

# Late Neogene seismic stratigraphy of the eastern mixed siliciclastic-carbonate platform of New Caledonia (SW Pacific)



Check out the associate publication  
(Kerouédan et al., 2026)

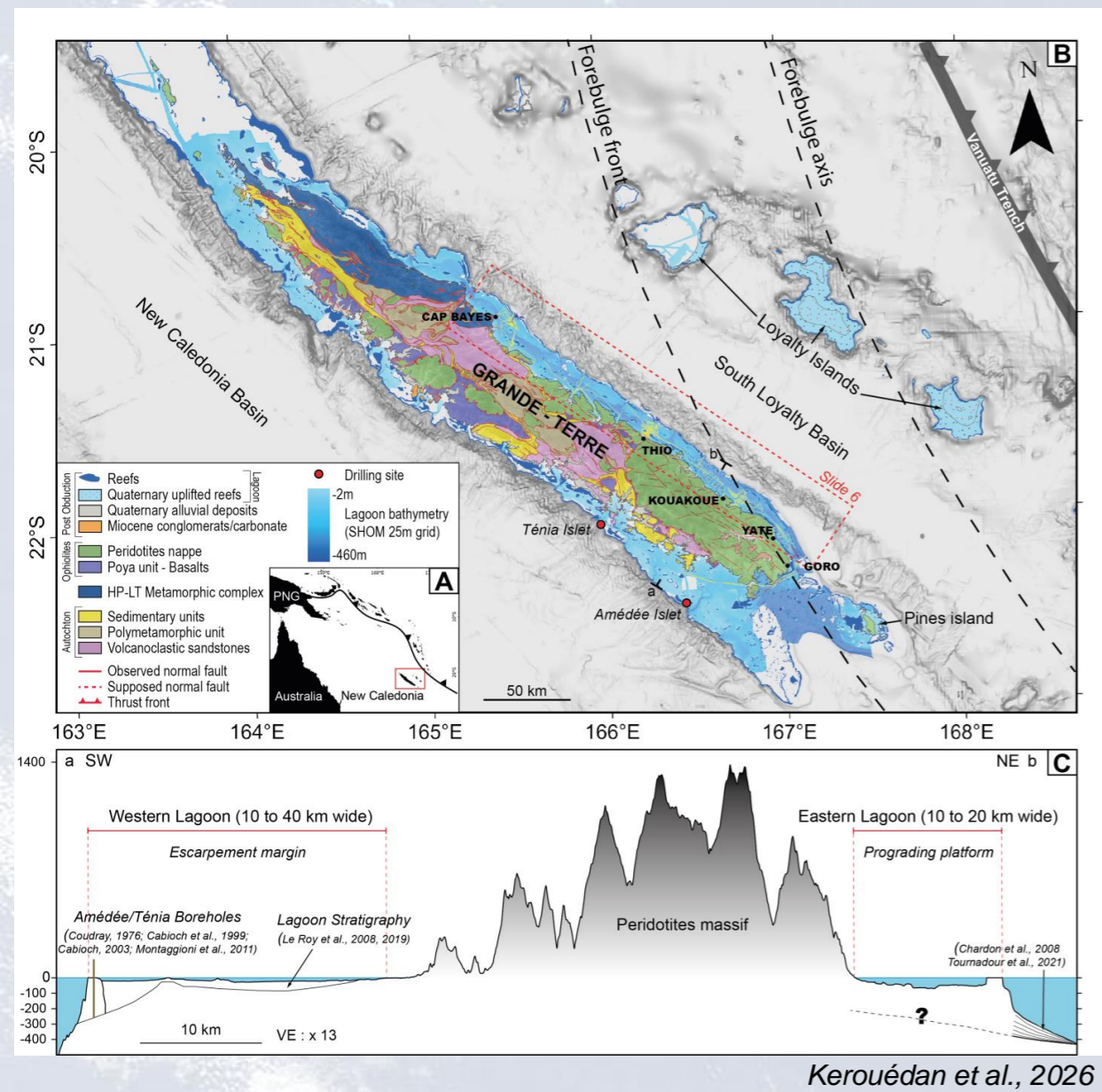


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Abstract



**WHAT ?**

- New Caledonia lagoon
- Tropical mixed siliclastic-carbonate margin in SW Pacific
- Tectonic active area, high relief, various onland lithology

**WHY ?**

**Investigate the morphologies and sediment infilling in the eastern lagoon: record of global sea-level and climate changes, vertical movement**

**HOW ?**

Geomorphology analysis  
ArcGisPro

Seismic interpretation  
Kingdom Suite

Stratigraphic modelling  
DionisosFlow

Radiocarbon dating  
Core description

Abstract

Outstanding Student & PhD candidate Presentation contest

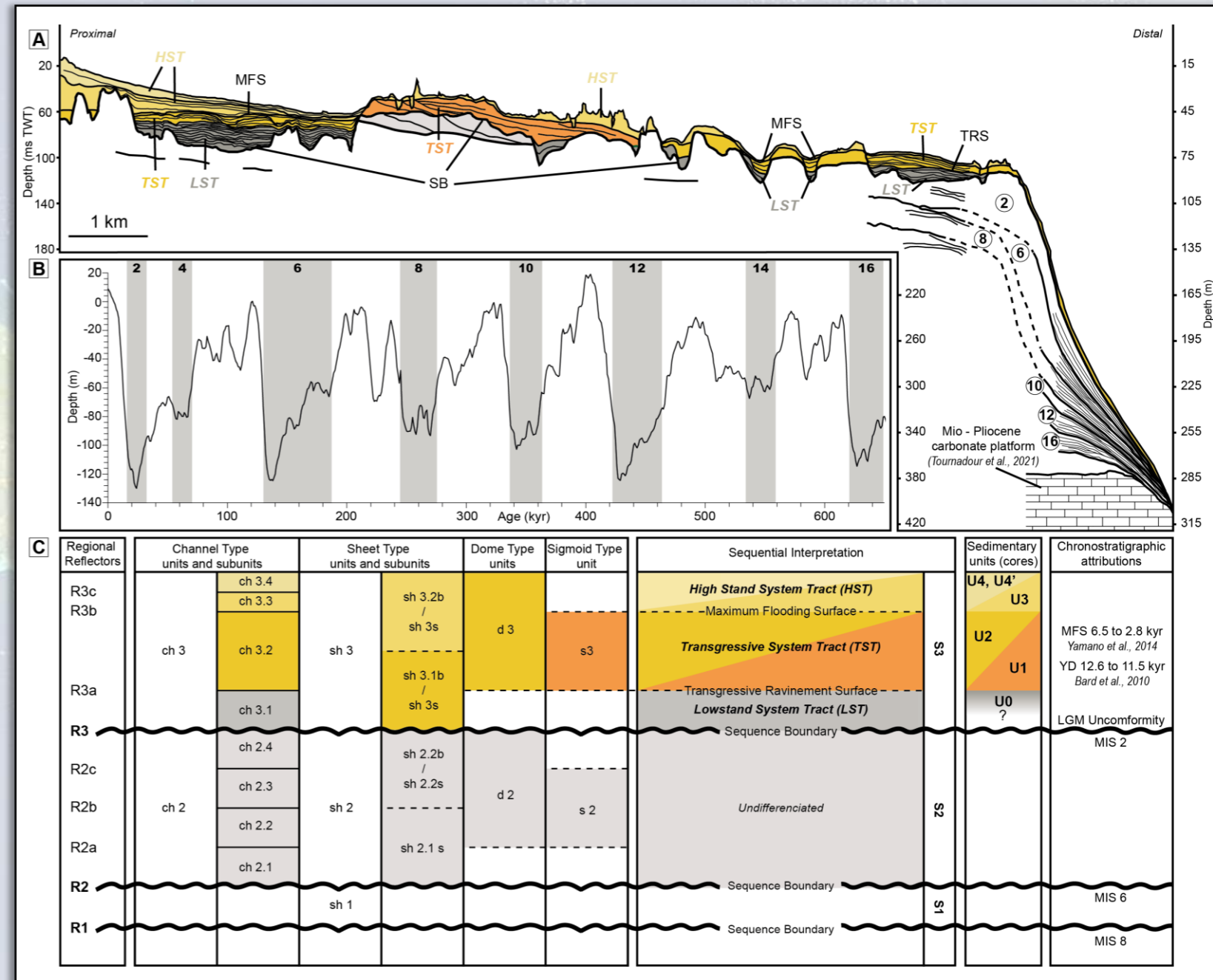
Sharing is encouraged

**PICO 3.1**

## Summary of main results and discussion

- Preservation of **three sedimentary sequences** in the eastern lagoon of New Caledonia.
- Influence of **inherited geomorphology** on sediment infill and carbonate production.
- Preservation of lowstand wedges since MIS 16 on the Mio-Pliocene carbonate platform
- A continuous mean **subsidence rate of 0.06 m/kyr** over the last 630 kyr

→ Perspectives: validate this model thanks to **stratigraphic modeling with DionisosFlow**

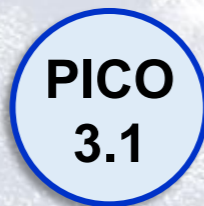


B – Sea-level curve from Spratt et al., 2016

Kerouédan et al., 2026

Abstract

EGU  
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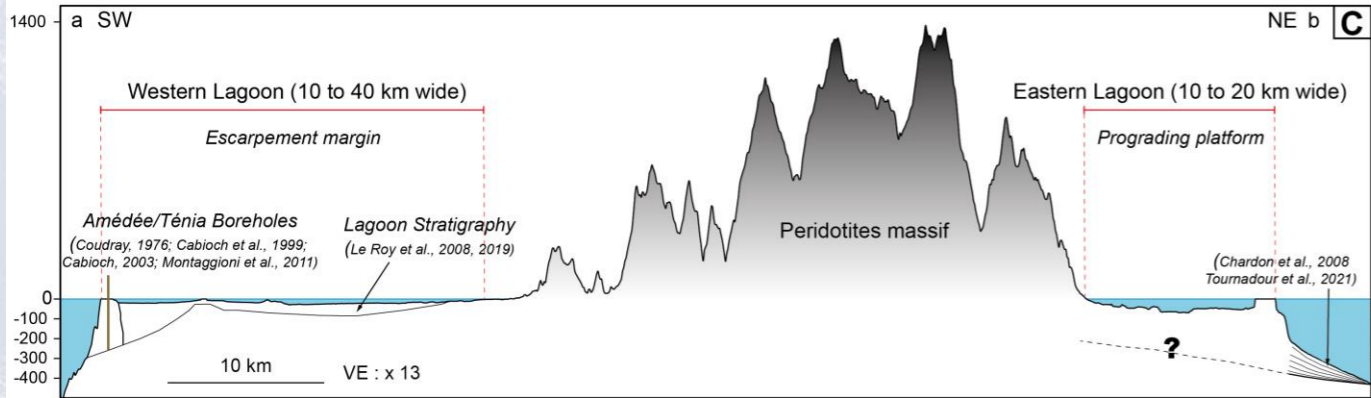
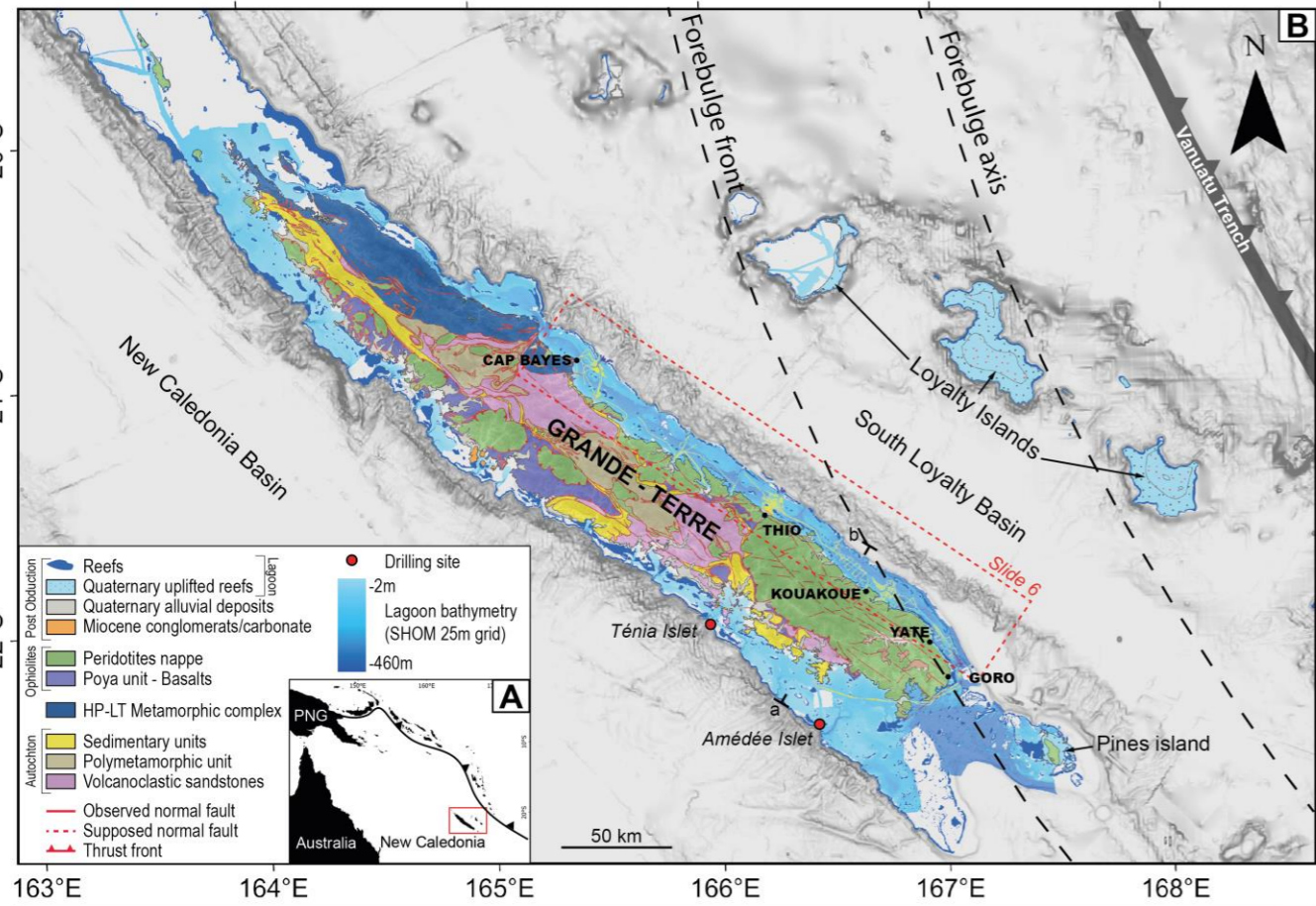


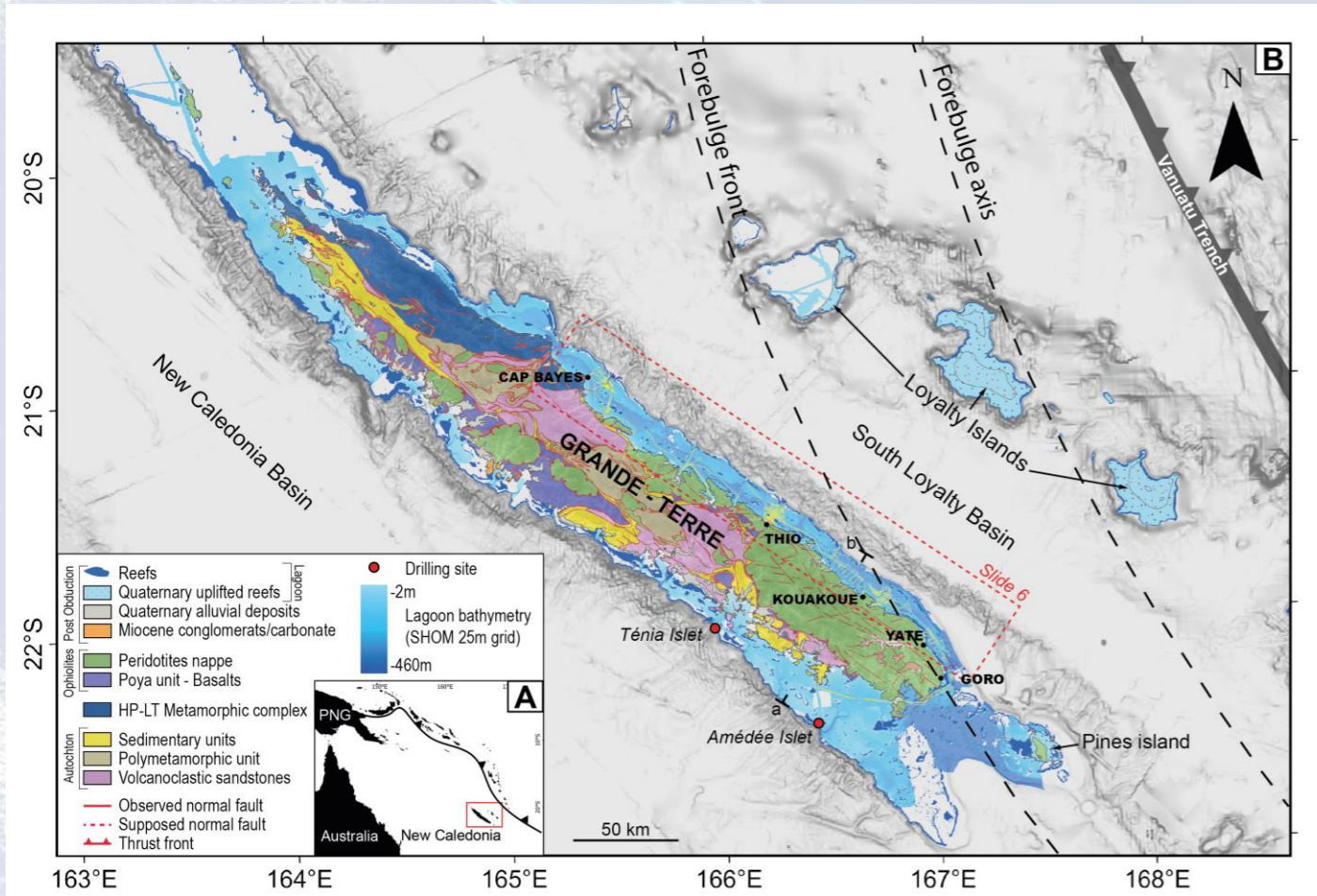
# General characteristics of the mixed siliciclastic/carbonate margins of Grande – Terre island

- Behavior of tropical mixed siliciclastic-carbonate margin still poorly understood.
- The lagoon of New Caledonia is the 2<sup>nd</sup> largest in the world.
- Active regional geodynamic context.
- Eastern and western lagoon with different features (width, depth, barrier reef drowned or not, shelf edge).
- Eastern margin not much studied

## SCIENTIFIC QUESTIONS

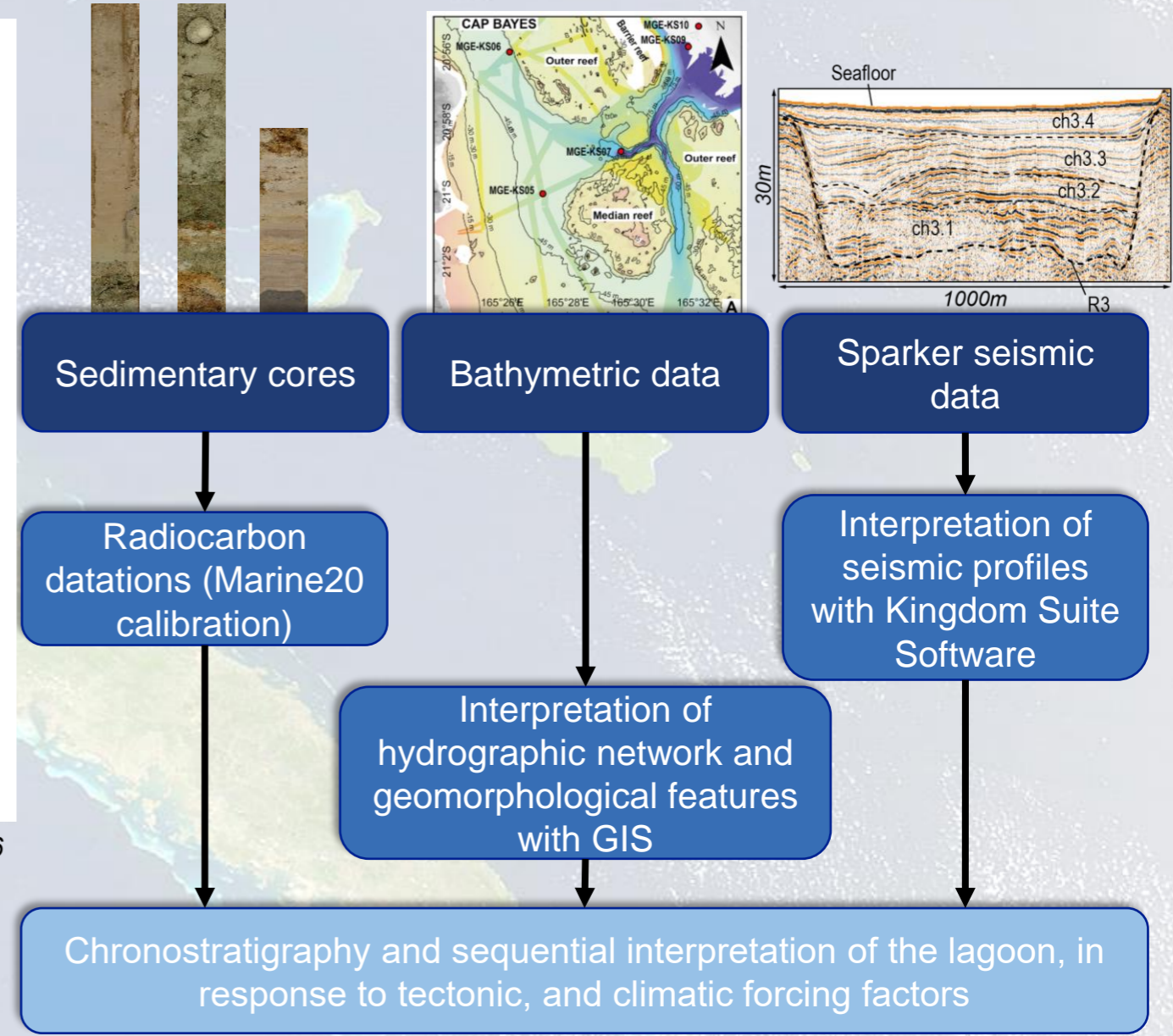
- How has the sediment infilling of the eastern lagoon evolved in response to climatic and tectonic forcing factors ?
- What is the stratigraphic organization within the lagoon ?
- What are the differences between western and eastern stratigraphic lagoonal record ?

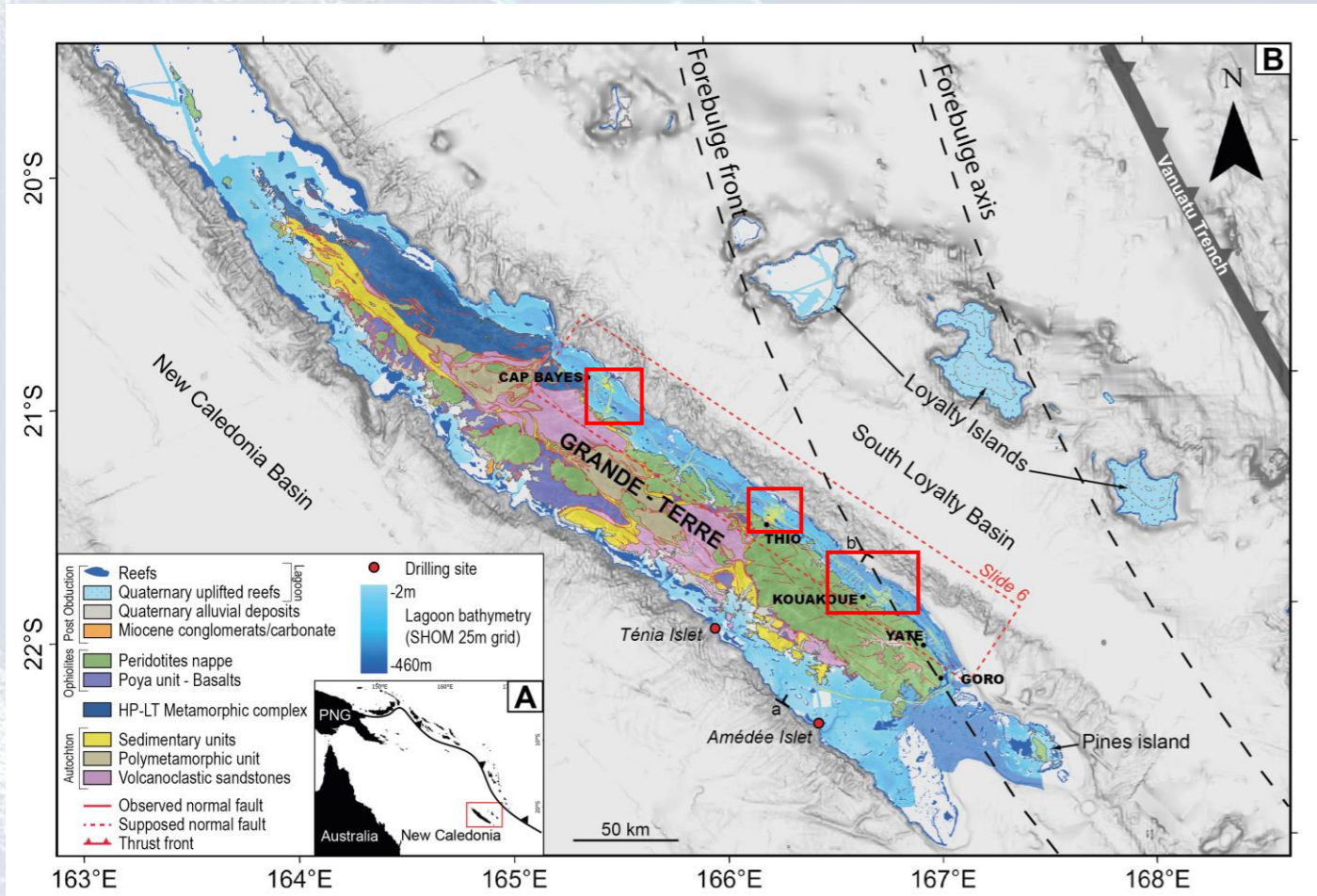




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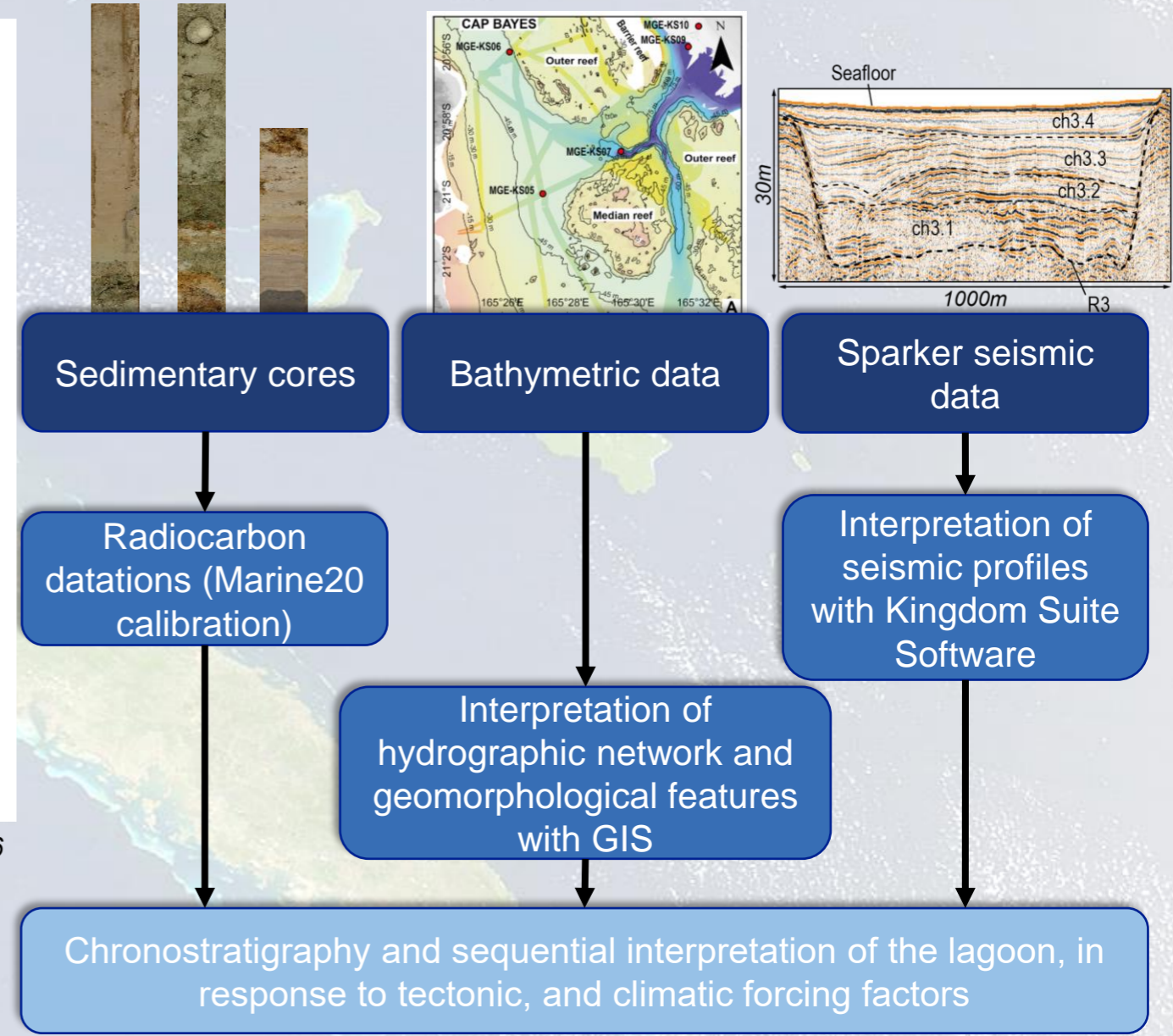
- Three main study areas on the eastern margin: Cap Bayes, Thio and Kouakoué
- All the data provide from recent MARGEST cruise (Le Roy, 2022)





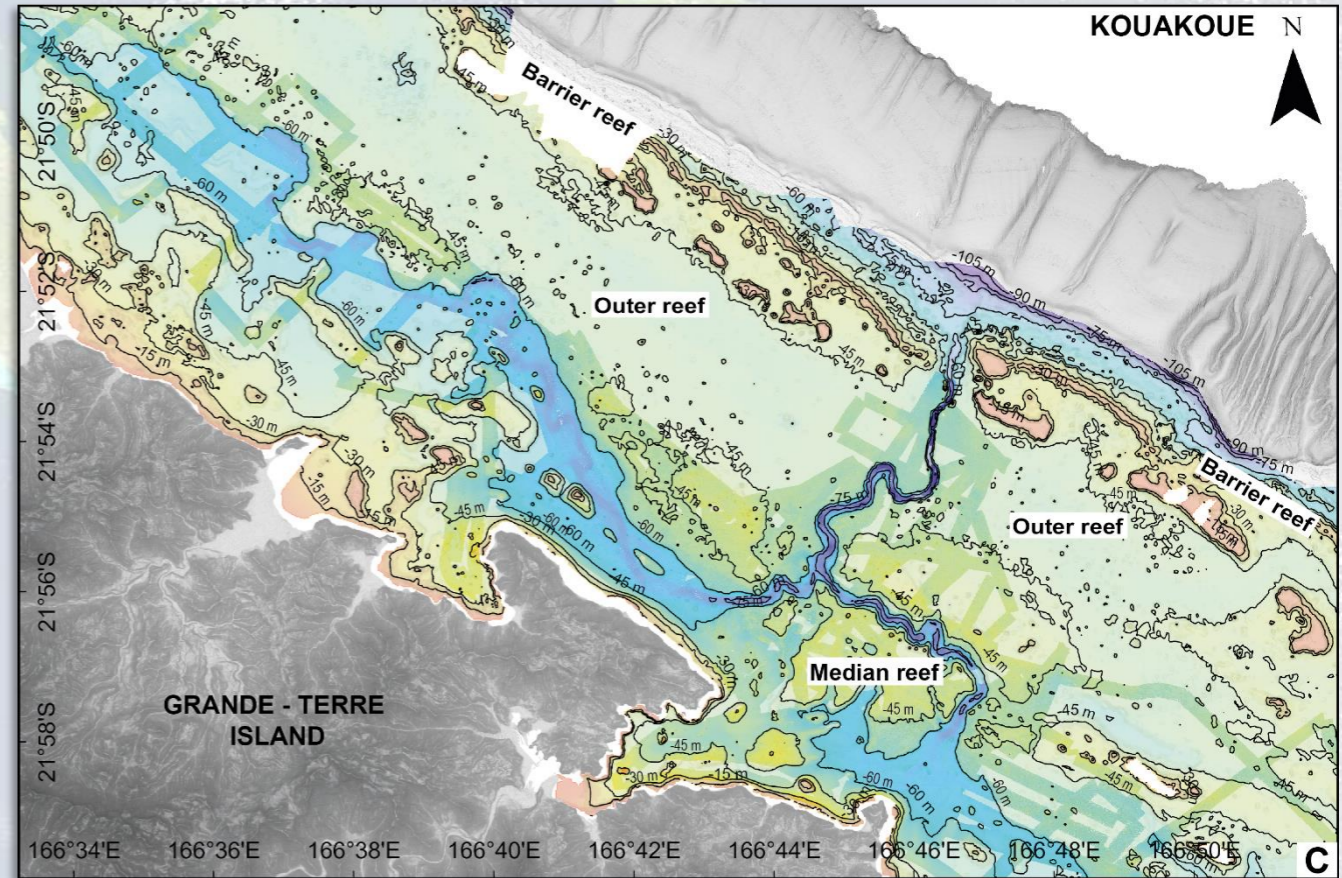
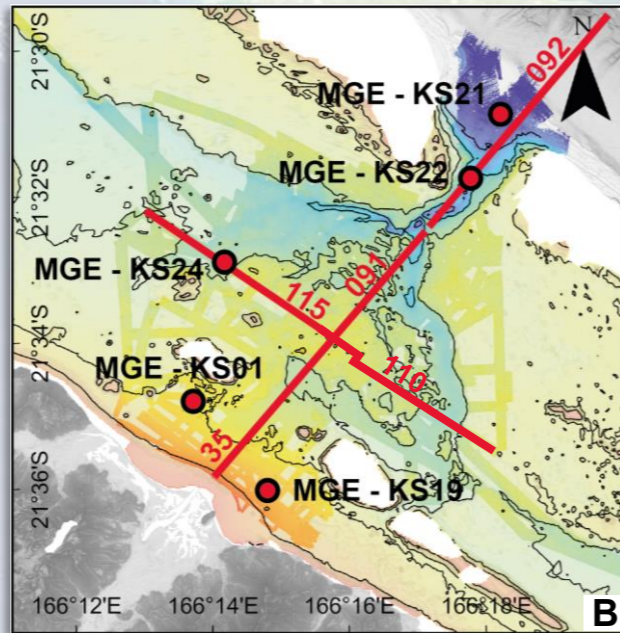
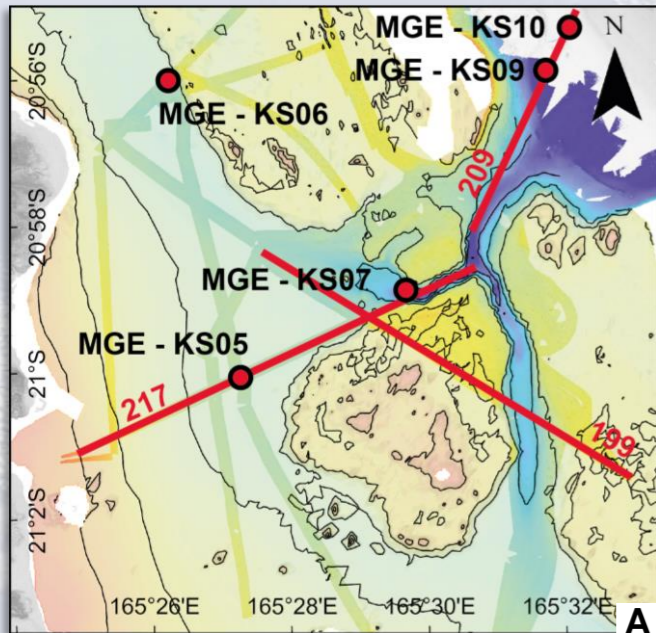
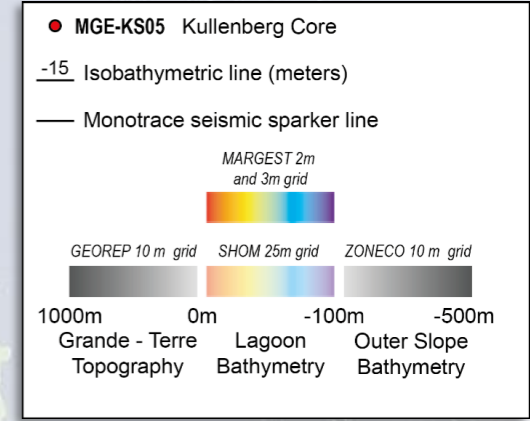
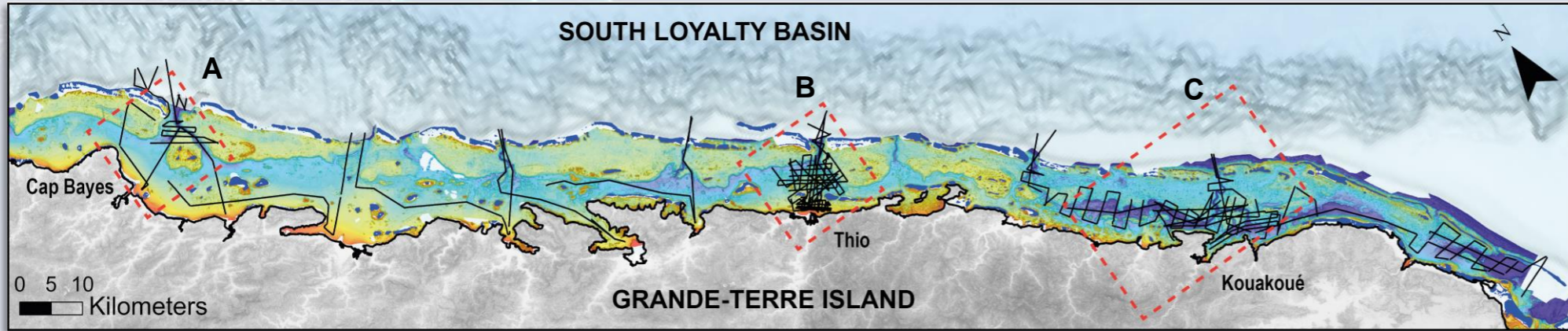
Kerouédan et al., 2026

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# Geomorphology of the eastern margin



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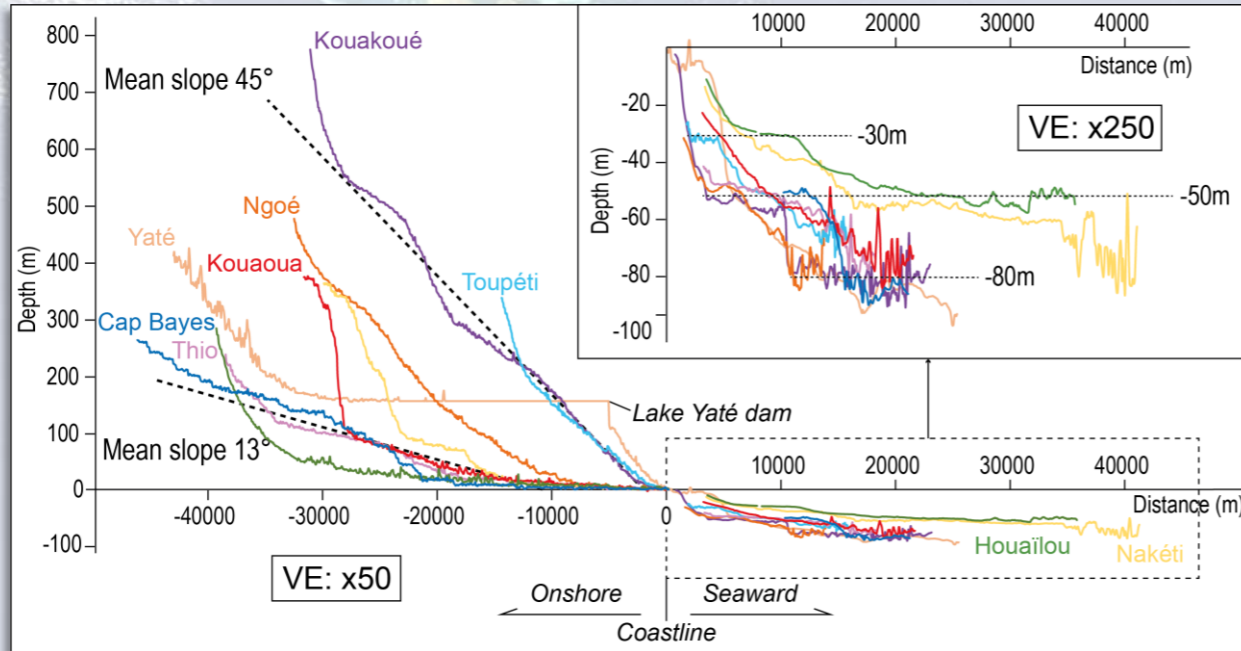
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Léa Kerouédan – 3rd year PhD Student – GEO OCEAN

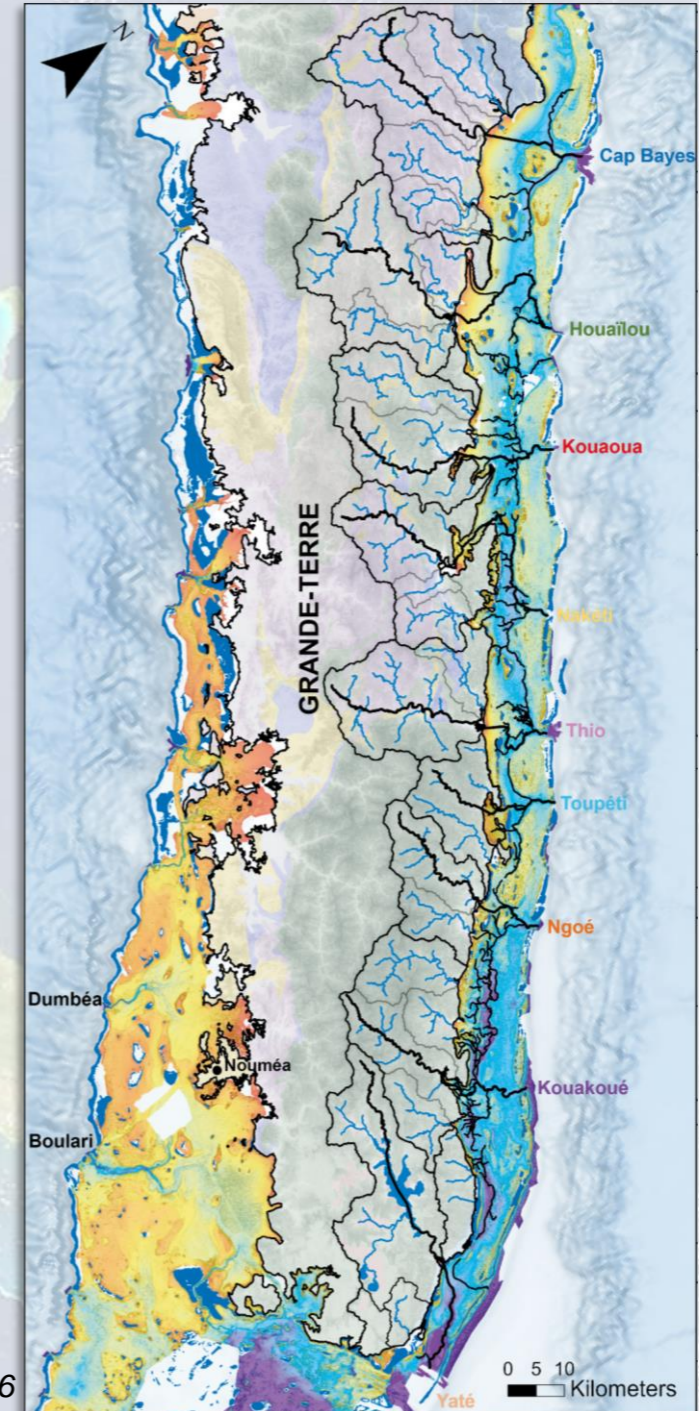
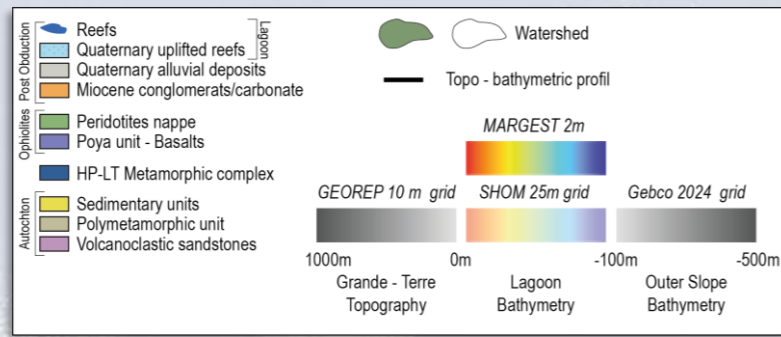
- Same geometry all along the eastern margin: a median reef flat, surrounded by two incisions that join to cross the barrier reef and form a *passe*



Onland geology and drainage network (M1 internship, V. Ferrelloc, IUEM)



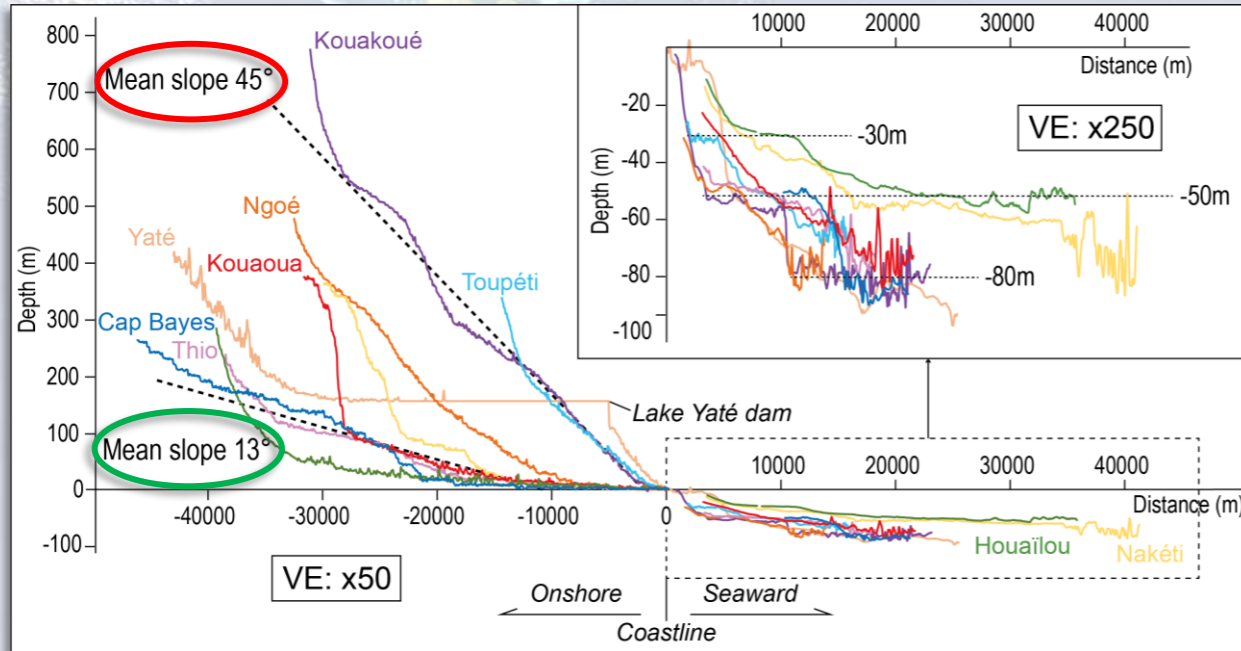
Kerouédan et al., 2026



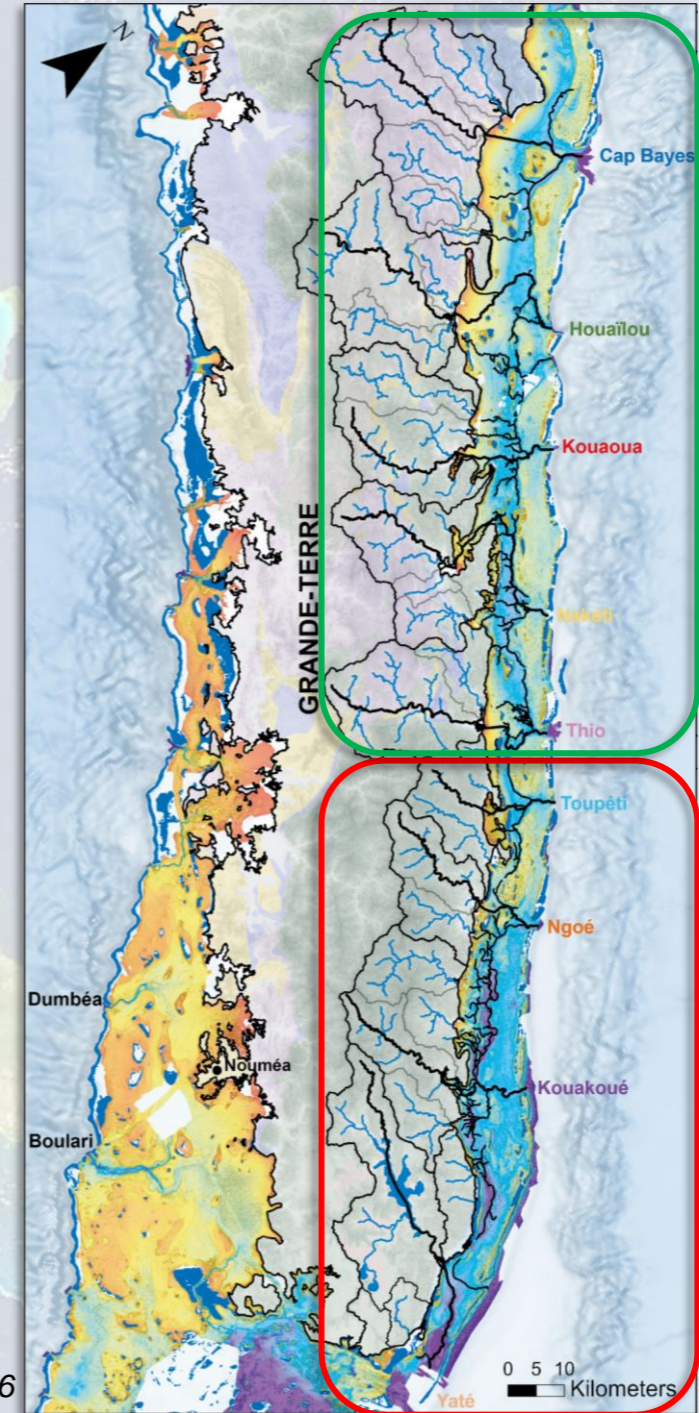
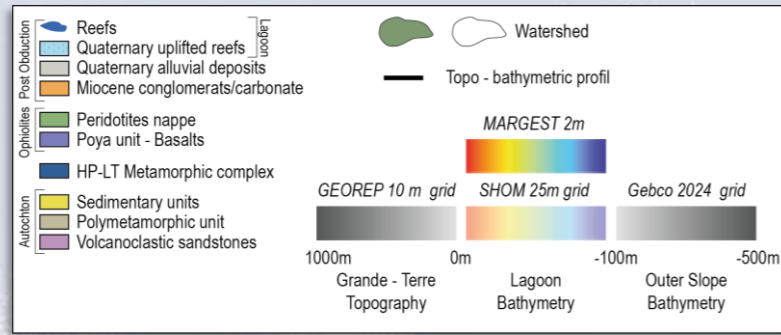
Kerouédan et al., 2026



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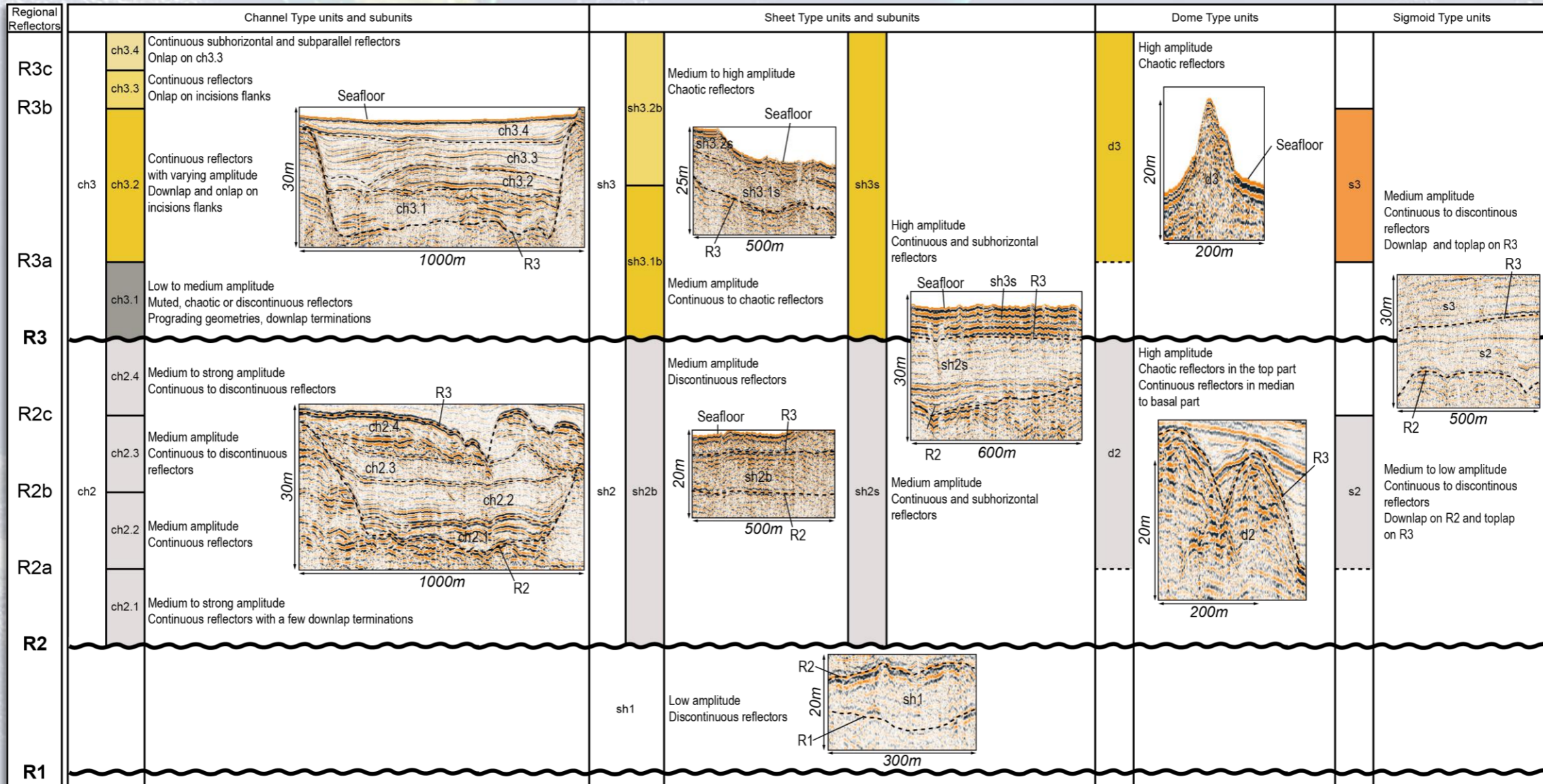


# Seismic facies catalog

- Reflectors' continuity or discontinuity
- Reflectors terminations: downlap, toplap, onlap (*Mitchum et al., 1977*)

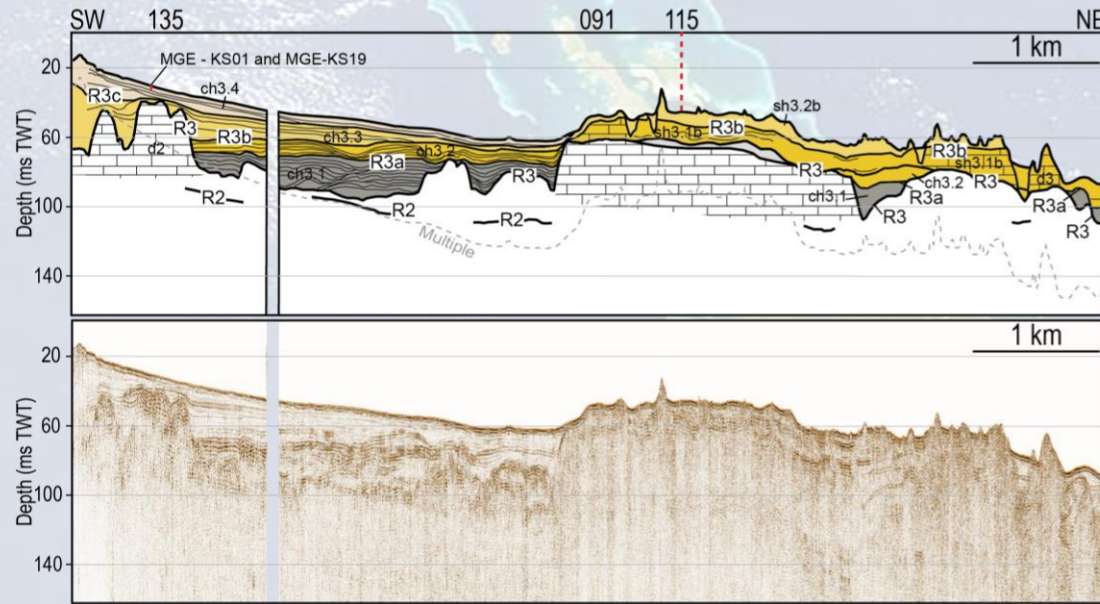
- Amplitude
- Seismic facies and internal configuration (reflectors paralleled, chaotic,...)

*Kerouédan et al., 2026*

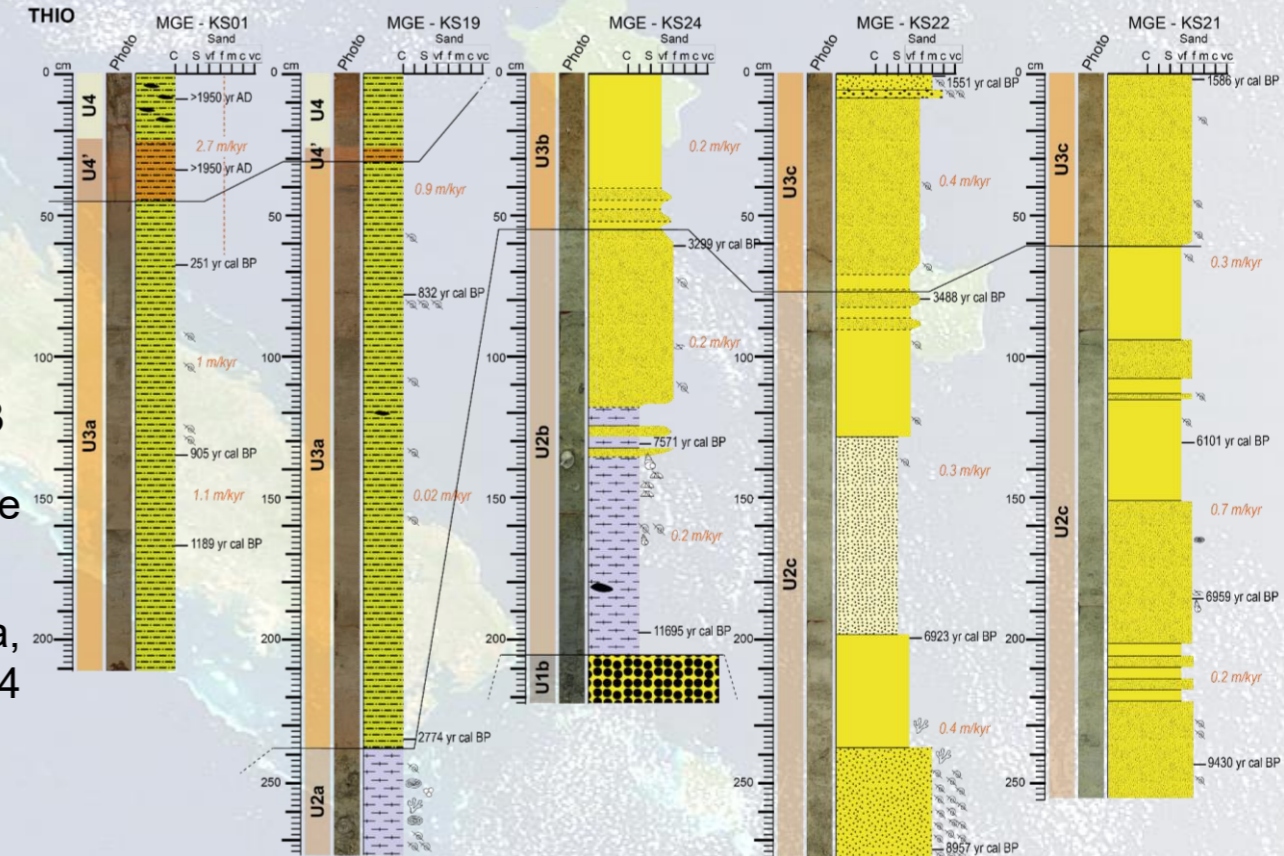
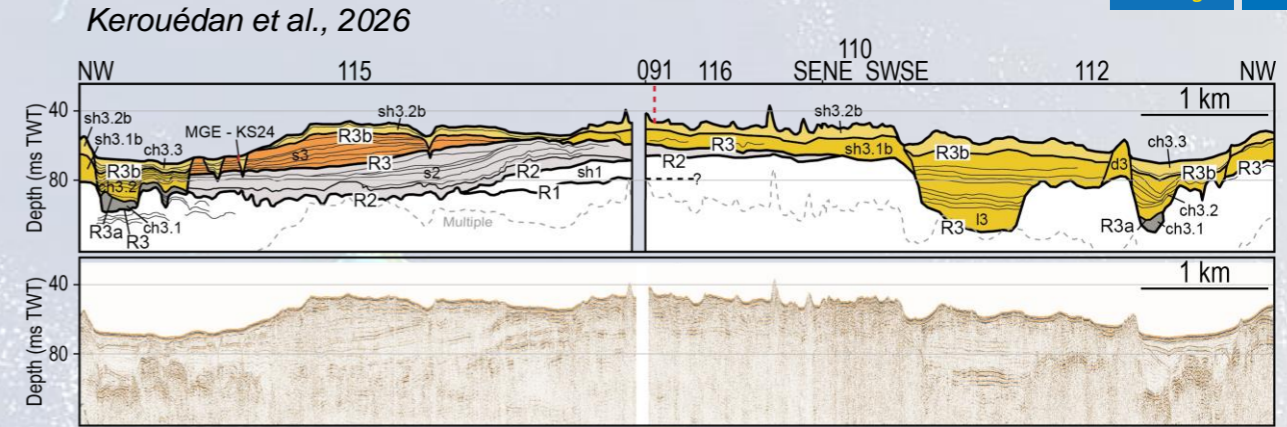




# Stratigraphy – Thio

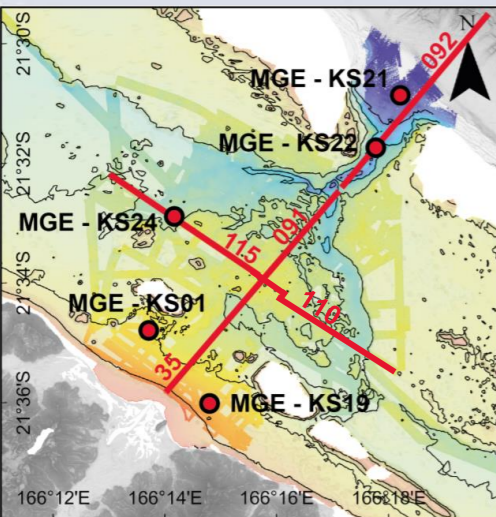


Kerouédan et al., 2026



Kerouédan et al., 2026

- Three main erosive discontinuity: R1, R2 and R3
- Incision constrained by pre-existing carbonate building
- Incised sedimentary prism in the median area, older than 11695 yr cal BP (C14 MGE-KS24 dating)



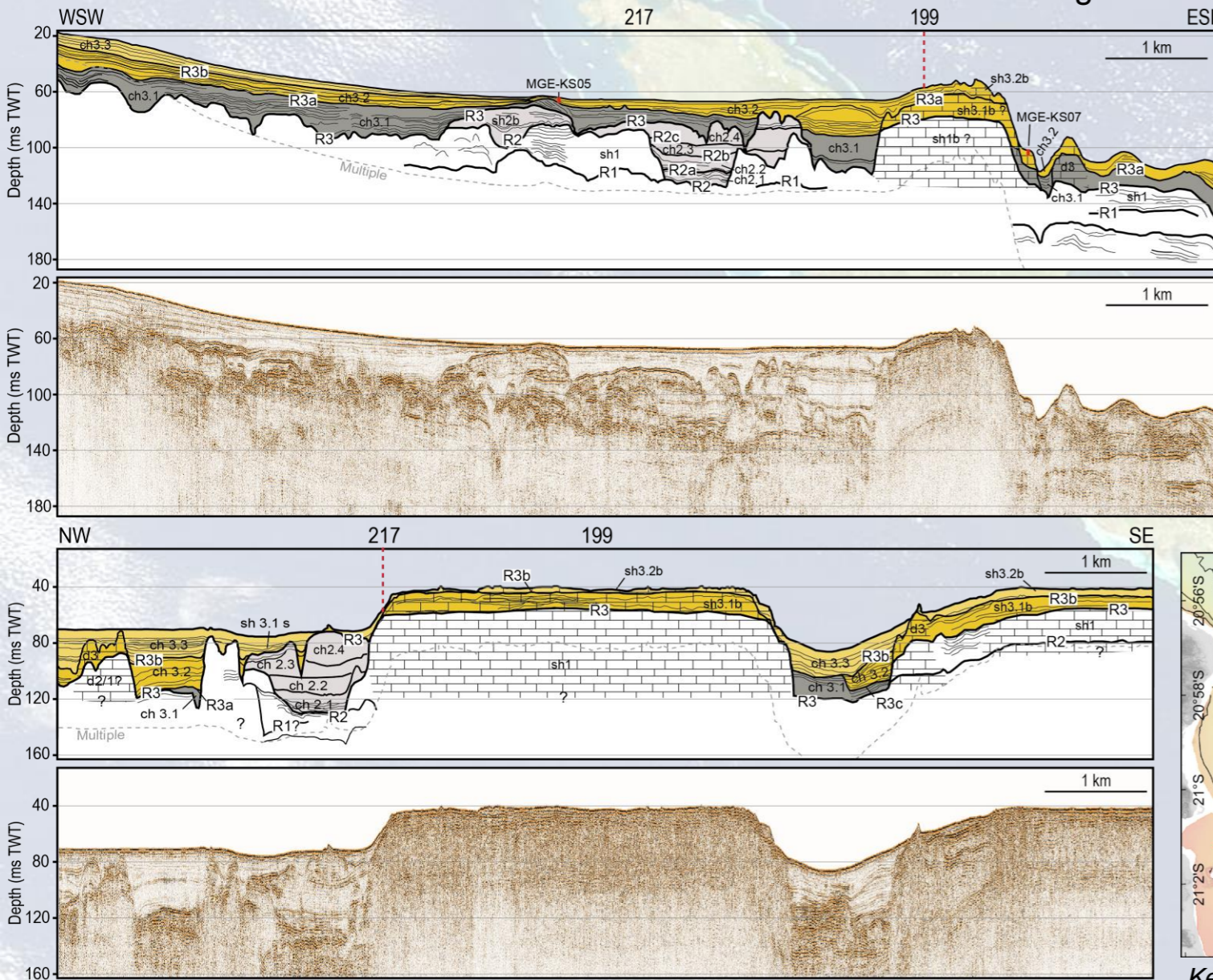
Kerouédan et al., 2026



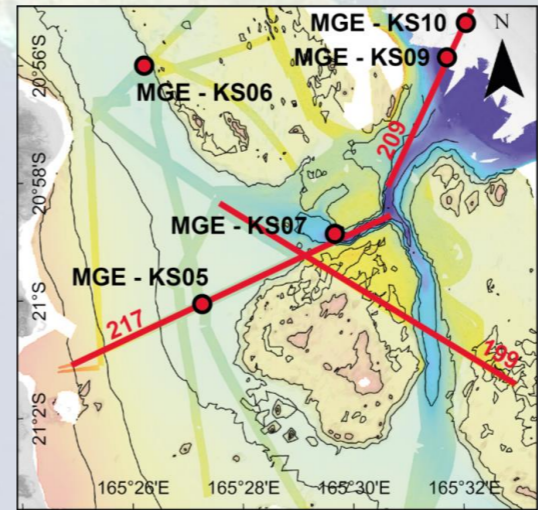
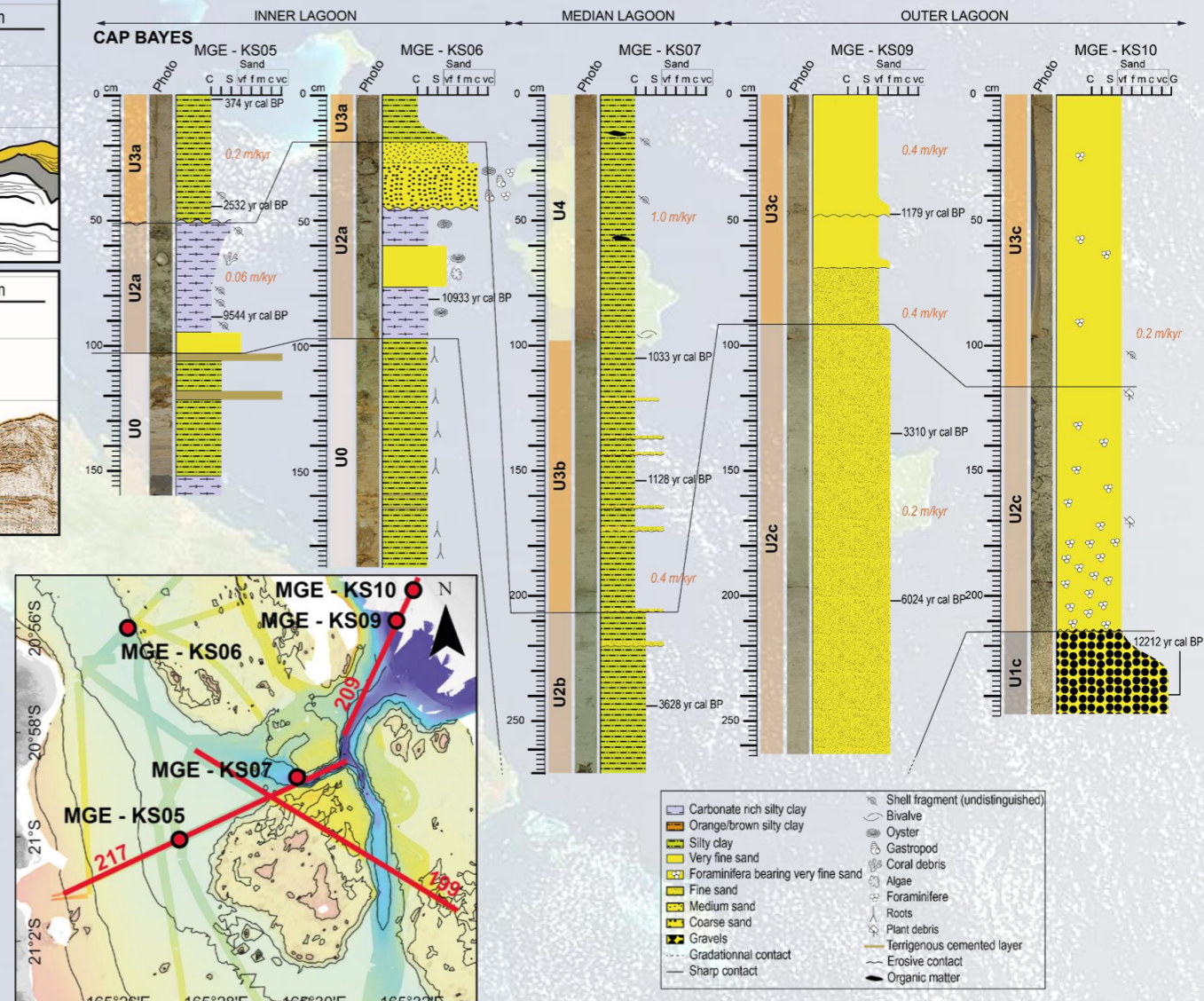
# Stratigraphy – Cap Bayes

- Three main erosive discontinuities: R1, R2 and R3
- Incision and thus, sediment fluxes constrained by carbonate constructions
- Dominant terrigenous input in the proximal lagoon

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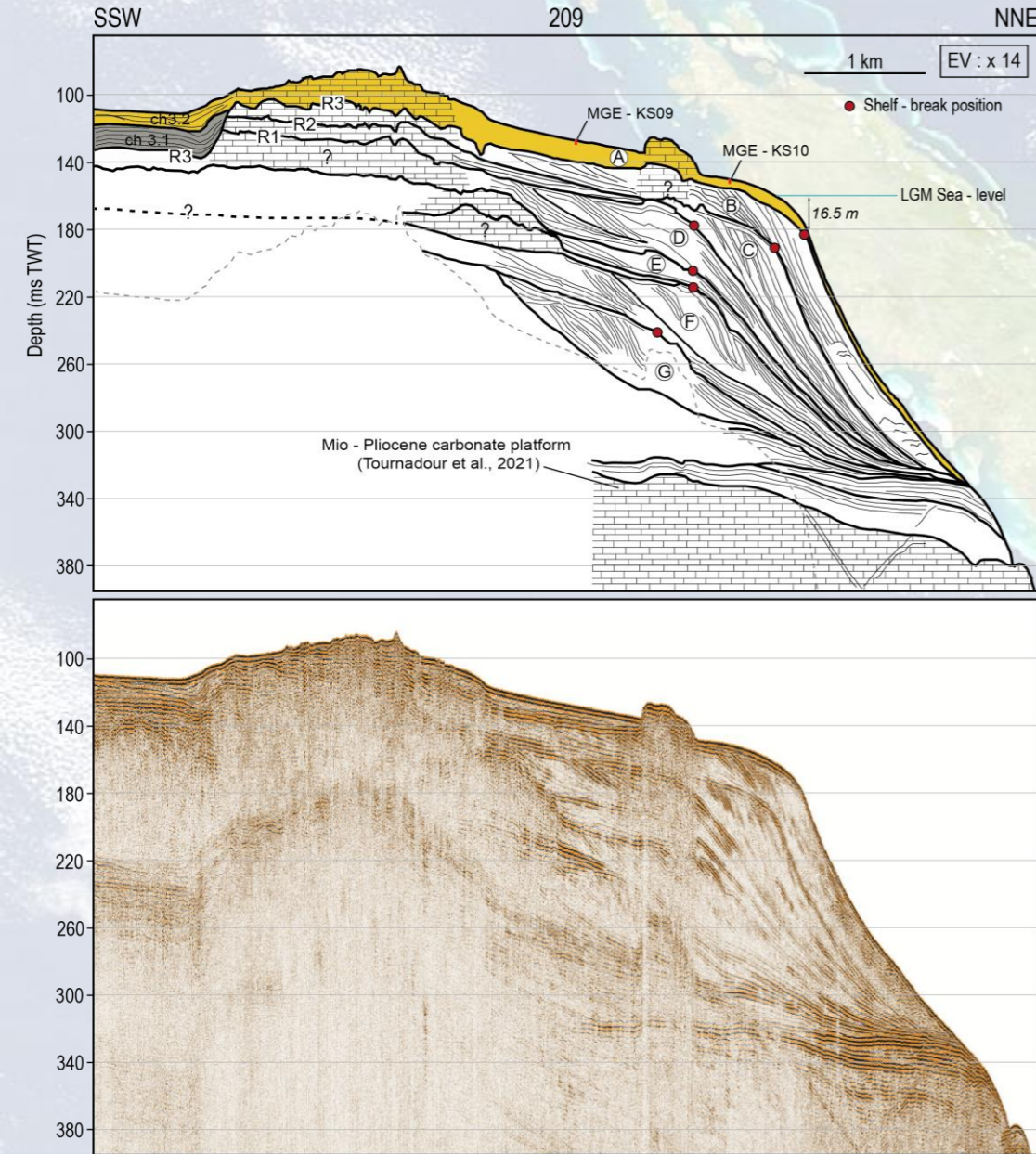
Kerouédan et al., 2026



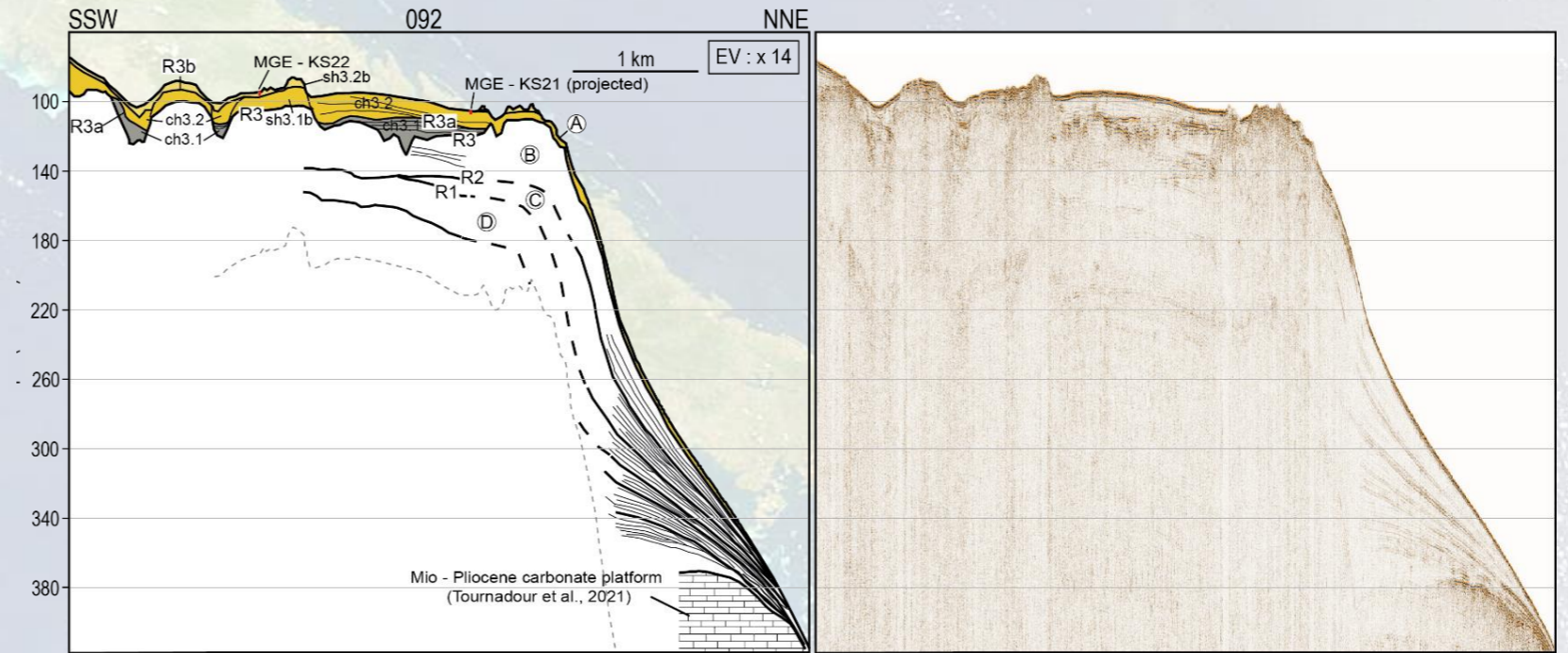
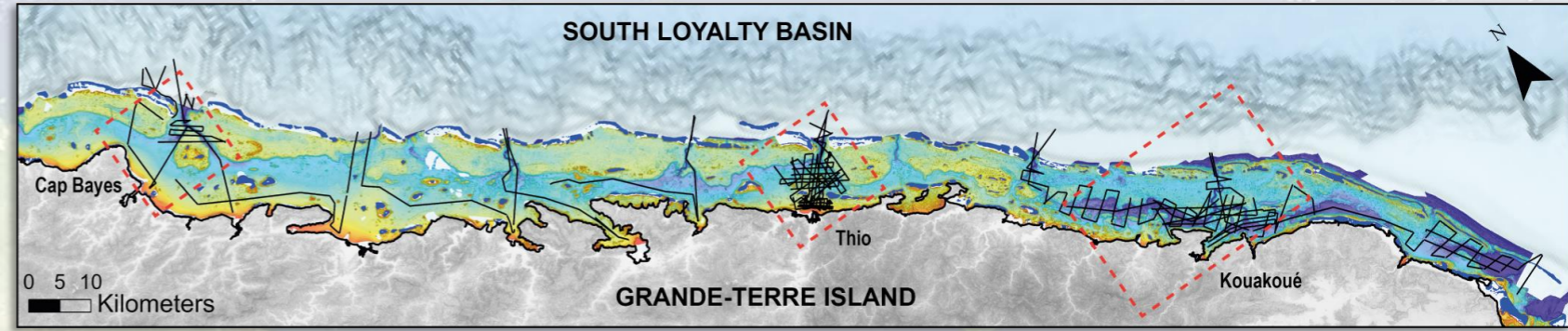


# Seismic stratigraphy on the outer slope

- Six low angle (10 to 30°) to high angle (50 to 60°) progradational clinoform wedges (B to G)



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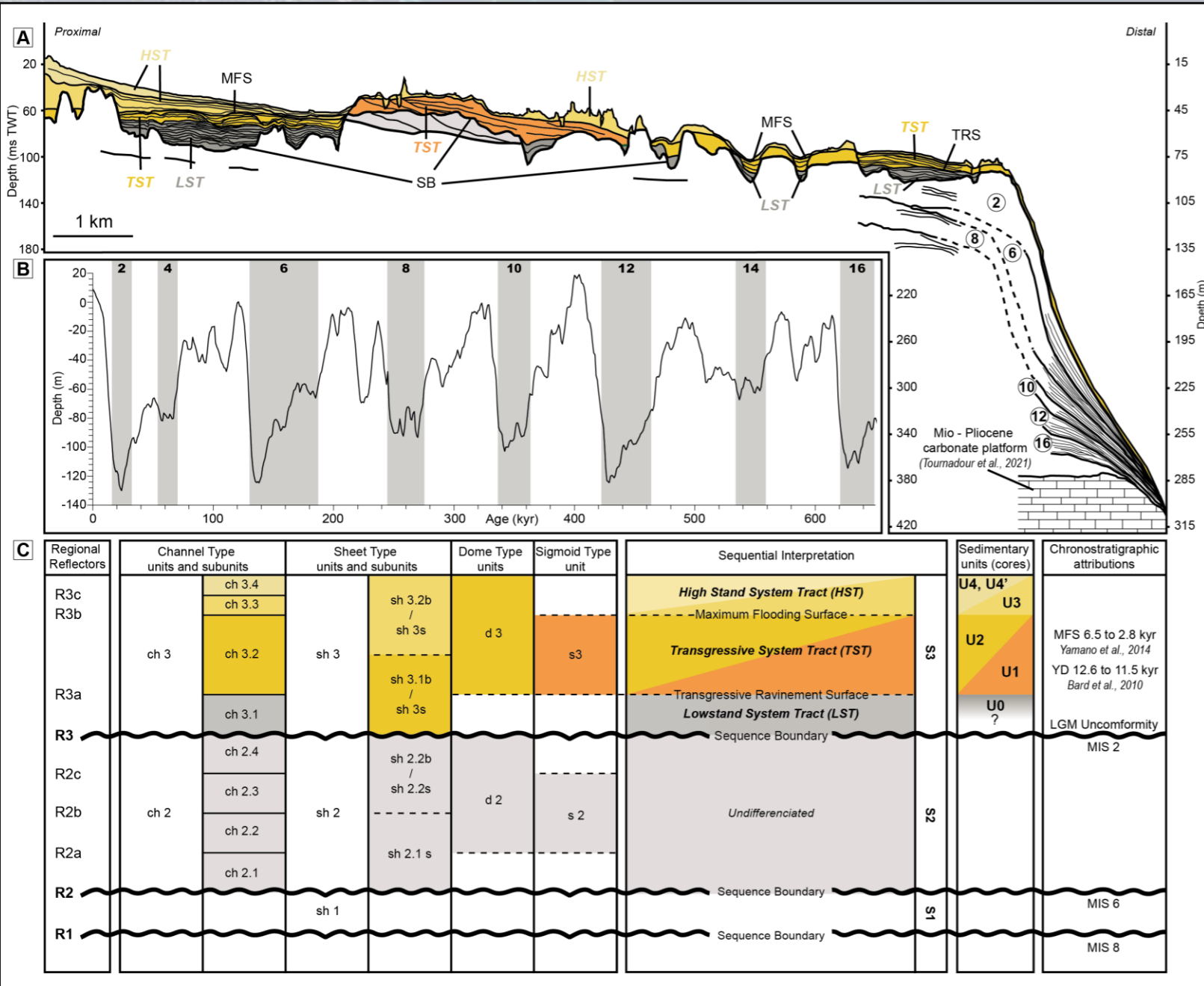


Kerouédan et al., 2026



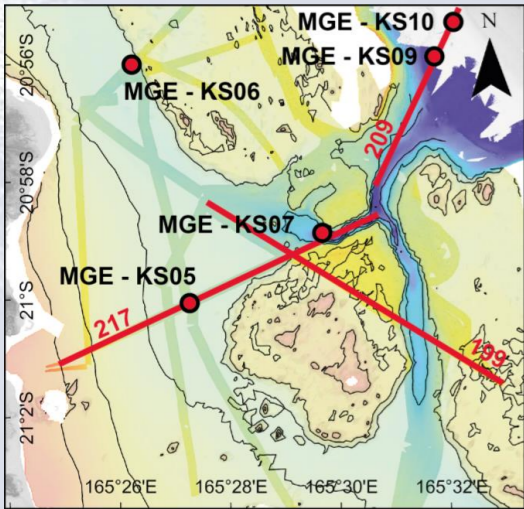
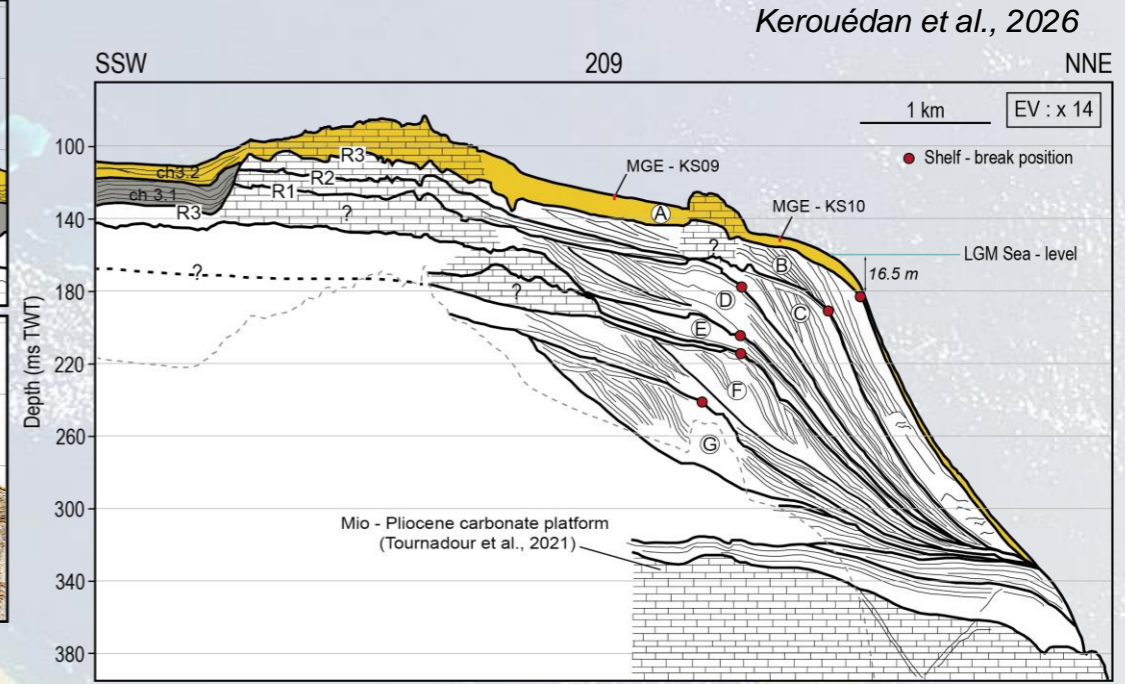
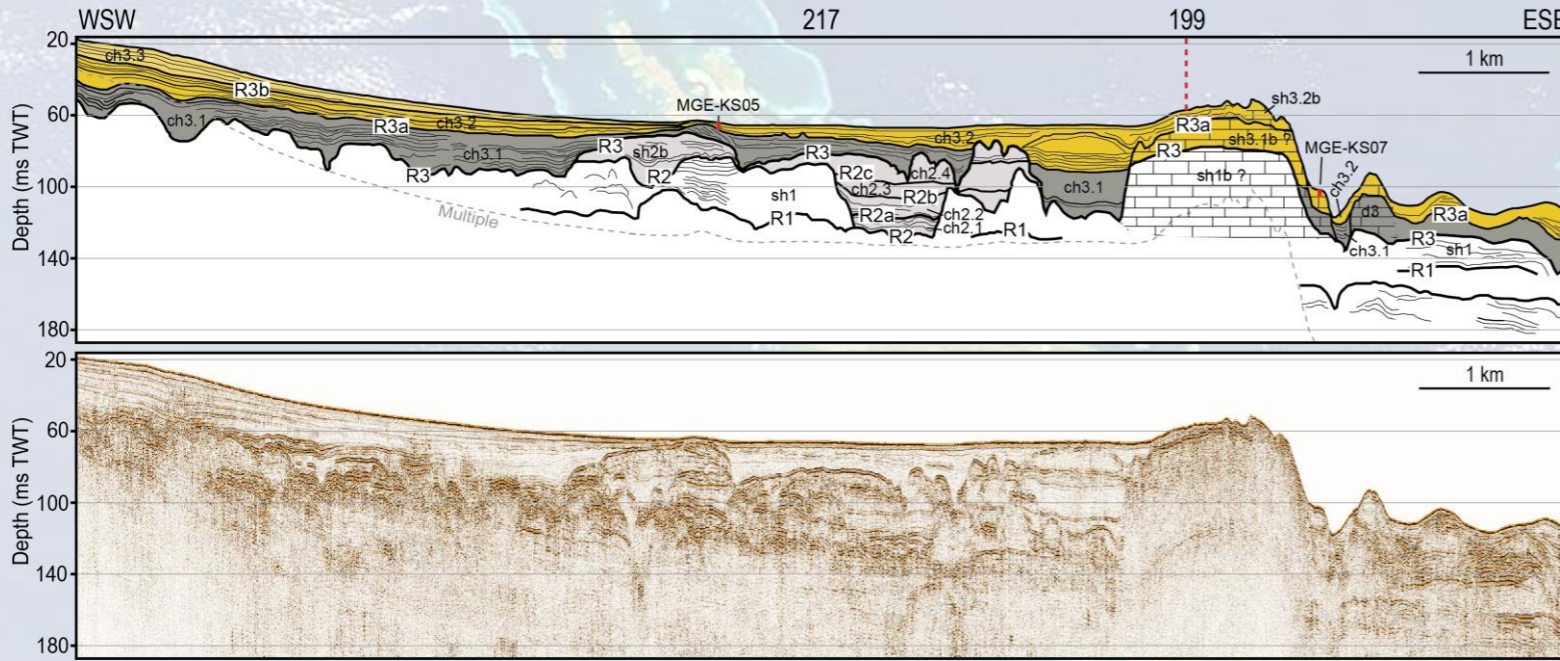
# Sequential interpretation of the eastern platform

- Preservation of **three sedimentary sequences** in the eastern lagoon of New Caledonia.
- Preservation of **lowstand wedges** since **MIS 16** on the Mio-Pliocene carbonate platform
- R3 is interpreted as the **LGM unconformity**. Considering the same sketch as *Rabineau et al., (2005)*, each lowstand wedge is associated to a Glacial Marine Isotopic Stage.
- Influence of **inherited geomorphology** on sediment infill and carbonate production. **Partitioning of sedimentation**: concentration of siliciclastic deposits in the proximal lagoon vs carbonate deposits on the distal lagoon.



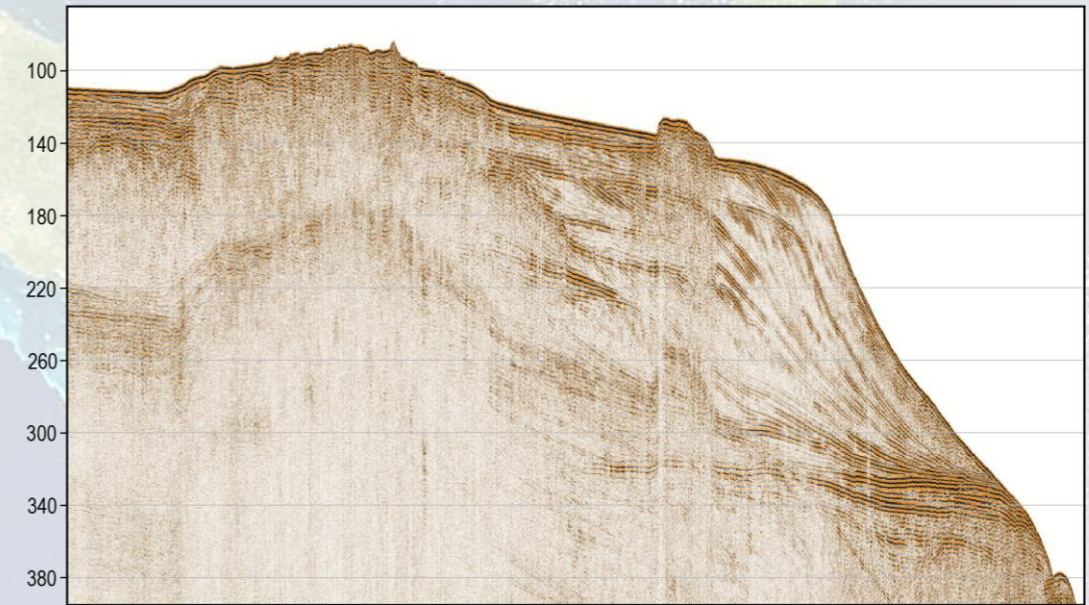


# Seismic stratigraphy of the outer slope – Focus on Cap Bayes area



Kerouédan et al., 2026

- We propose a subsidence evolution model from the paleo sea-levels inferred from the sequential interpretation of lowstand shelf-margin wedges in Cap Bayes area
- The mean subsidence rate computed by this method is **0,06 m/kyr** over the last 630 kyr at the shelf-break.





# Vertical movements

Kerouédan et al., 2026

Kerouédan et al., 2026

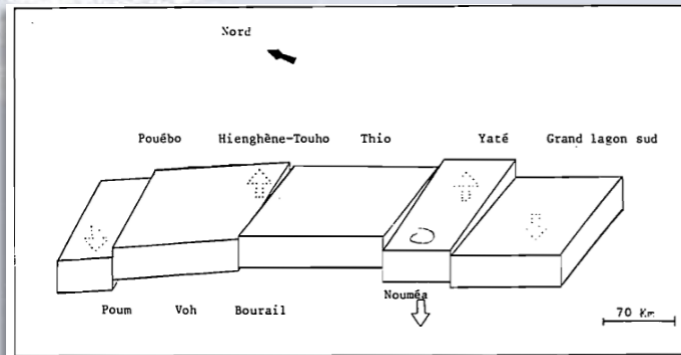
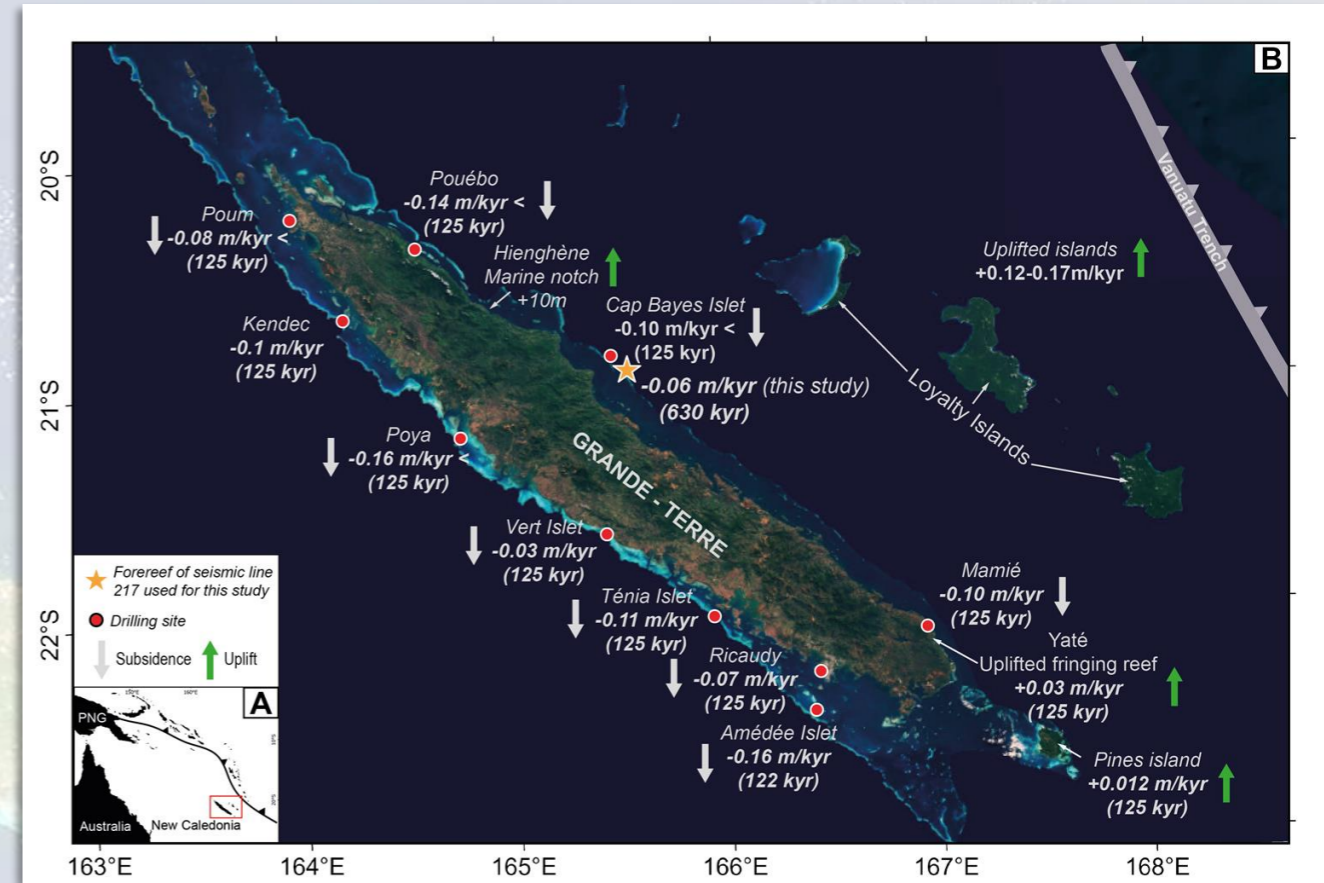
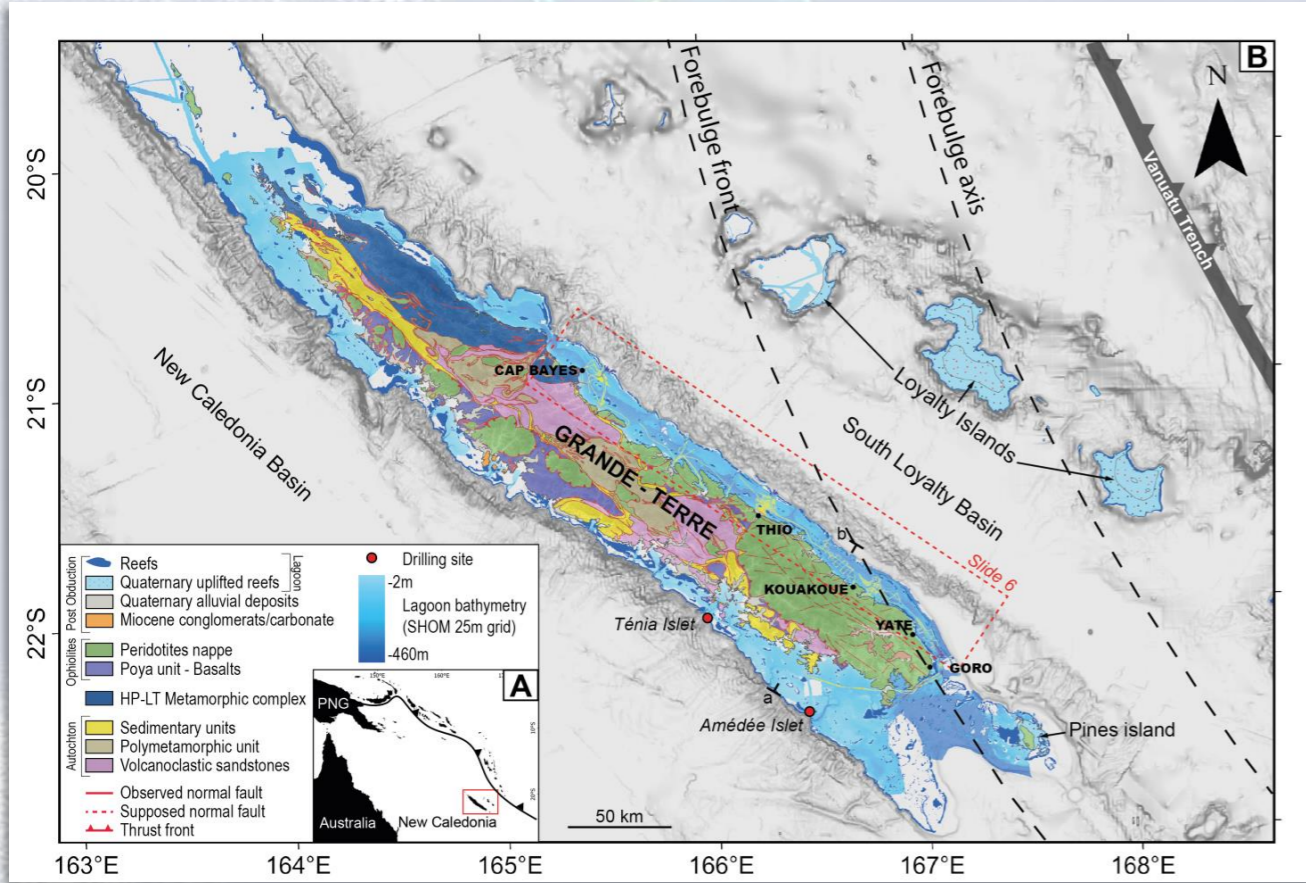


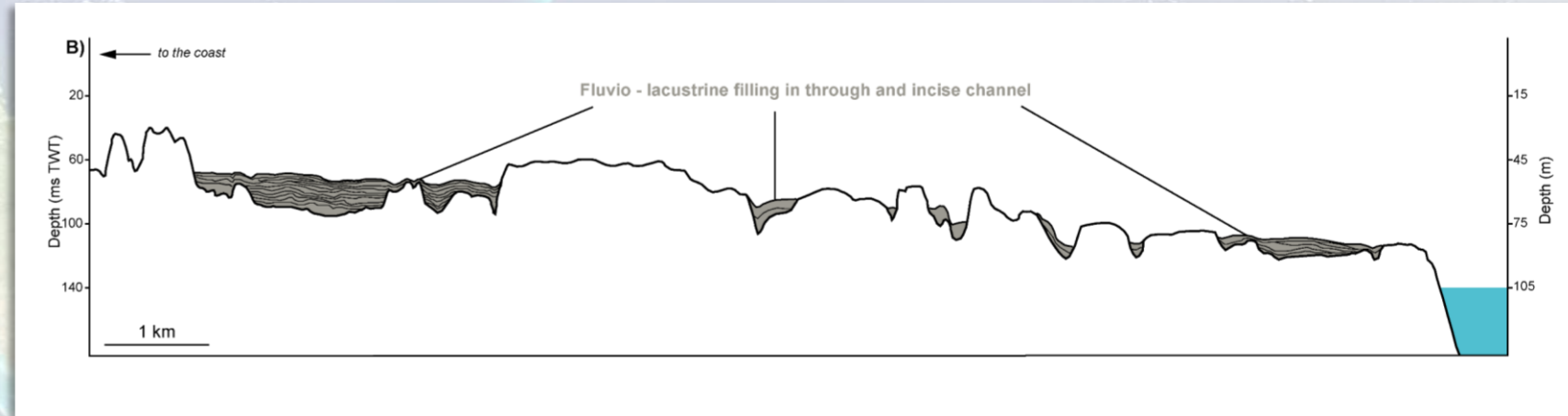
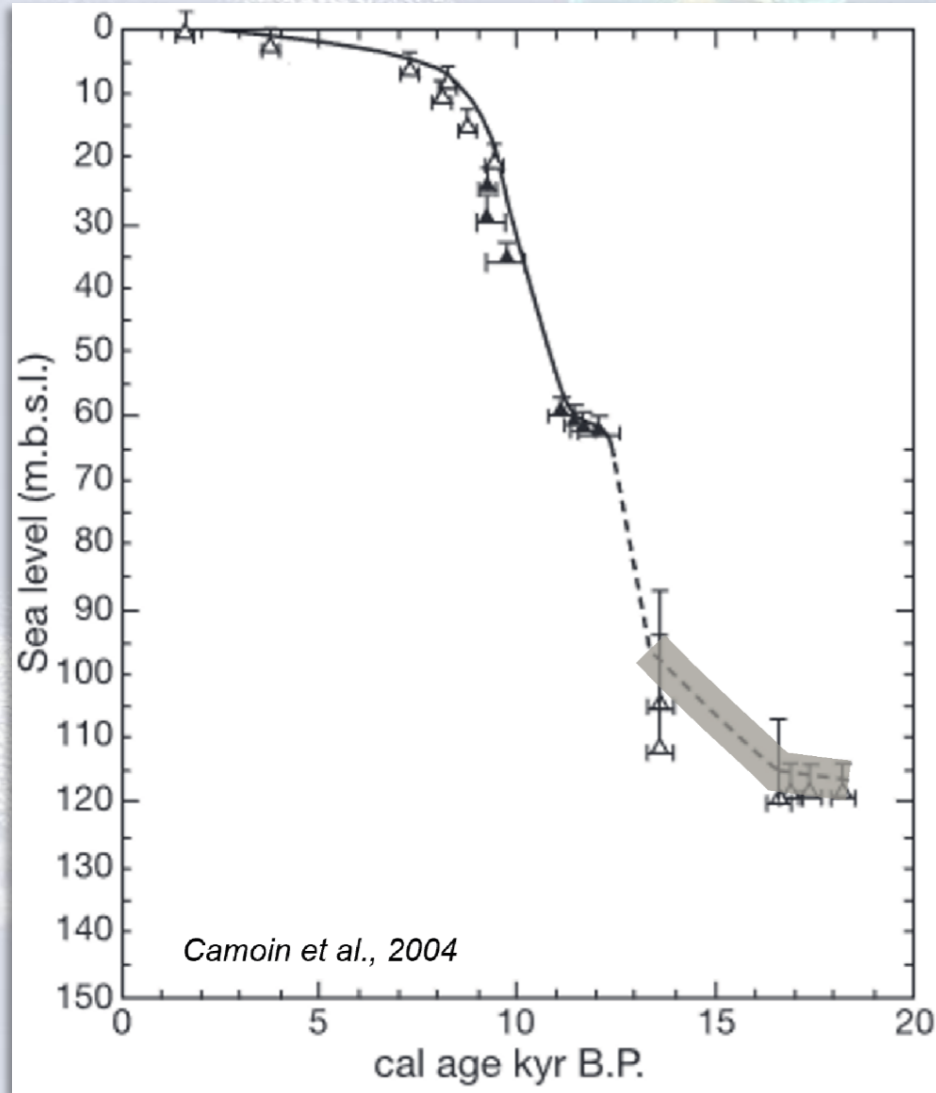
Figure 57 : le comportement spécifique de la Grande Terre

Cabioch, 1988

- Both **uplift** and **subsidence** at Grande-Terre (Cabioch et al., 1996, Coudray et al., 1976, Frank et al., 2006, Marshall and Launay, 1978) – may be applied by blocks (Cabioch, 1988)
- Vertical movements induced by **isostatic readjustement** (erosion of peridotites massif) and/or **regional tectonic** (Vanuatu subduction, lithospheric bulge (Dubois et al., 1974))



# Evolution of the Holocene lagoon's flooding

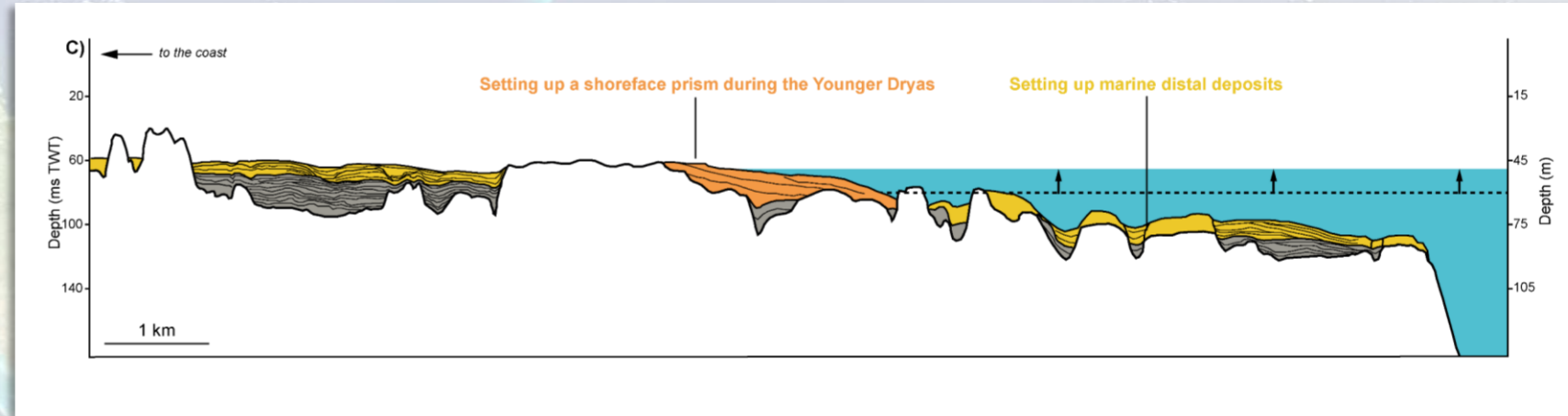
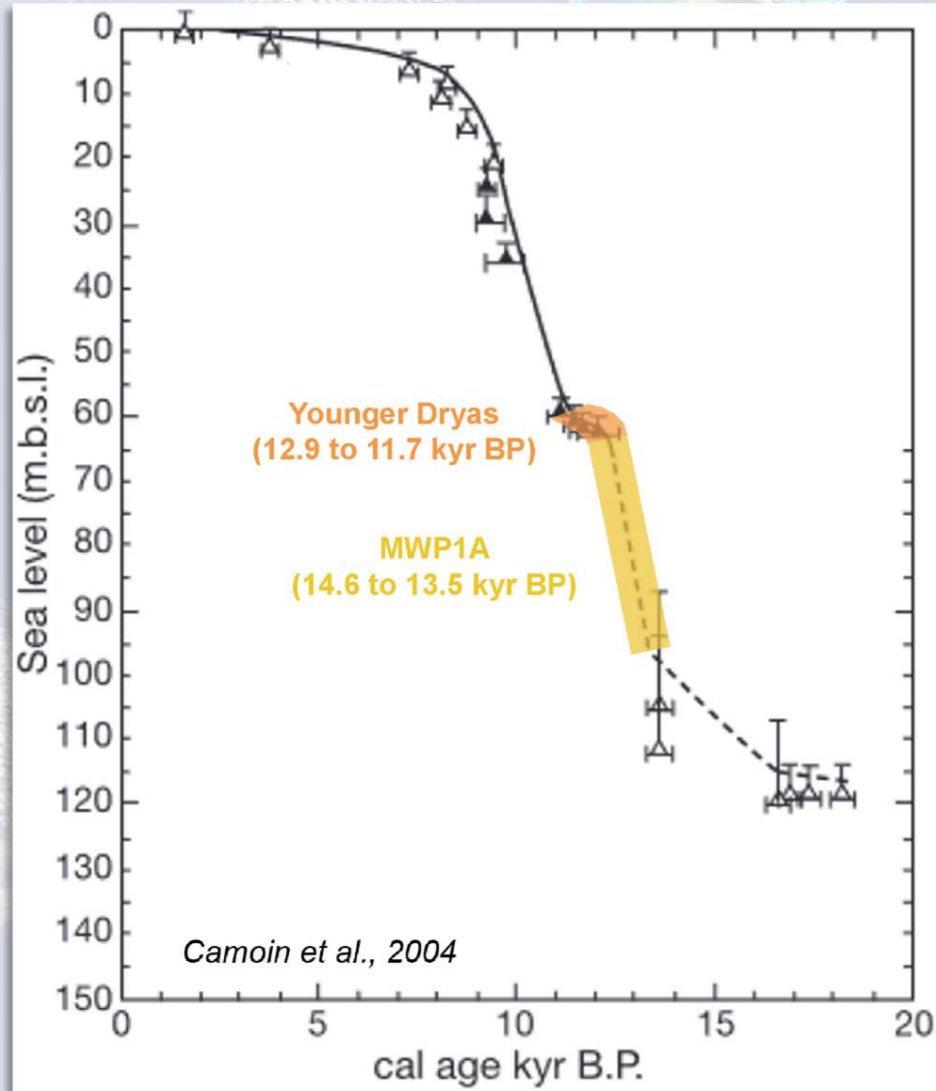


*Kerouédan et al., 2026*

- Lagoon totally exundated
- Beginning of sea-level rise from -120 m after the Last Glacial Maximum
- Lowstand fluvial and estuarine deposits in trough and incision



# Evolution of the Holocene lagoon's flooding

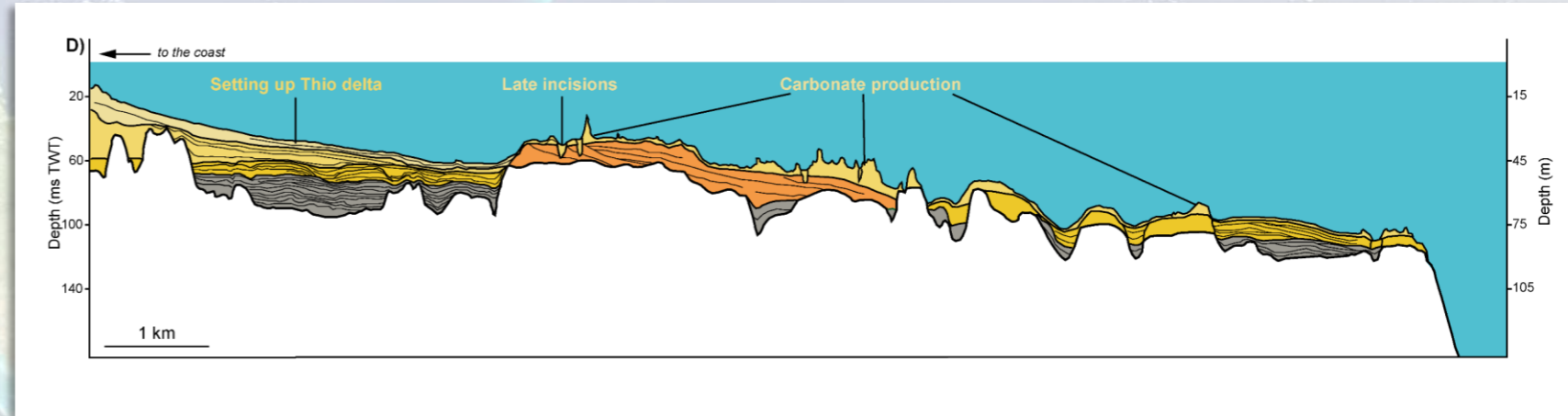
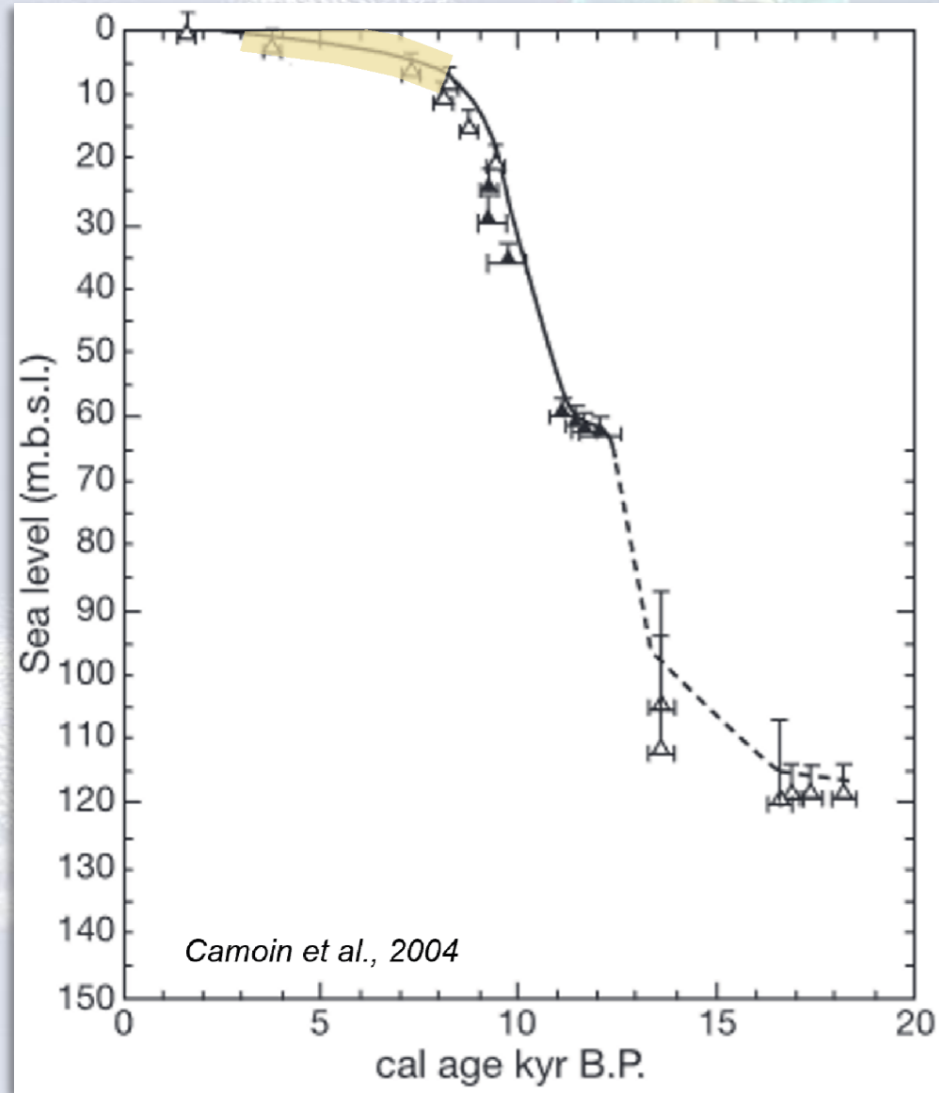


Kerouédan et al., 2026

- Rapid sea level rise during the MWP1A, MWP1B and MWP1C
- First flooding of the lagoon
- Transgressive deposits
- Stagnation during Younger Dryas (12,9 to 11,7 kyr): shoreface prism



# Evolution of the Holocene lagoon's flooding

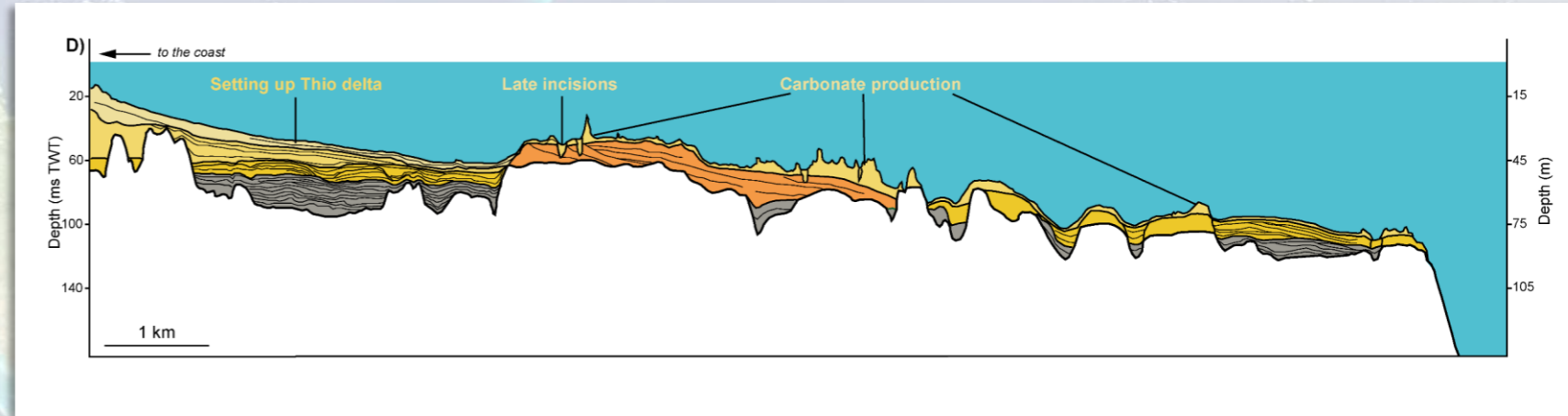
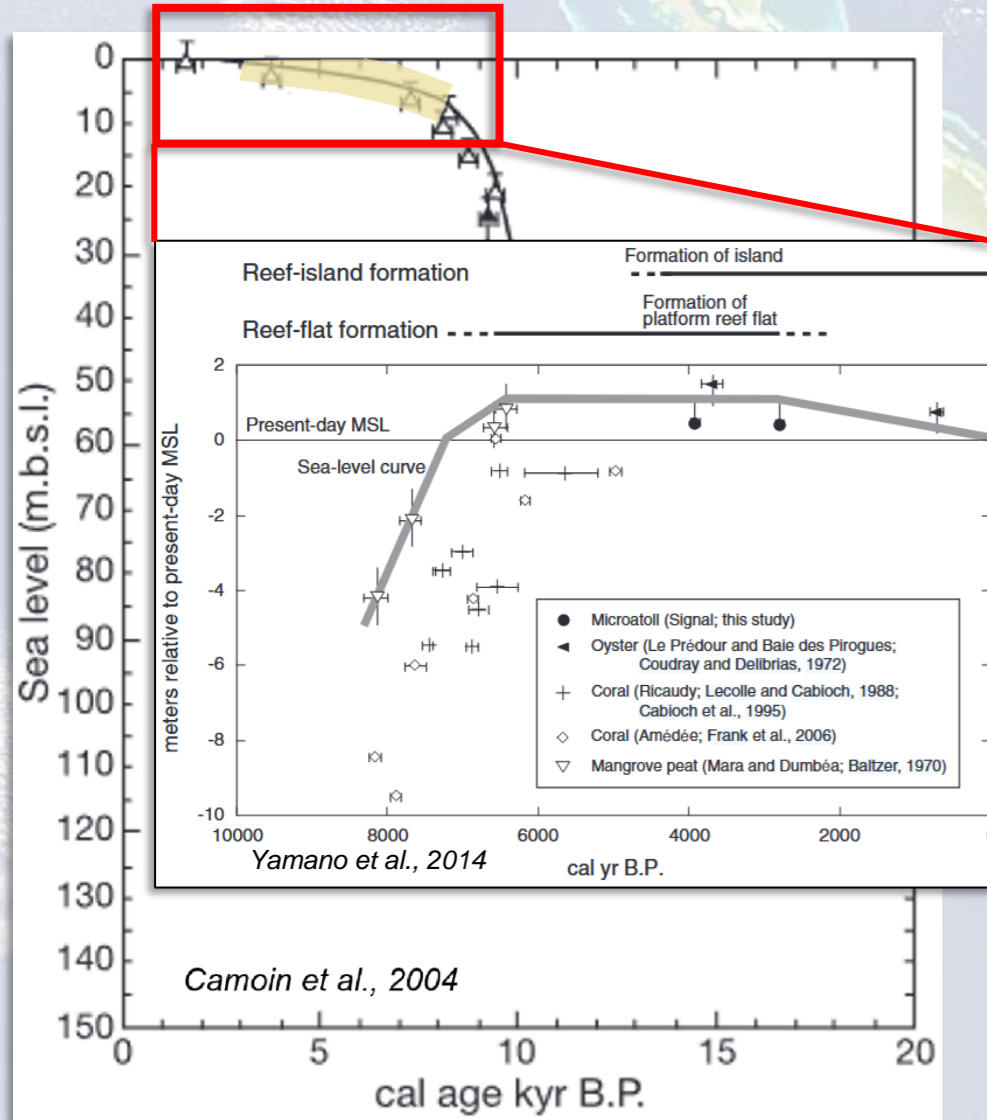


Kerouédan et al., 2026

- Sea level rise to the present-day sea level
- Higestand deposits: prodelta of Thio river and carbonate production on bathymetric high



# Evolution of the Holocene lagoon's flooding

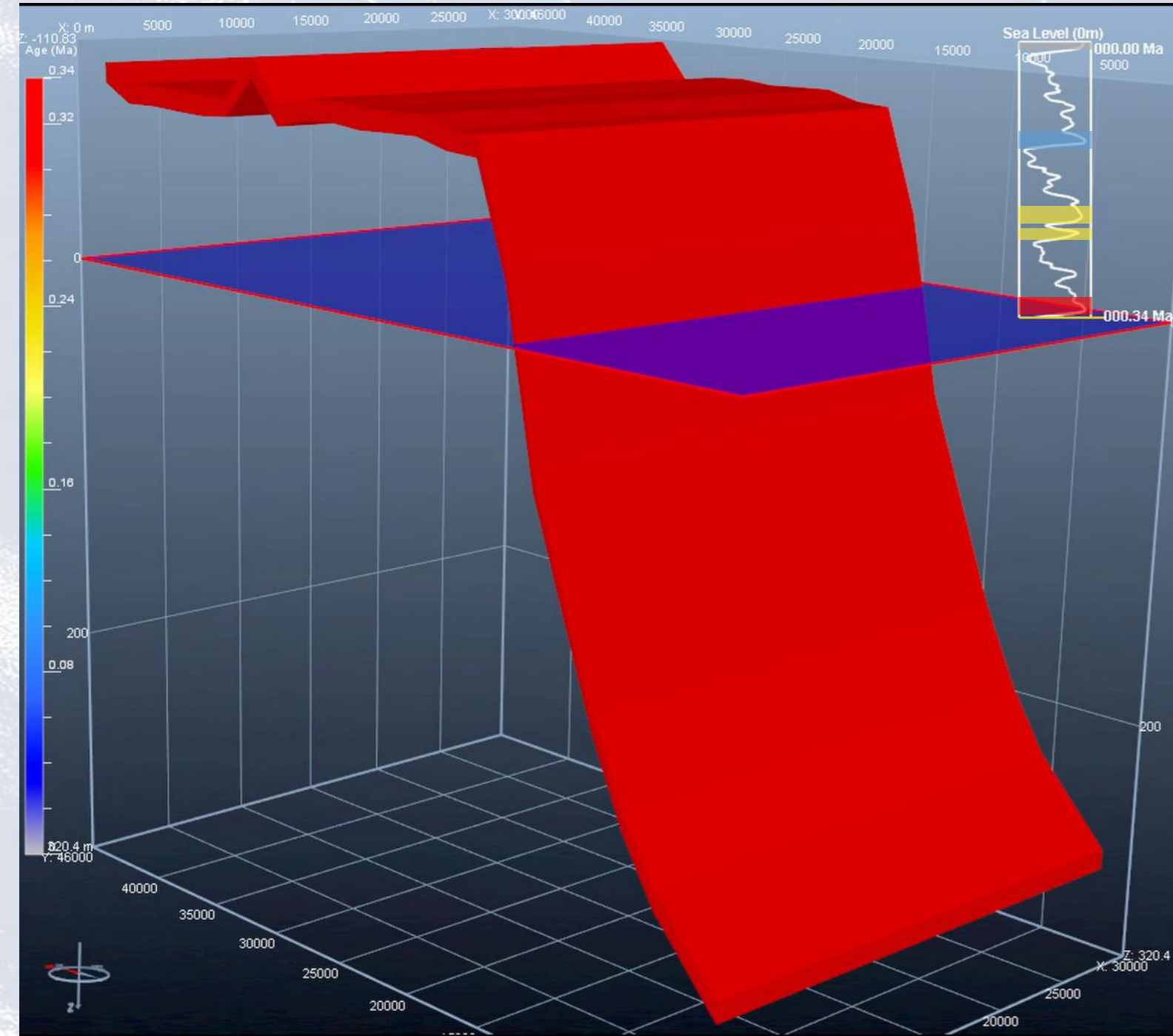


Kerouédan et al., 2026

- Sea level rise to the present day sea level
- Highstand deposits : prodelta of Thio river and carbonate production on bathymetric high
- MFS from 6,5 to 2,8 kyr BP



Kerouédan et al., 2026



## Testing carbonate production on the western platform with Dionisos (forward) numerical stratigraphic model

Goal: to better understand the mixed siliciclastic carbonate sedimentation of New Caledonia

- Preliminary step (on the video): calibrate in situ carbonate production over the last 340 kyr with a **pure carbonate model of the western margin** thanks to existing boreholes (Amédée 4 (Cabioch et al., 2008 ; Frank et al., 2006), Ténia 1 & 3 (Coudray et al., 1976 ; Montaggioni et al., 2011))
- 2<sup>nd</sup> step (work in progress): modeling the stratigraphic evolution of **the eastern margin with mixed siliciclastic-carbonate model** based on our geological model and carbonate production from the preliminary step.



Check out the associate publication  
(Kerouédan et al., 2026)

# Thank you !

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