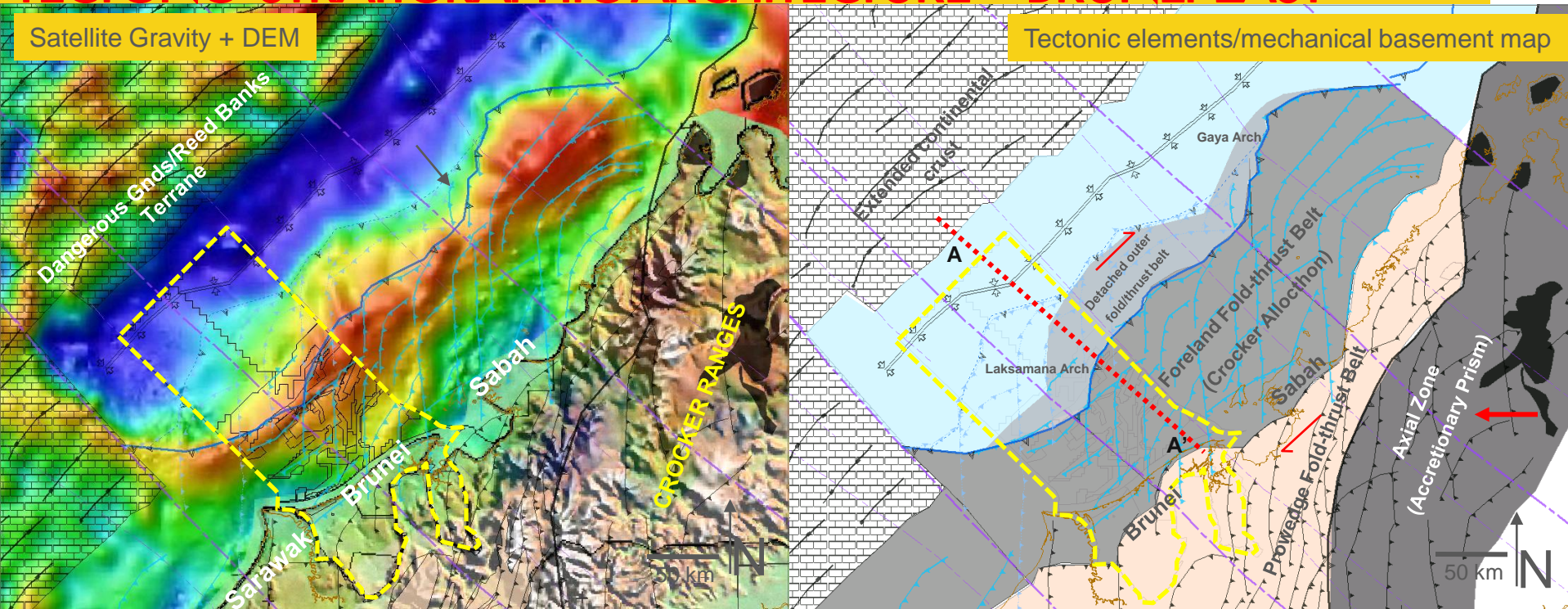
# PLATE TECTONIC SETTING



- Tectonically and structurally very complex region
- History of continental extension, oceanic spreading followed by convergence and collision due to major at plate boundary events (i.e. India, Australia, Phillipines)
- GPS measurements show that NW Borneo is presently converging towards Sundaland Block ~ 6mm/a

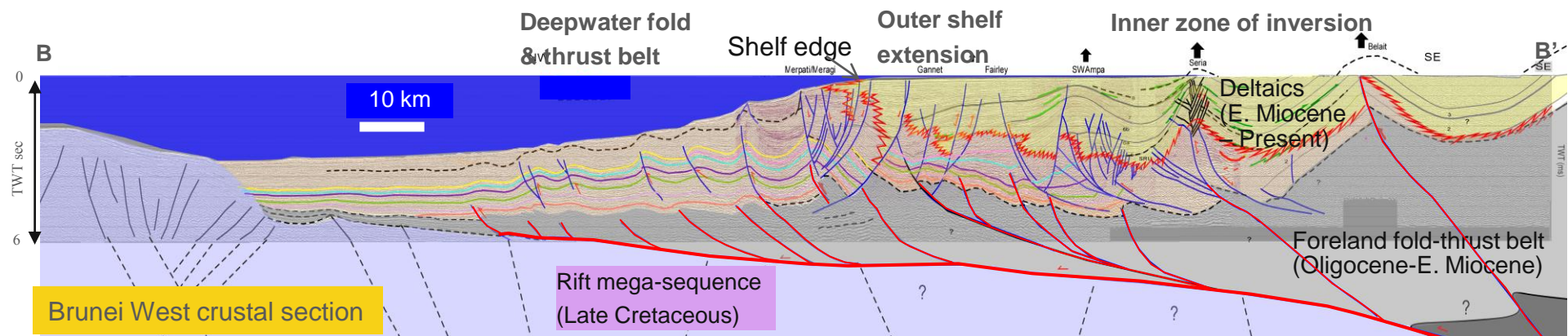
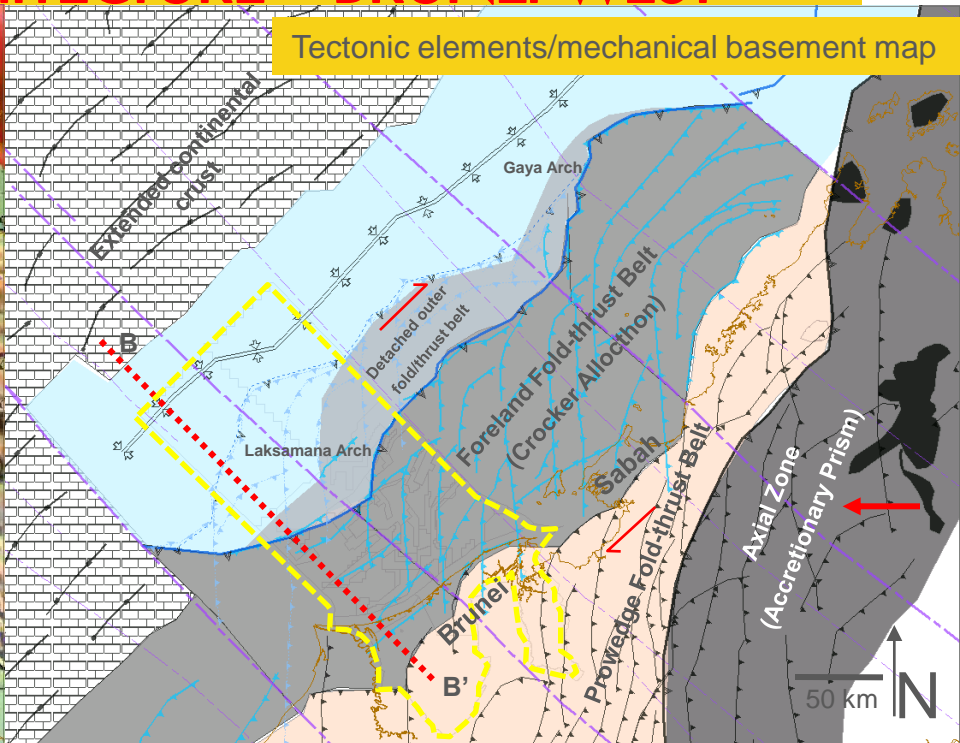
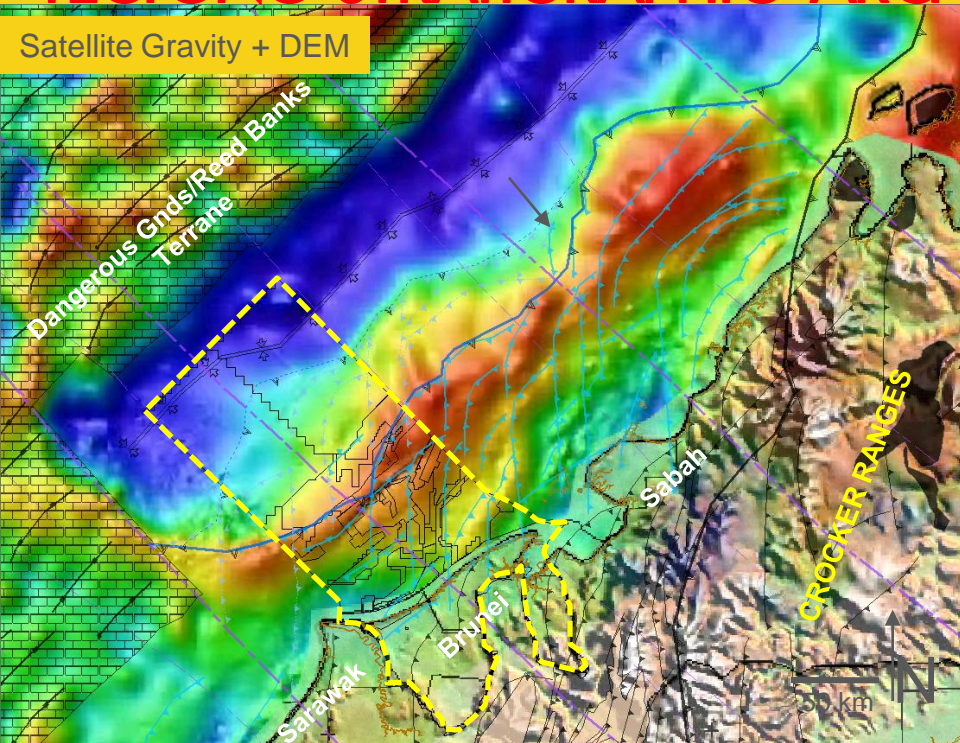


# TECTONO-STRATIGRAPHIC ARCHITECTURE – BRUNEI EAST

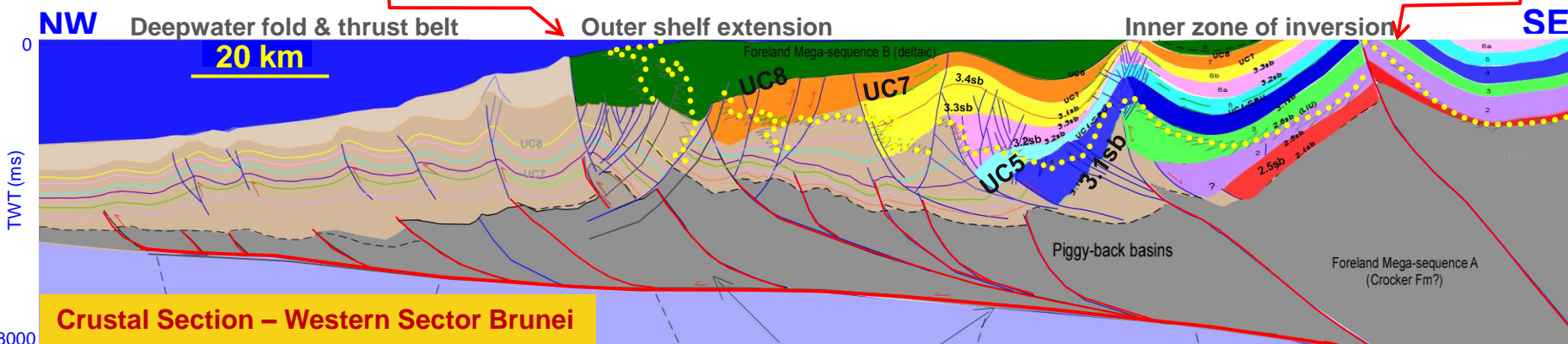
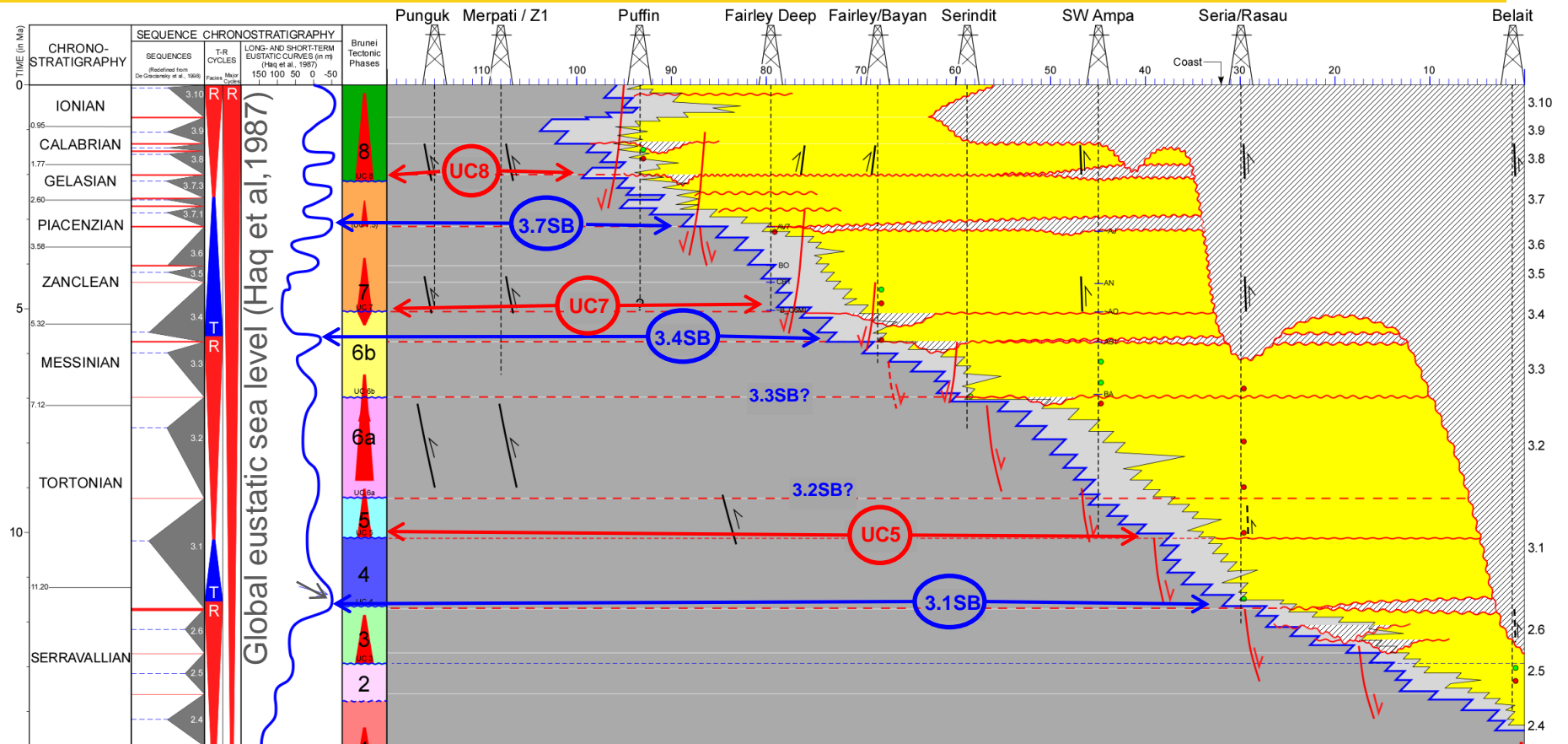




# TECTONO-STRATIGRAPHIC ARCHITECTURE – BRUNEI WEST

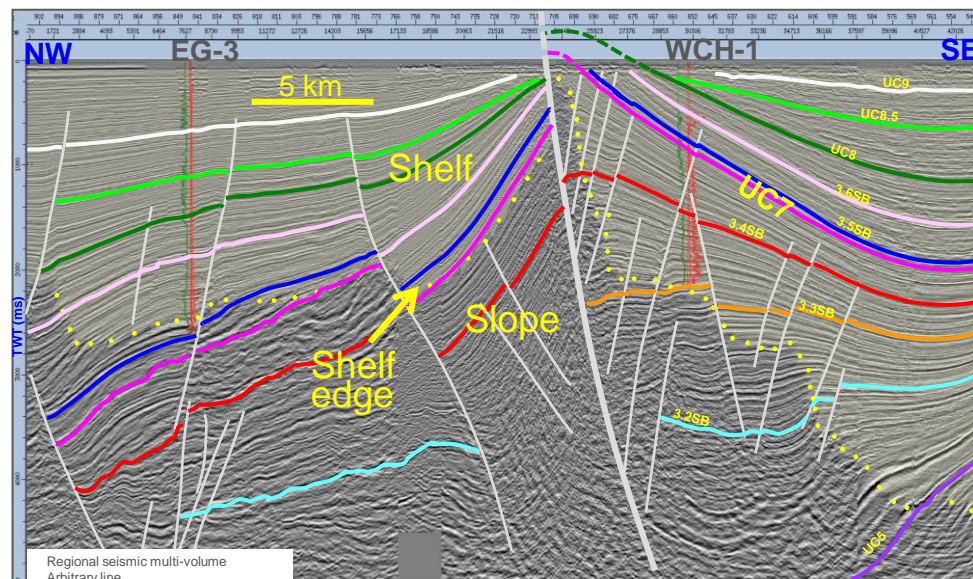
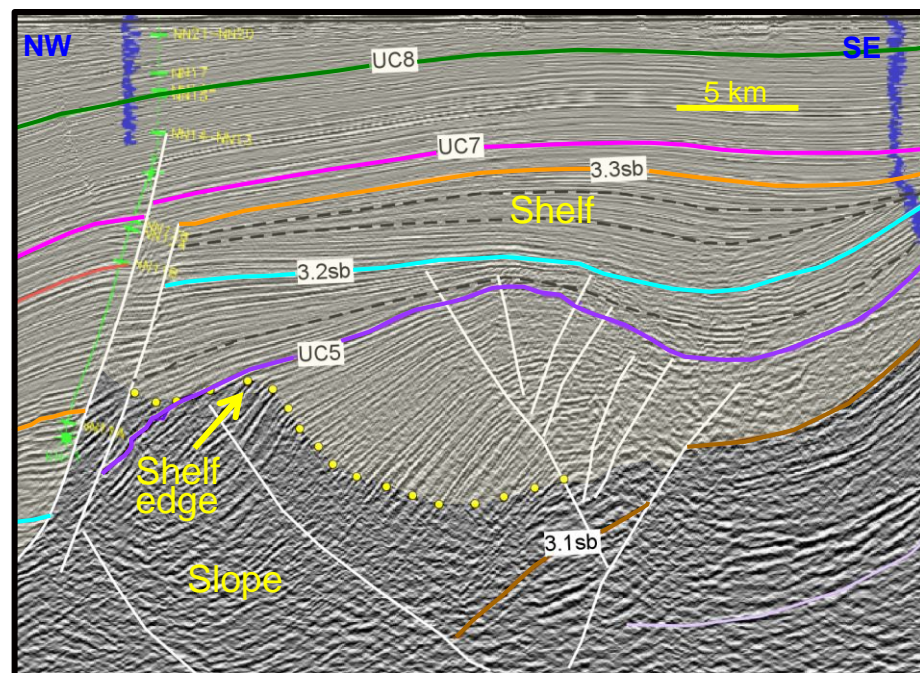
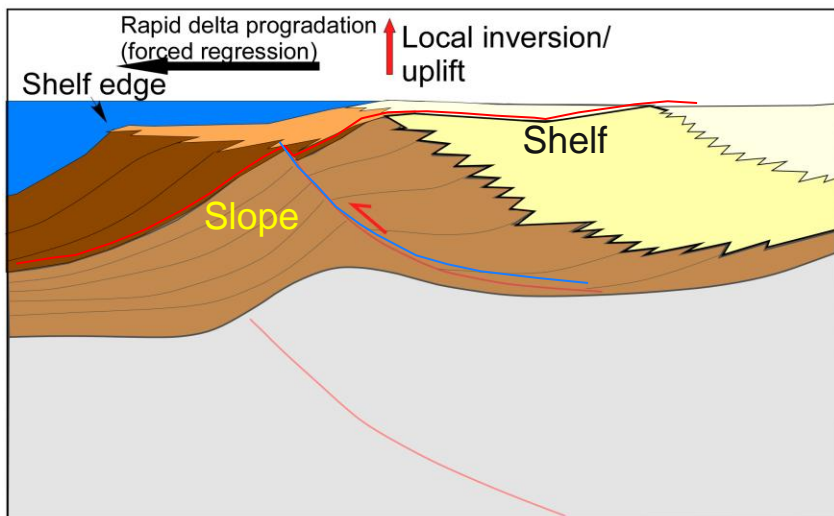
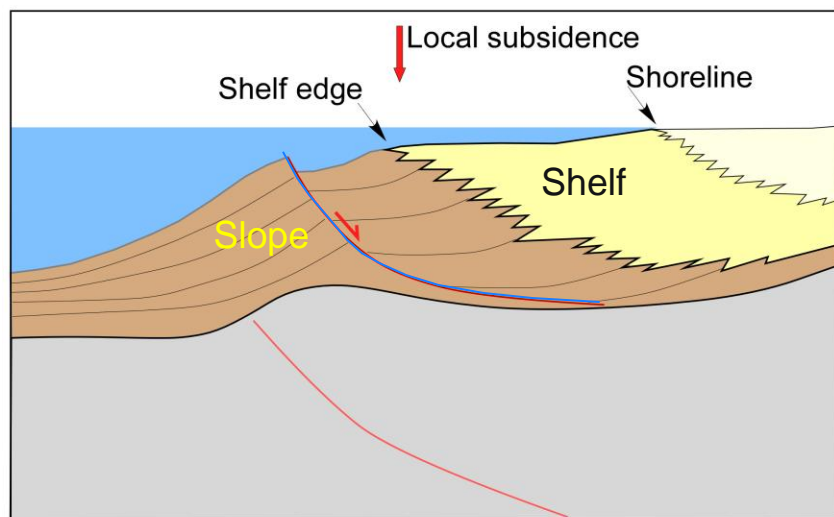


# SEQUENCE STRATIGRAPHY



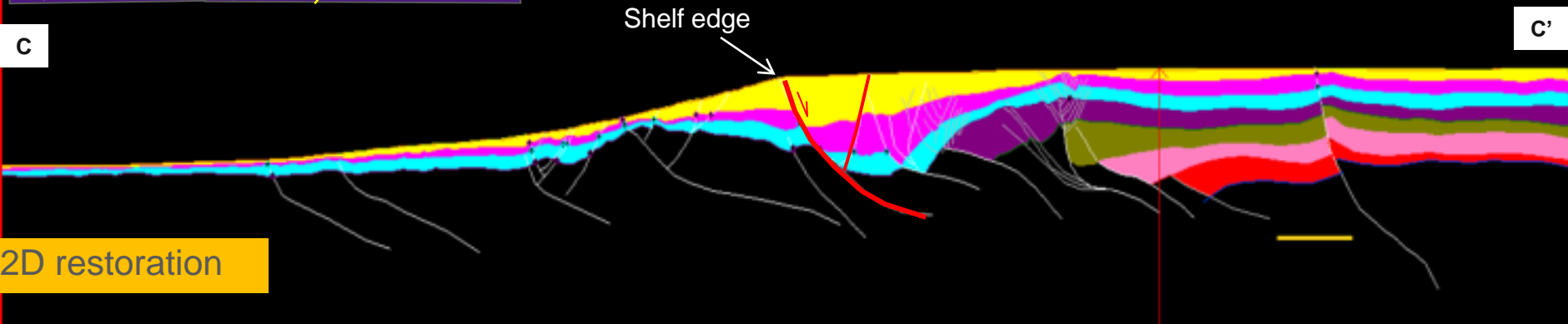
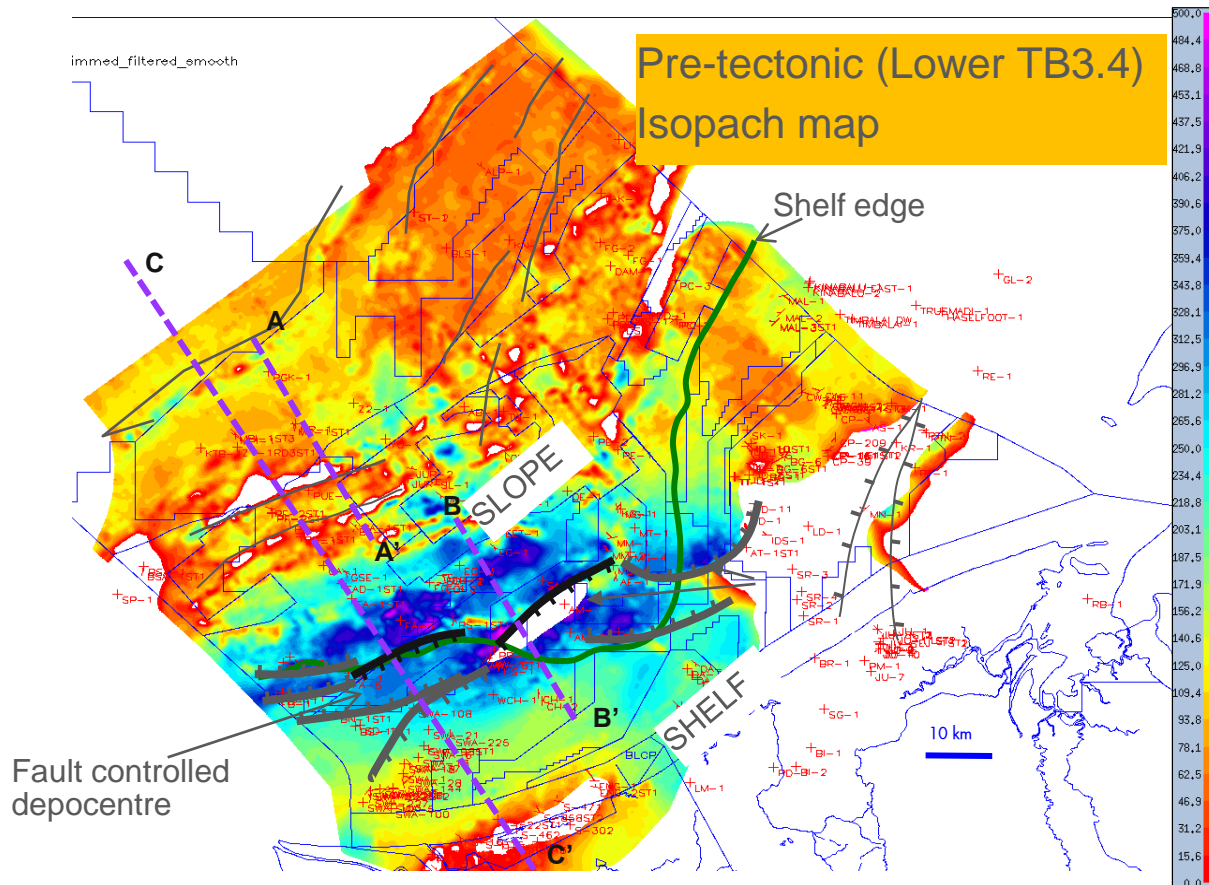
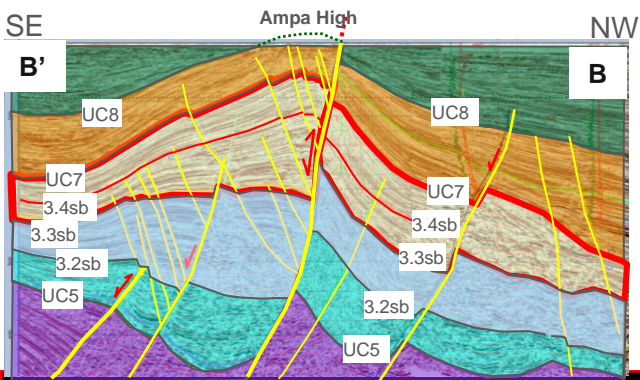
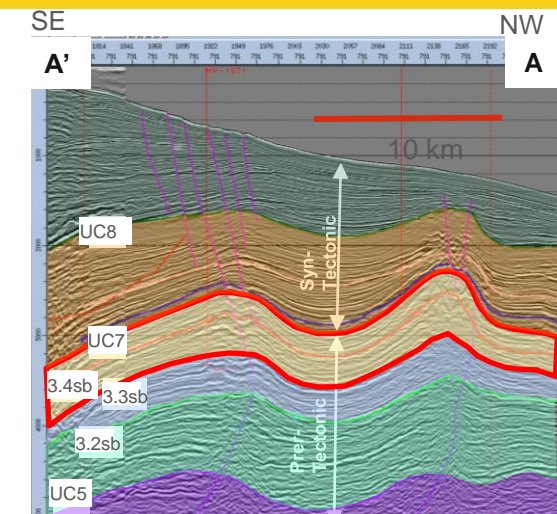


# STRUCTURAL CONTROL ON SEQUENCE ARCHITECTURE



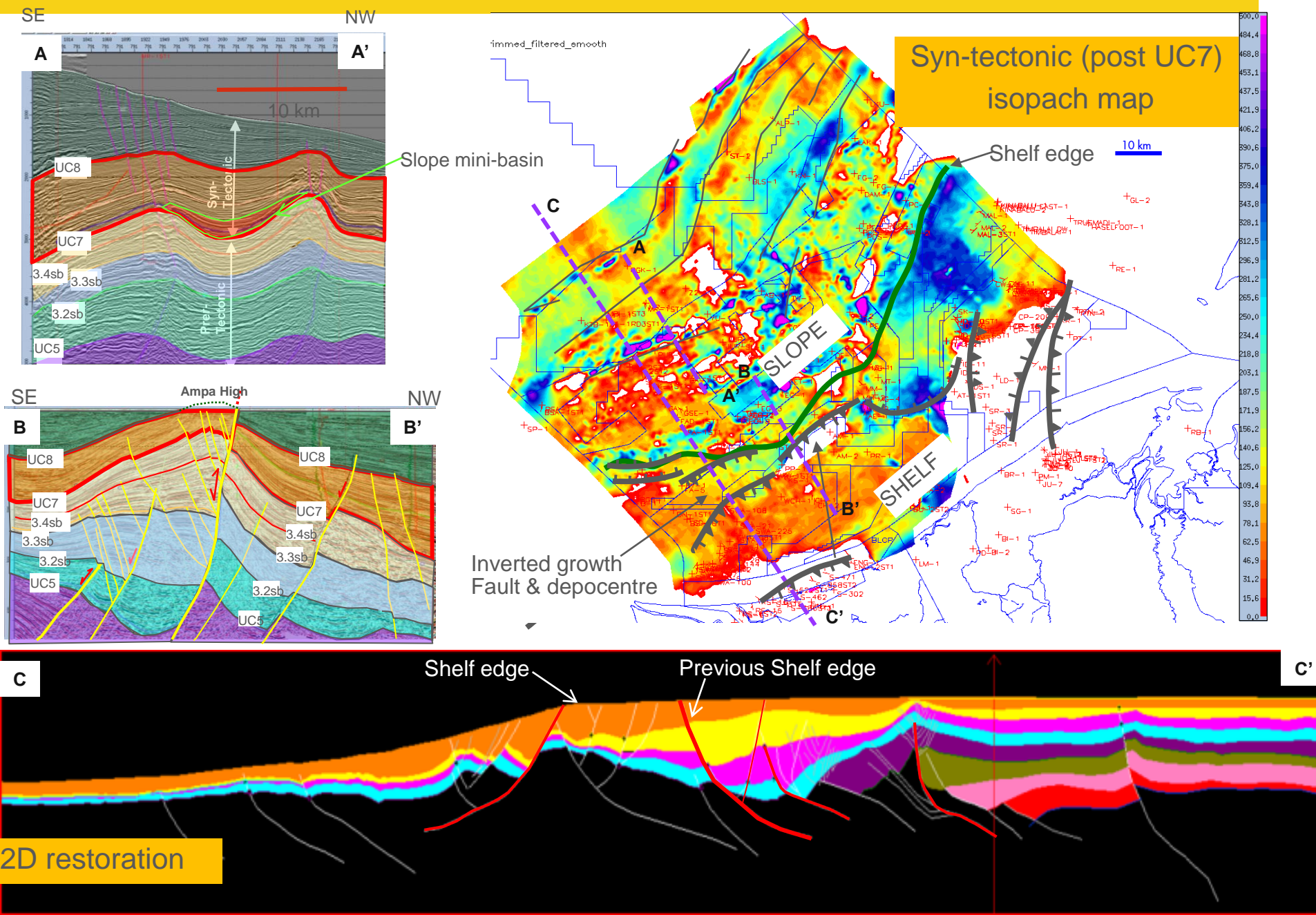


# LINK BETWEEN SHELF AND SLOPE PROCESSES

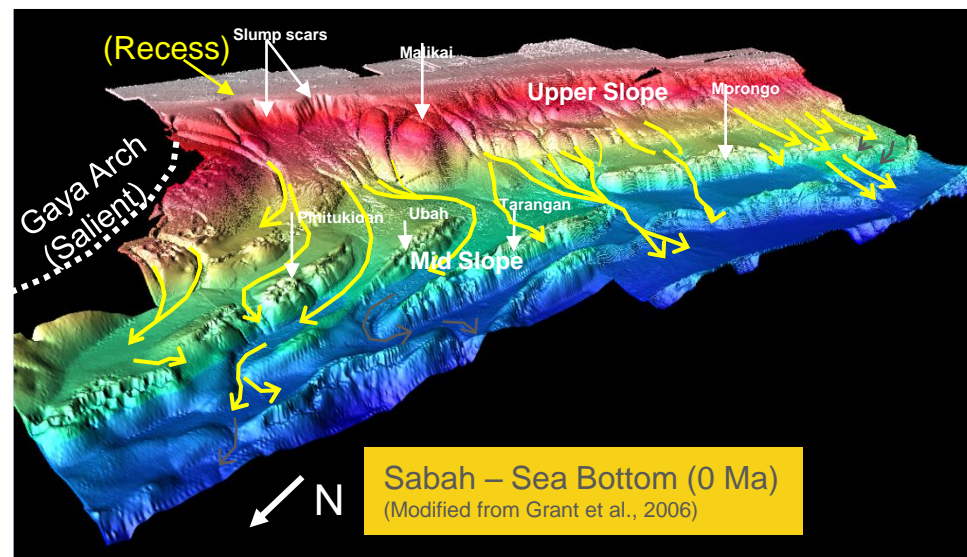




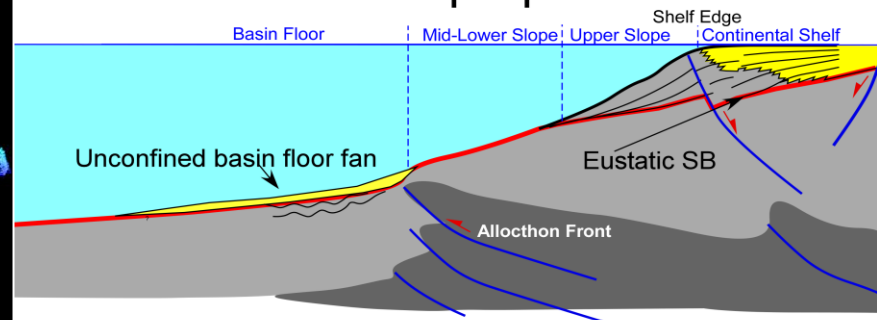
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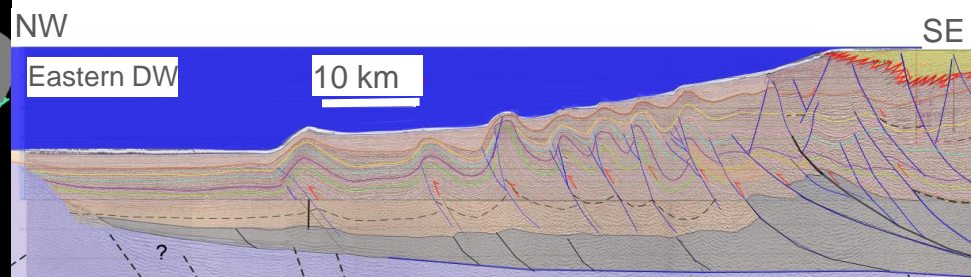
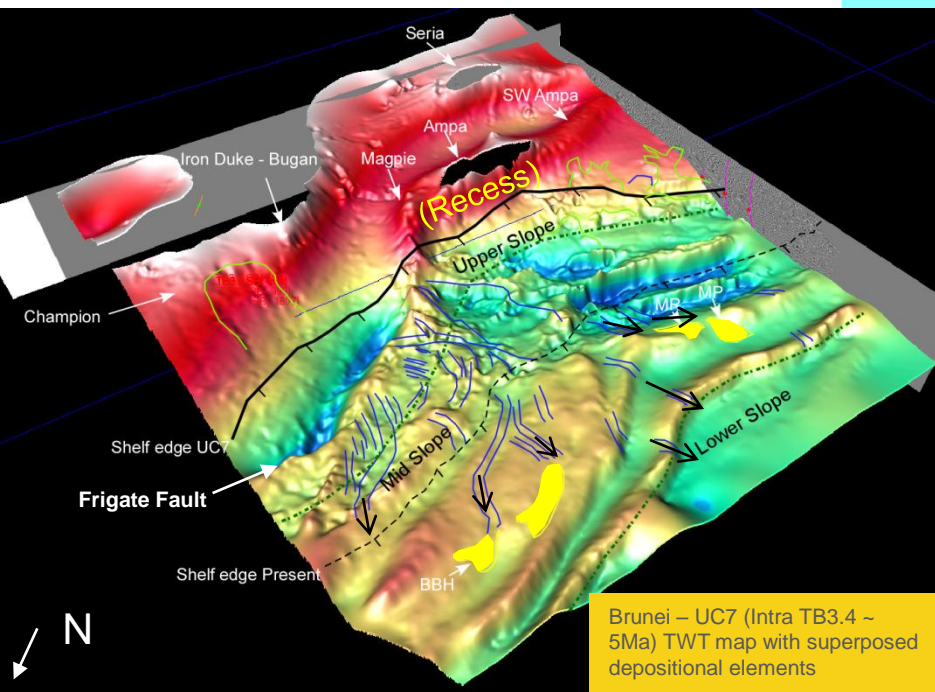
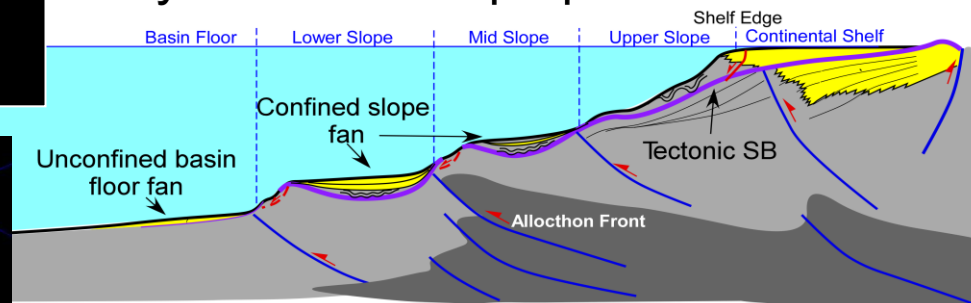
# IMPACT ON DEEPWATER DEPOSITIONAL PROCESSES



## Pre-tectonic slope profile



## Syn-tectonic slope profile





# CONCLUSIONS

- Structural architecture results from a combination of gravity-driven delta tectonics with pulses of regional compressional tectonics
- The sequence stratigraphy is controlled by the interplay between tectonics and eustacy.
- Understanding the basin deformation and fill history is very important for exploration in this setting, particularly in deepwater turbidite play

