# CENOZOIC OF THE PARIS BASIN

# GRAIN SHAPE AND GRAIN-SIZE PETROPHYSICAL IMPLICATIONS

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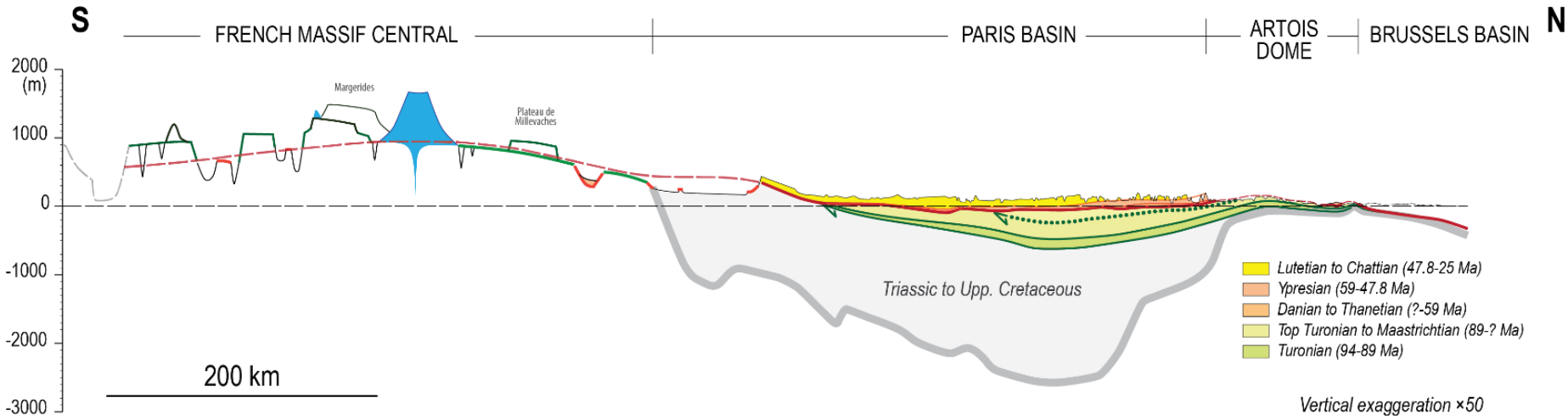
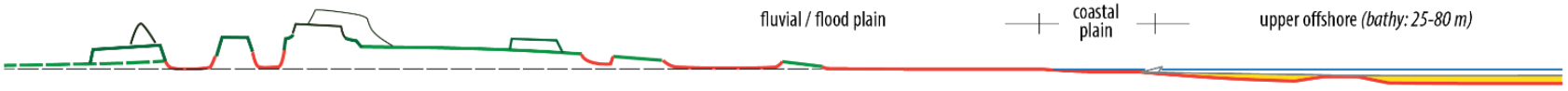
# CENOZOIC PALEOTOPOGRAPHY

## PRESENT-DAY CONFIGURATION

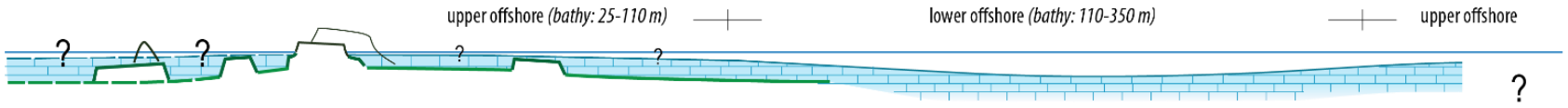



## 57 Ma (Ypresian)



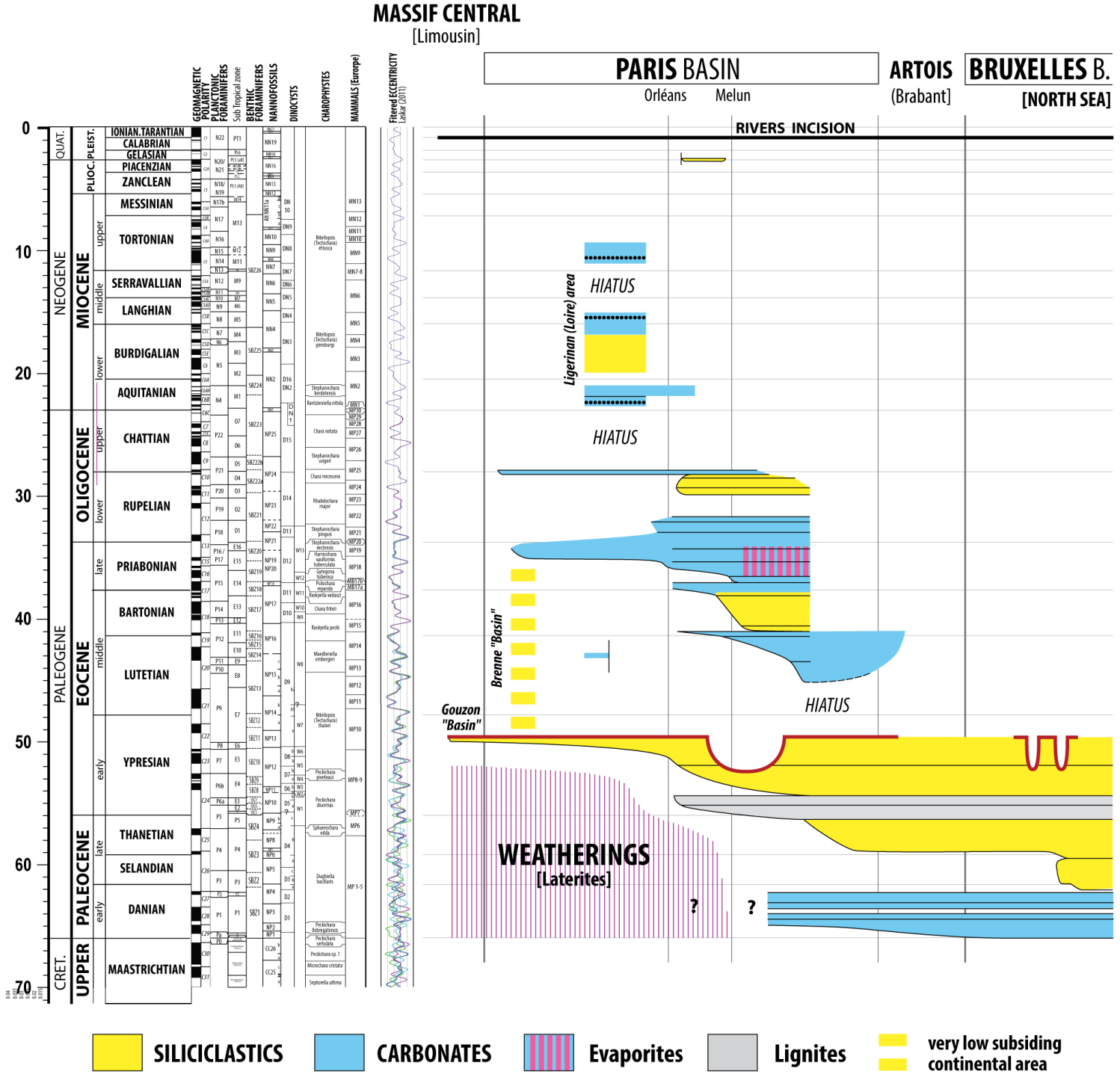

***ca. 70-65 Ma: emersion and weathering***

## 82-78 Ma (Lower Campanian)




(G. Baby, post-doc S2S TOTAL-BRGM)

# WHEELER DIAGRAM





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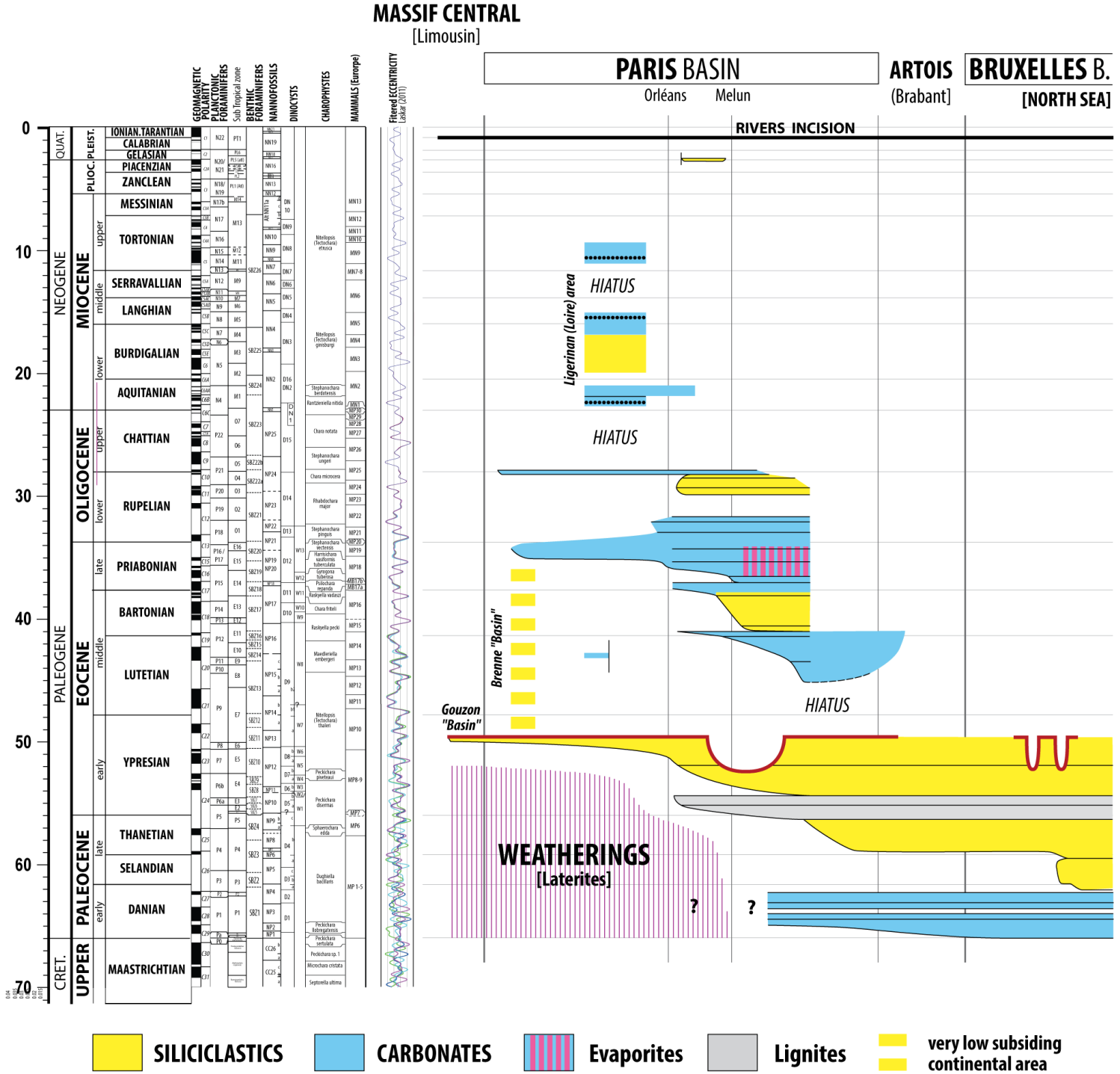
E. Lasseur
C. Robin
S2S TOTAL-BRGM

# BIOSTRATIGRAPHIC REEVALUATION

(Briais, 2016, Thèse)


*avec la collaboration de J.J Châteauneuf (ex-BRGM) et C. Bourdillon (ERADATA)*

# WHEELER DIAGRAM





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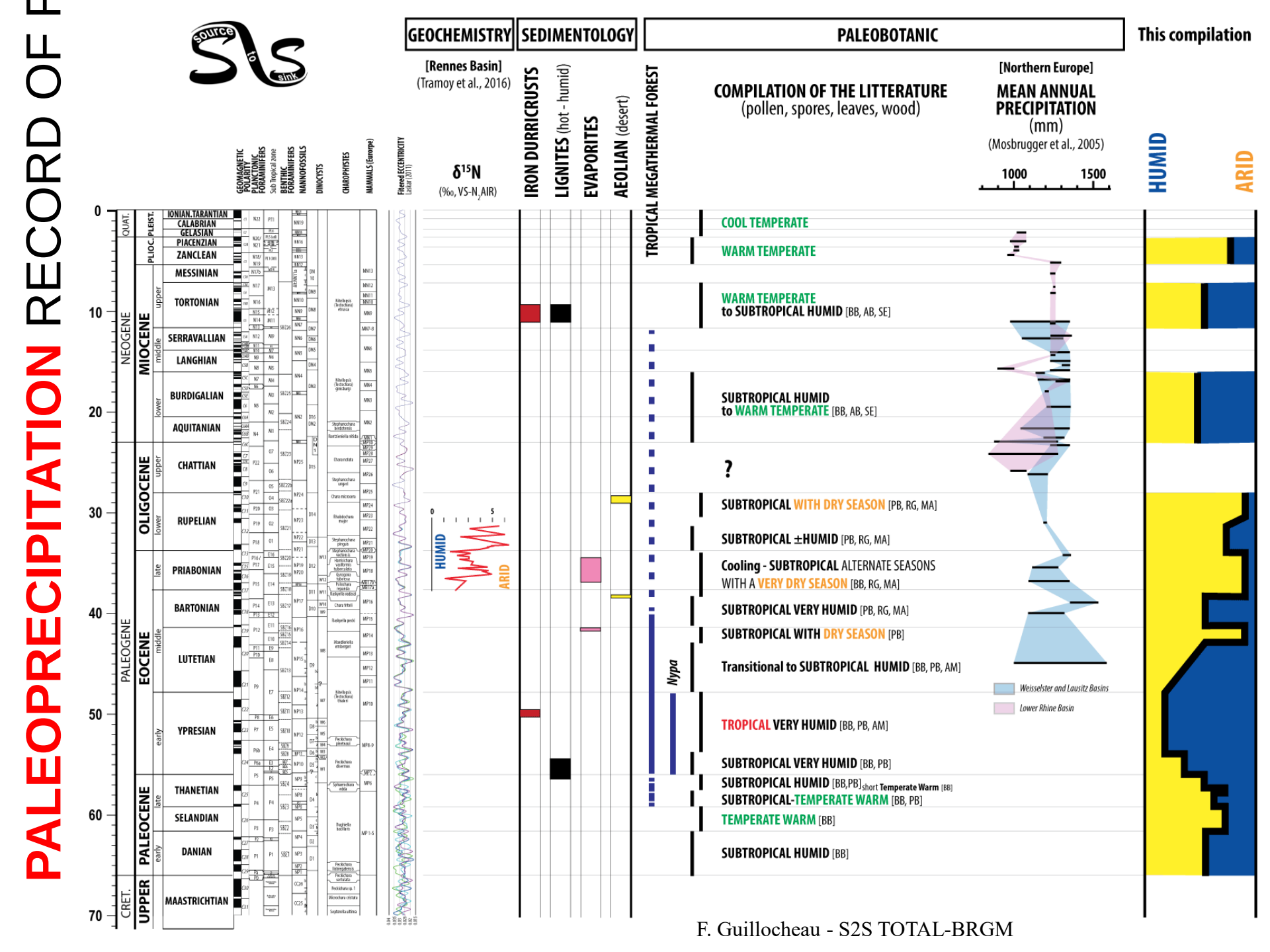
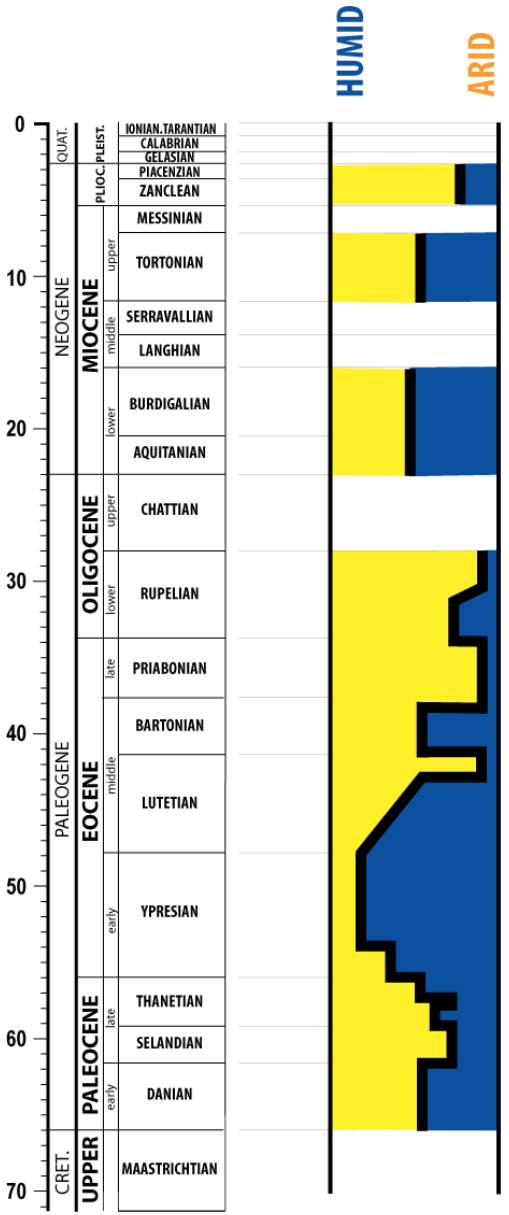
S2S TOTAL-BRGM

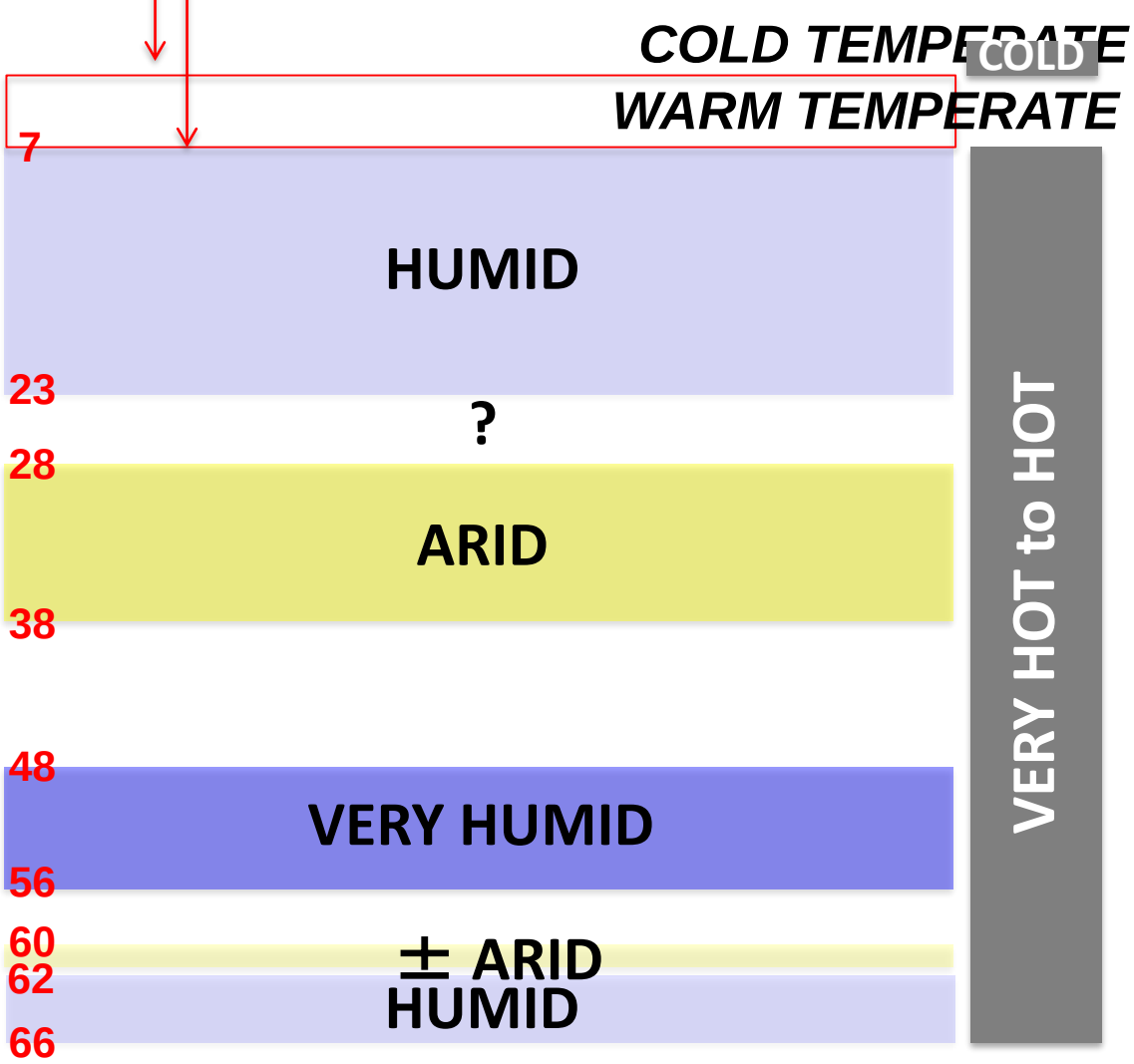



F. Guillocheau - S2S TOTAL-BRGM

# PALEOPRECIPITATION RECORD OF F

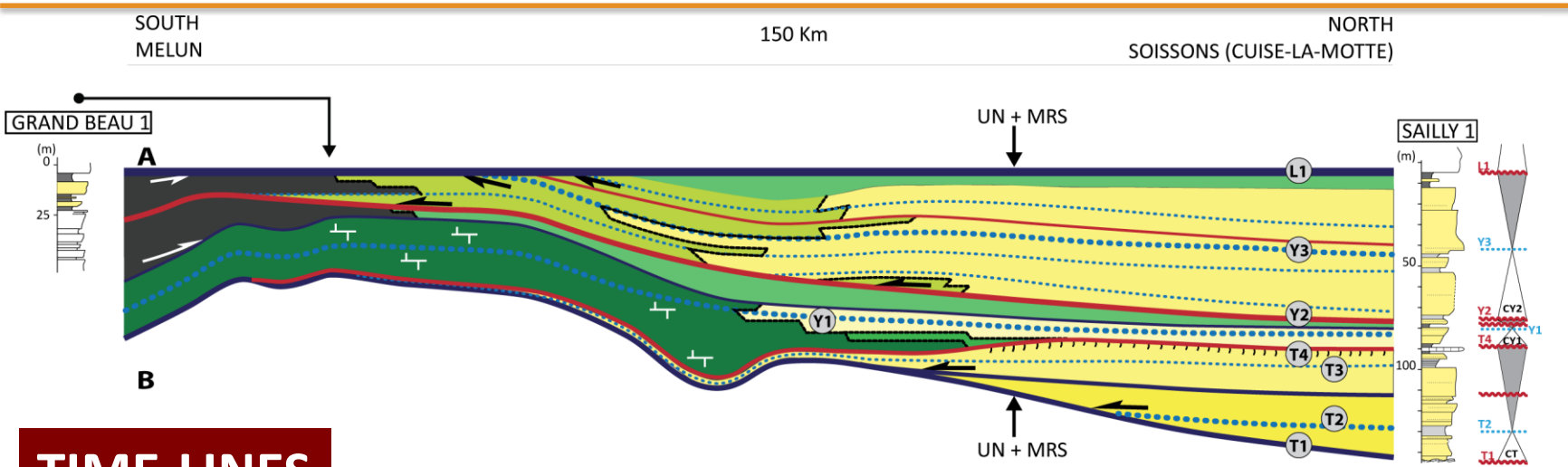
## COOLING and ARIDIFICATION : MODERN CLIMAT



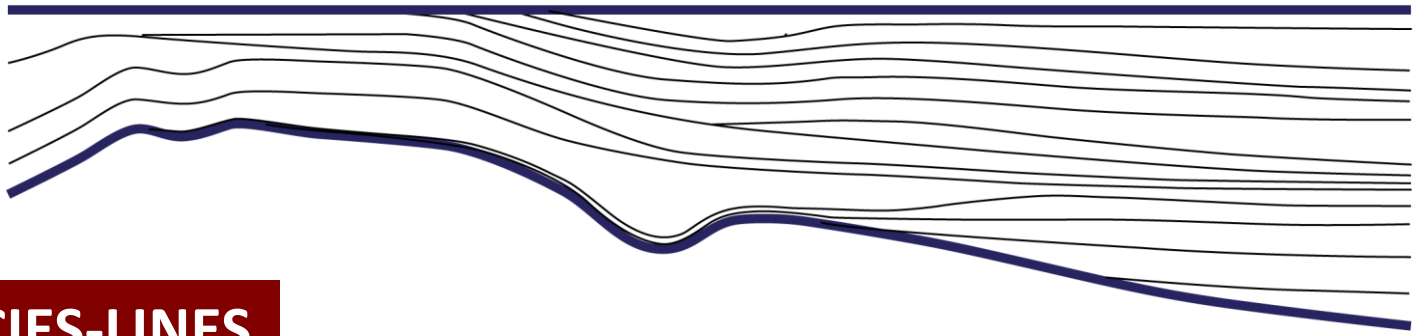
# TIME LINE AND FACIES LINES

Thanetian-Ypresian



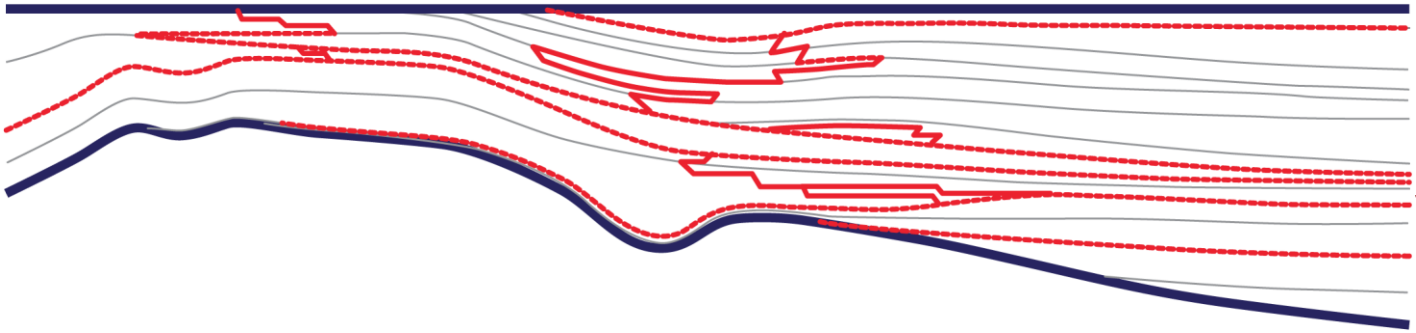

(Briais *et al.*, 2016, *Solid Earth*)

## TIME-LINES



SEQUENCE STRATIGRAPHY [well-logs]

## FACIES-LINES



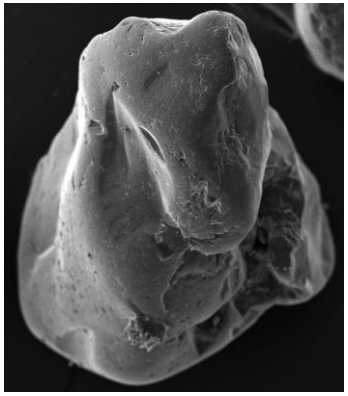
FACIES SEDIMENTOLOGY

TIDE-DOMINATED
"Estuaries"
"Subaqueous bars"

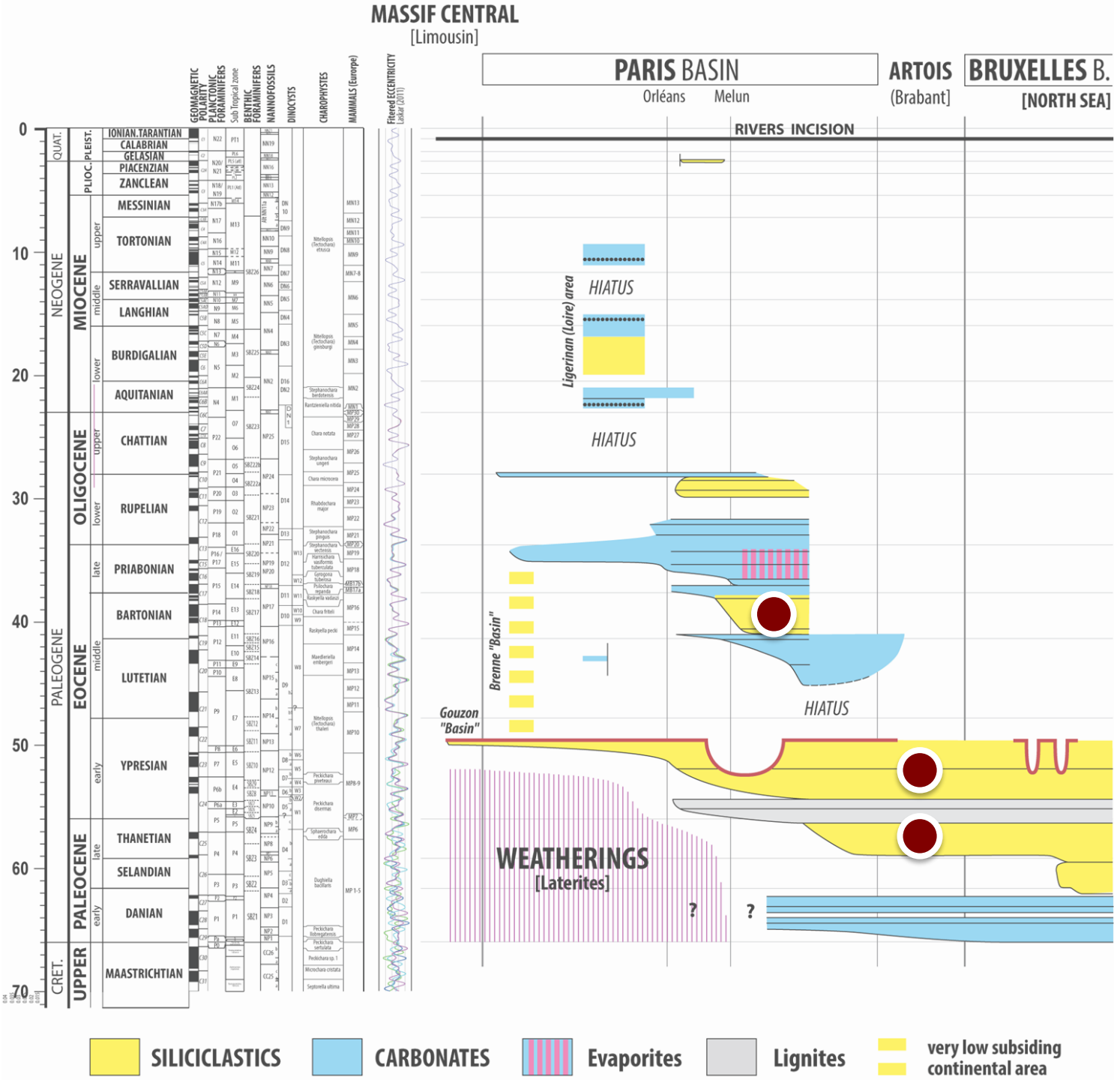

WAVE
DOMINATED
"Shoreface"

WAVE
PROTECTED
"Bays"

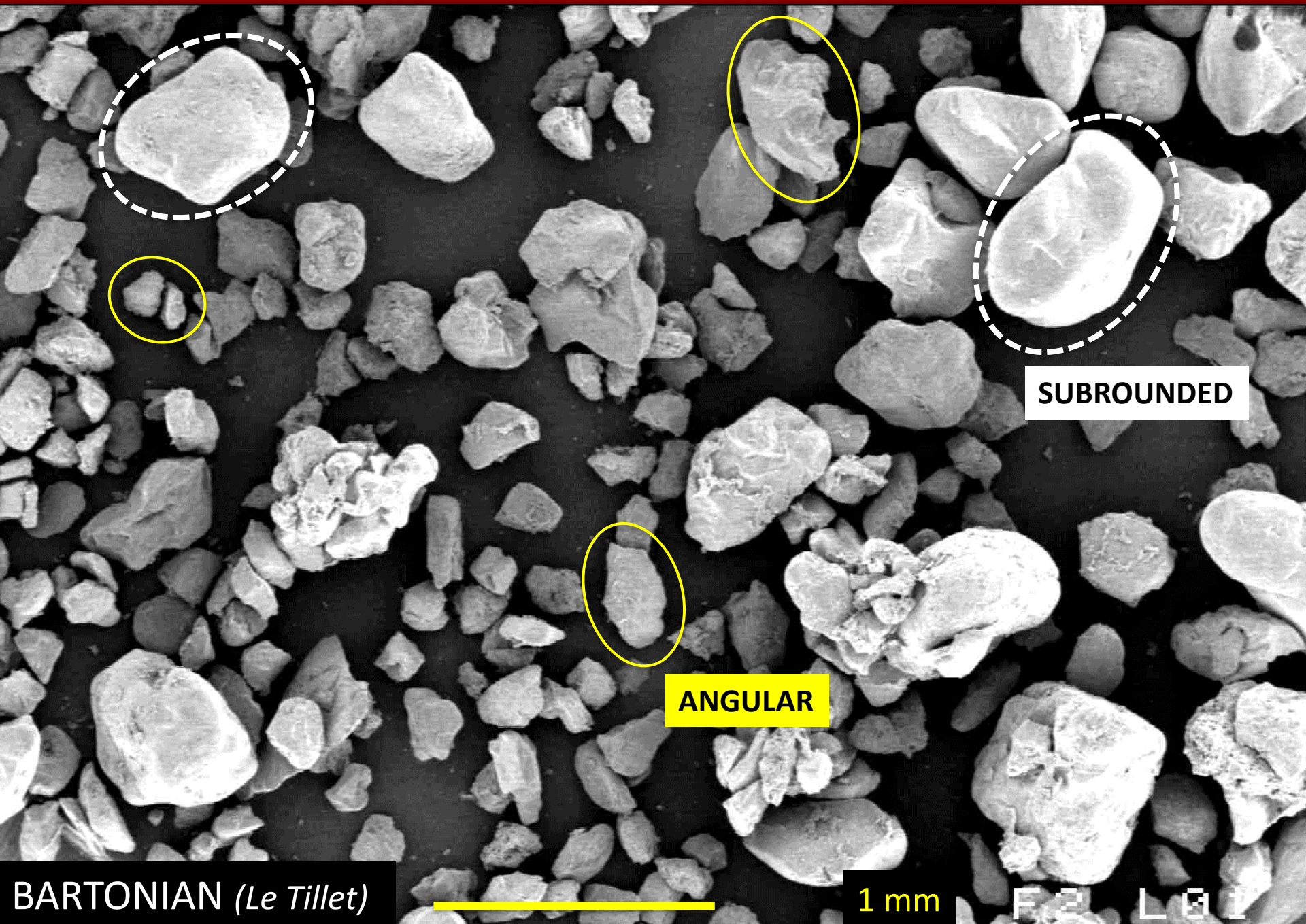
# EXOSCOPY STUDY



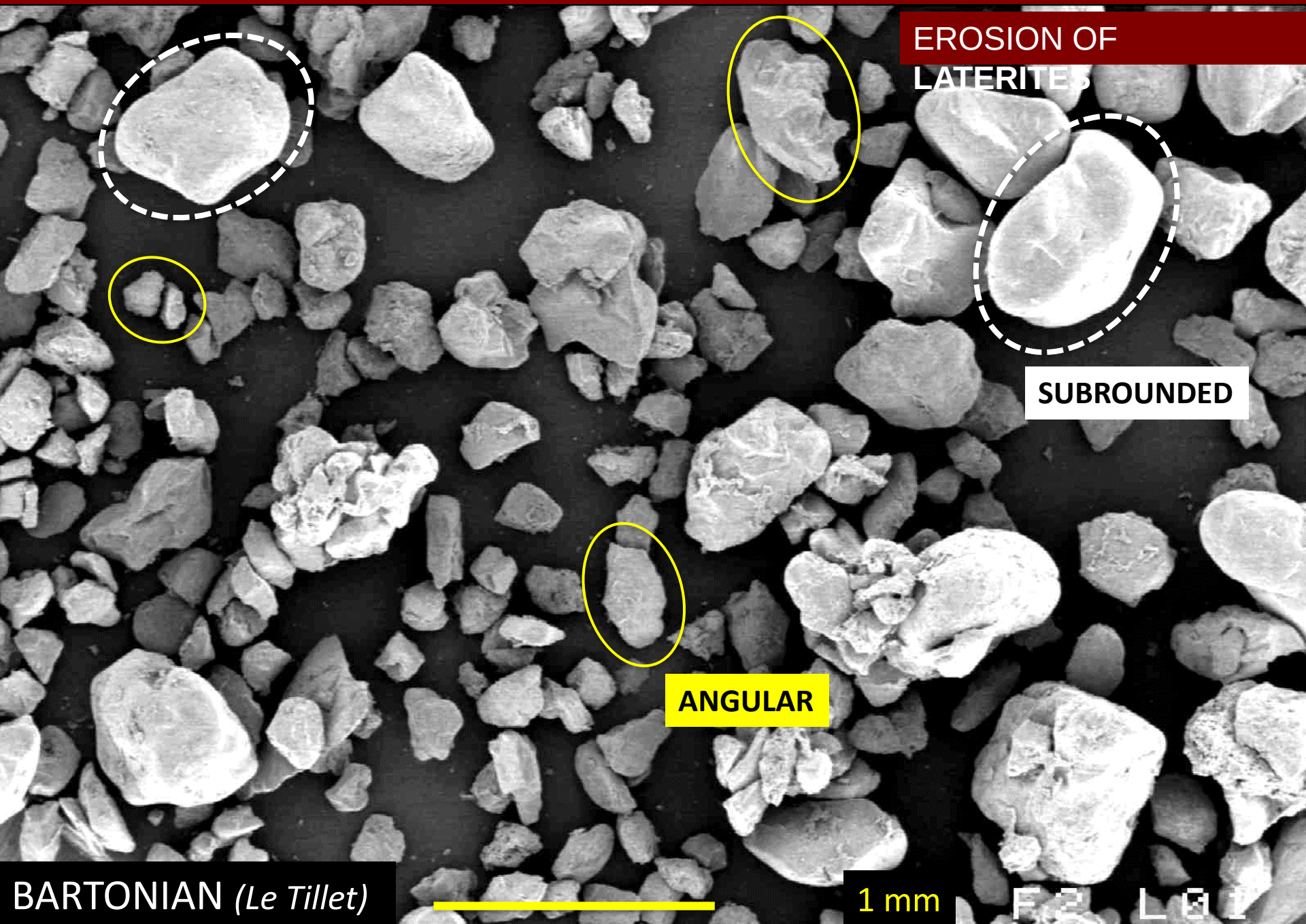
0,8 mm



# 1. TWO DIFFERENT SHAPES : ANGULAR [finest] – SUBROUNDED [coarsest]



# 2. **ANGULAR** GRAINS ARE **ETCHED** (WEATHERING) **BEFORE DEPOSITION**



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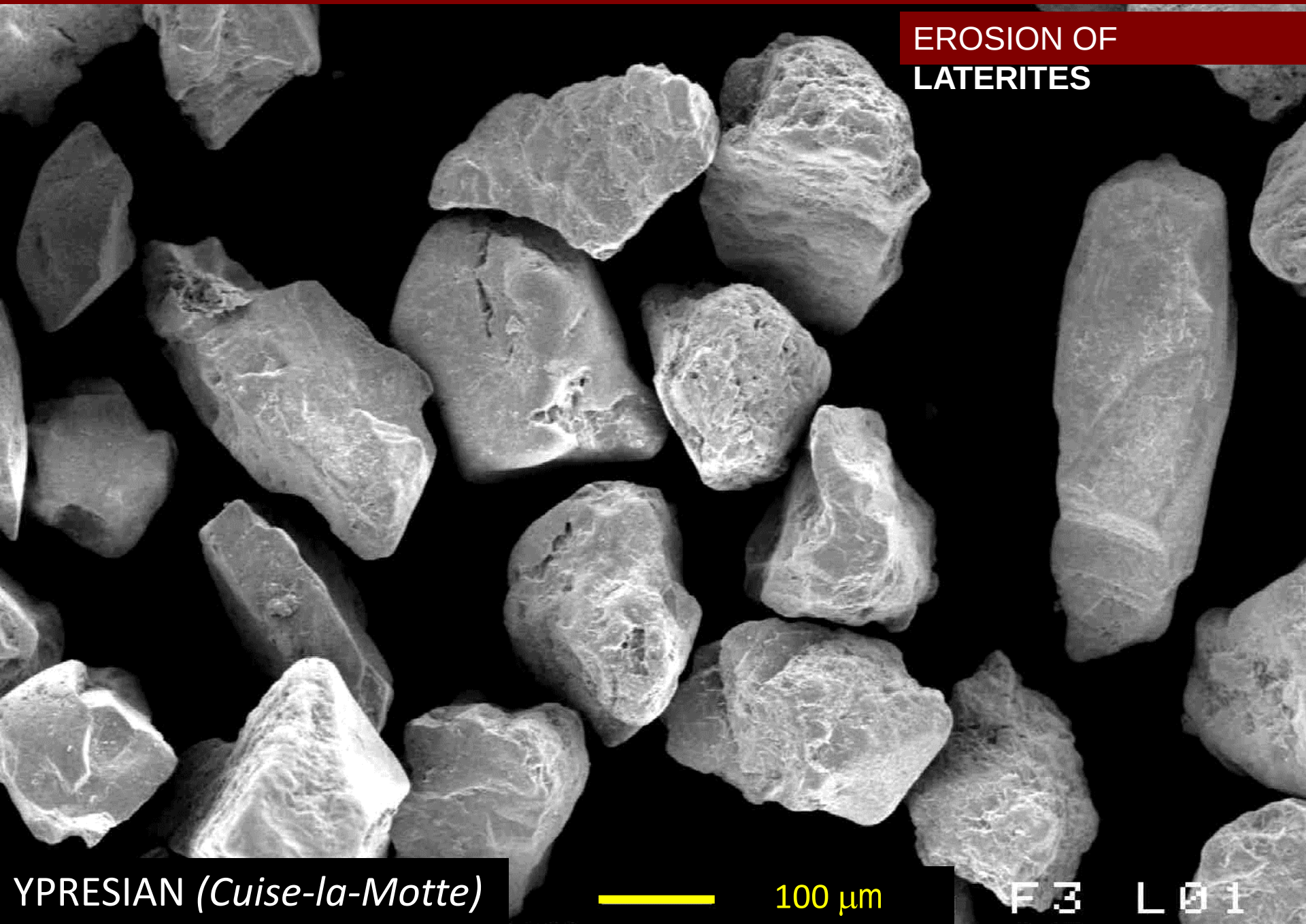
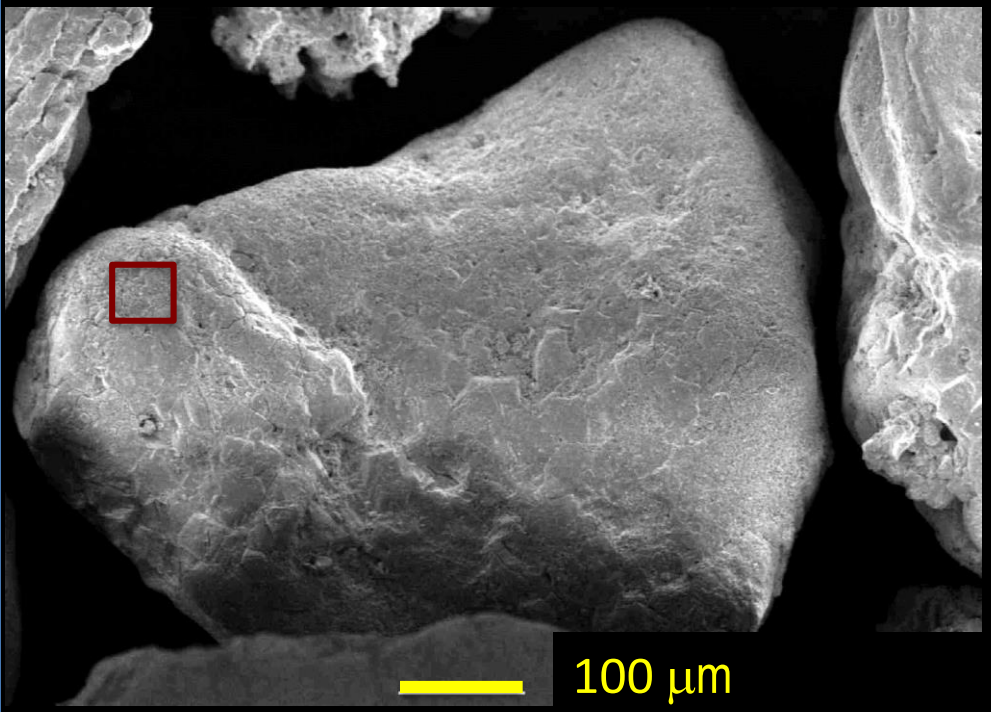
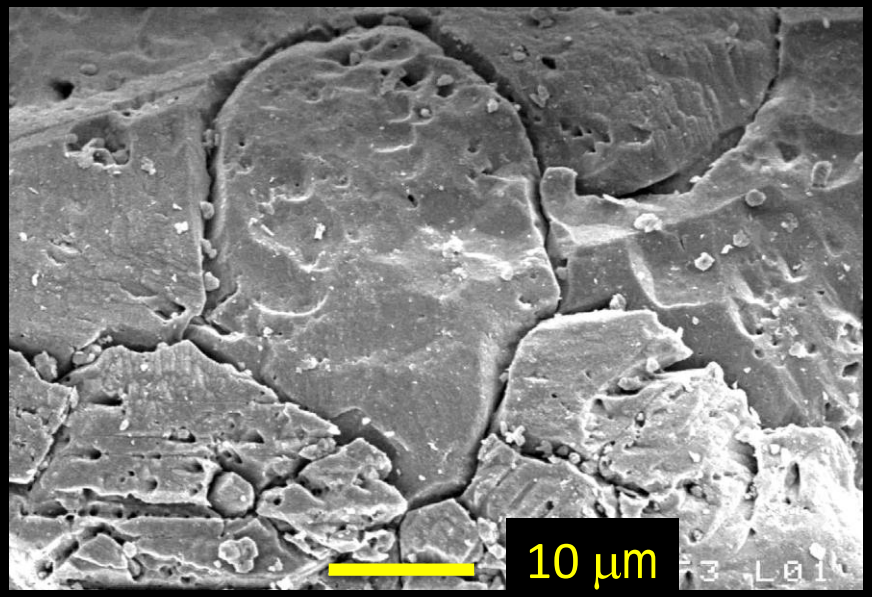
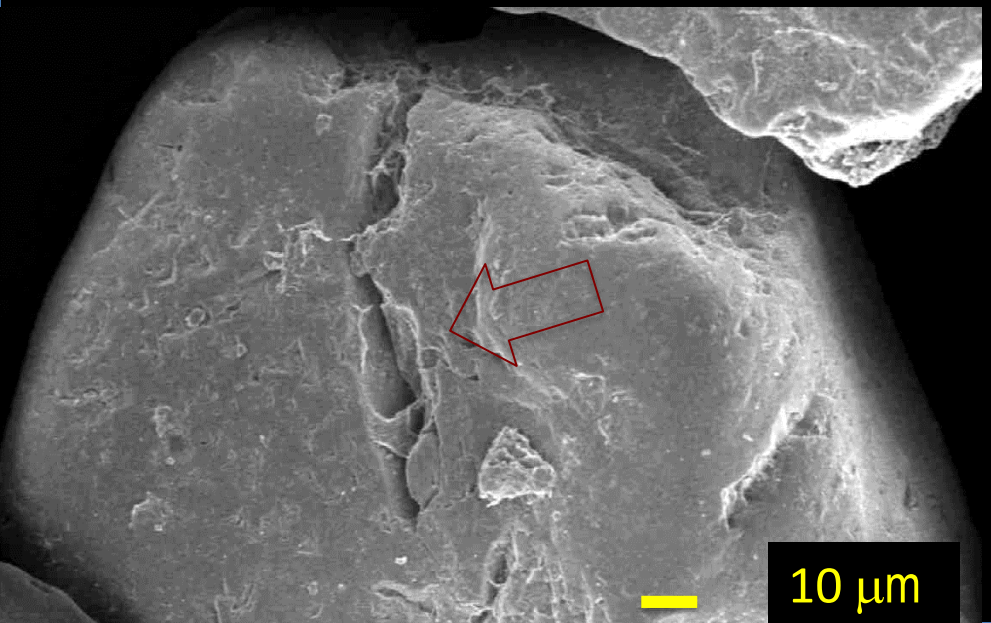


# 3. ALL GRAINS ARE ETCHED (DISSOLUTION) AFTER THEIR DEPOSITION




THANETIAN *(Montagne de Reims)*




YPRESIAN *(Cuise-la-Motte)*

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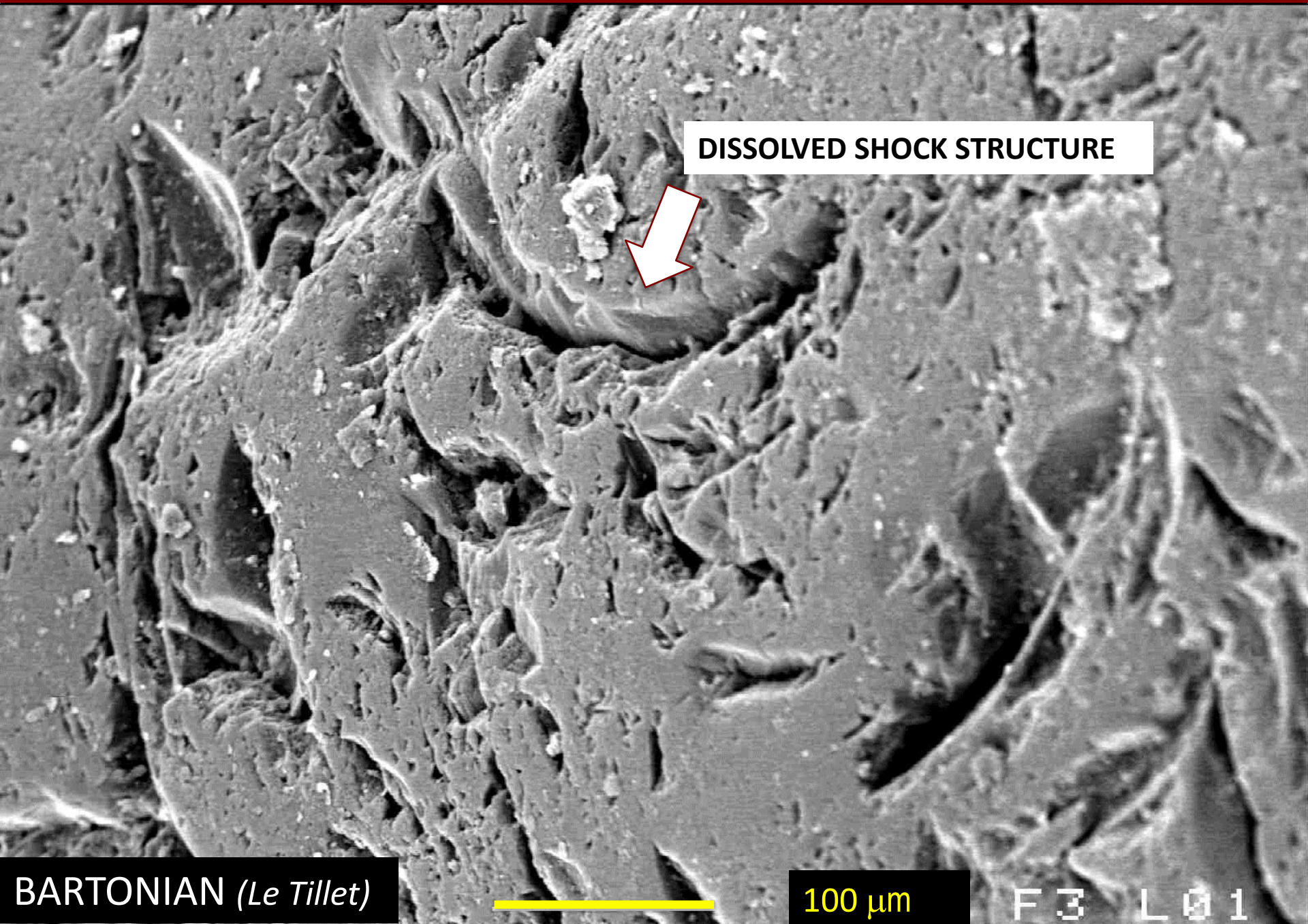

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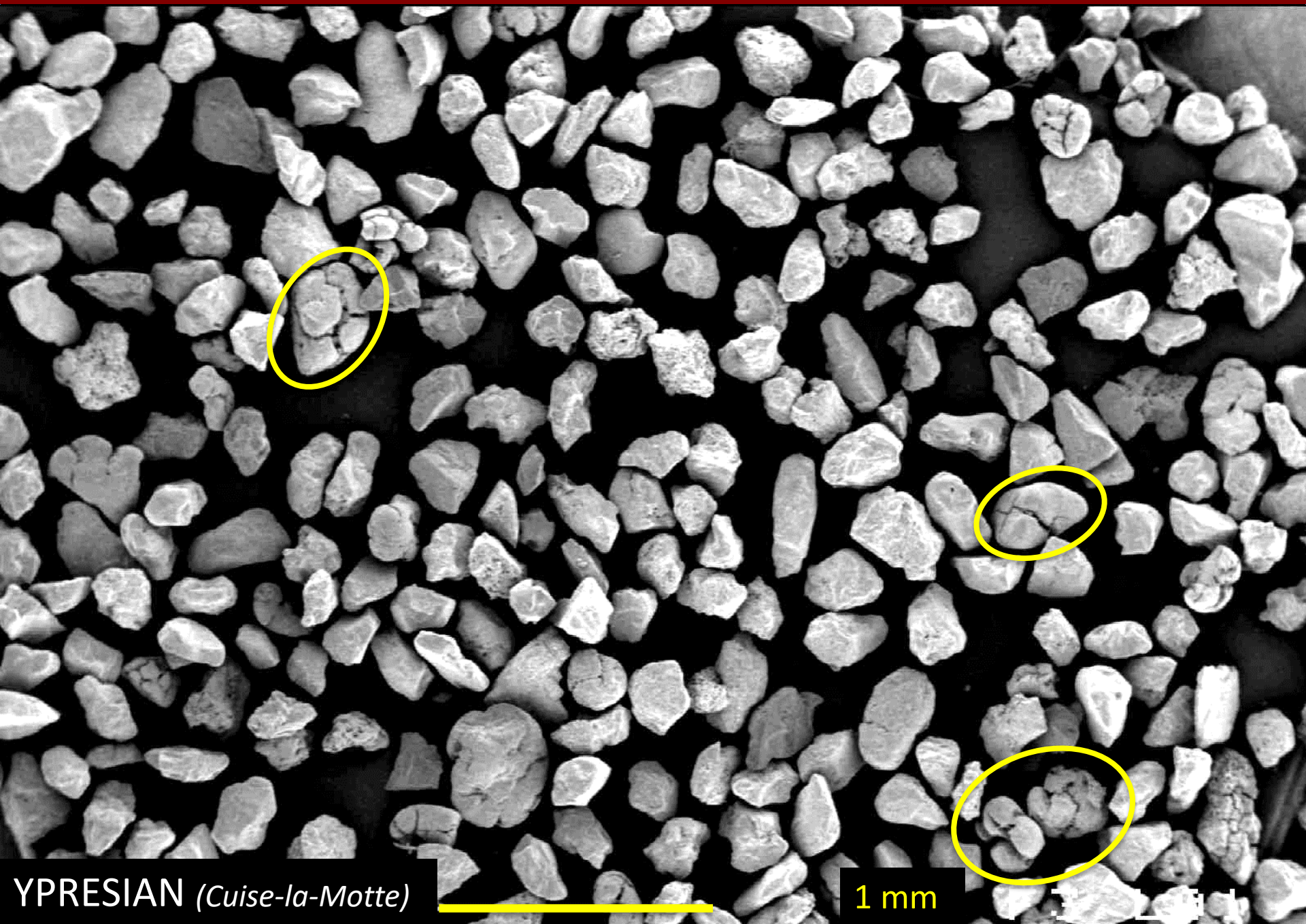
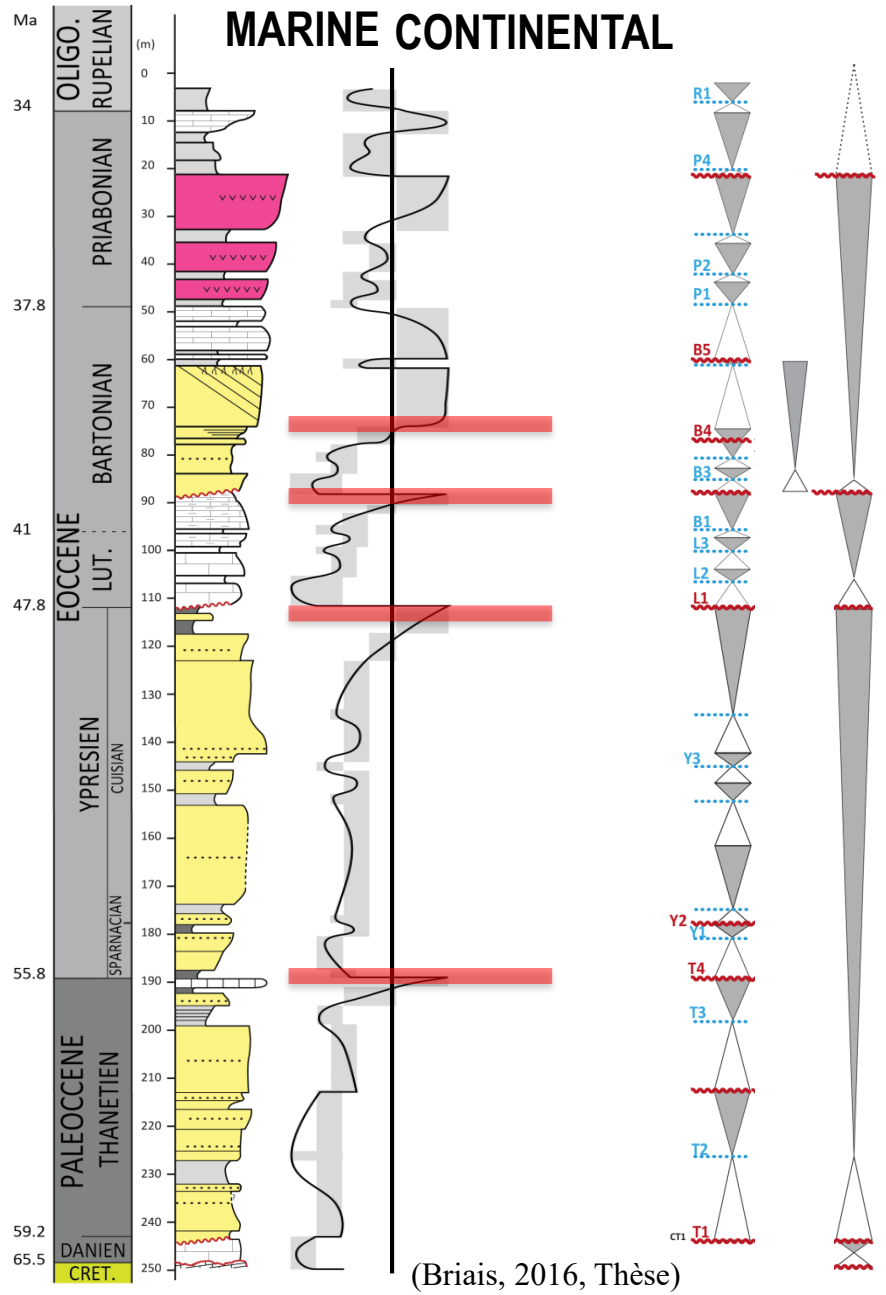


# QUARTZ GRAINS STORY

3. *IN SITU* WEATHERING

2. DEPOSITION
   IN TIDAL-DOMINATED / BAY
   ENVIRONMENTS

1. EROSION FROM LATERITES

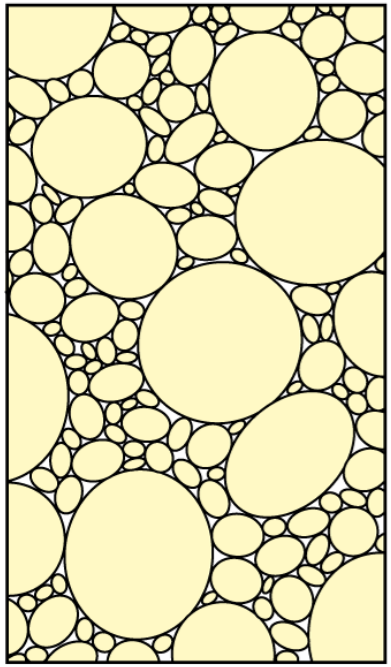



(Briais, 2016, Thèse)

# PETROPHYSICAL IMPLICATIONS

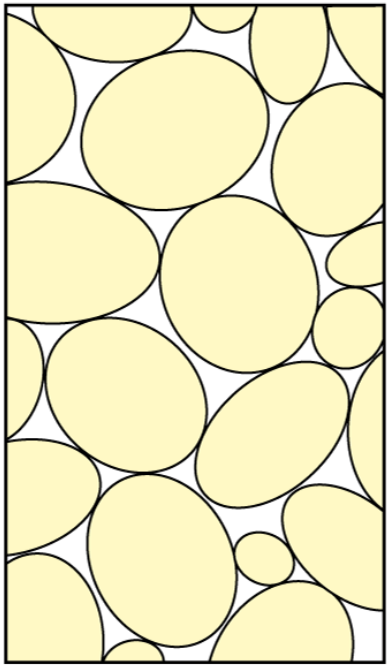
**POORLY SORTED**

BIMODAL



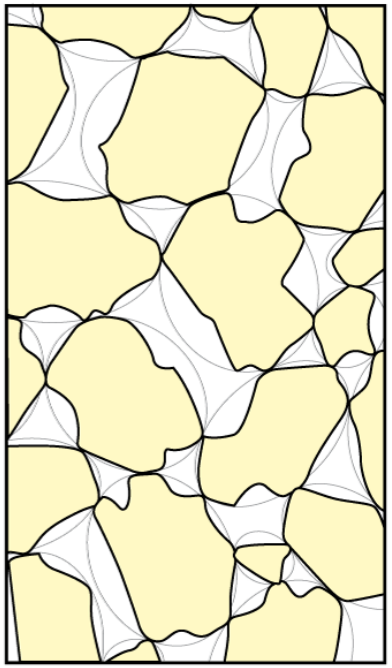
**WELL SORTED**

UNIMODAL



**DISSOLVED GRAINS**

**[primary: eroded laterite]**
**[secondary: *in situ* weathering]**



**LOW** → **HIGH**

**POROSITY**

# WHAT IS NEXT: 3D FACIES LINES, FACIES + PETROPHYSICS

**3D GEOMETRICAL MODEL** [LITHOLOGY + PETROPHYSICS] :
PREDICTION AND LOCATION OF **HETEROGENEITIES**

**TIME-LINES AVAILABLE:**

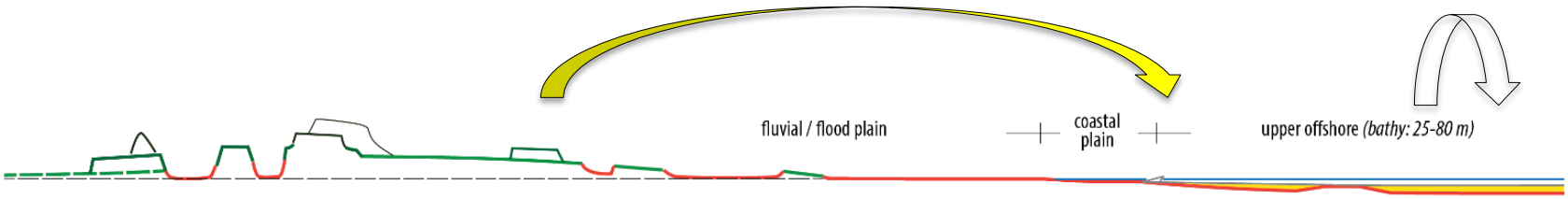
- increasing resolution (e.g. Bartonian multi-layers reservoirs)
- increasing wells number (e.g. in Paris area)

**FACIES-LINES and FACIES PETROPHYSICS CHARACTERIZATION + FRACTURATION**

- ✓ **SOURCE-TO-SINK STUDIES**
- ✓ **FACIES SEDIMENTOLOGY [Siliclastics, Carbonate, Evaporites]**
- ✓ **BASIN DEFORMATION and FRACTURATION**
- ✓ ***NEW DATA : BOREHOLE IMAGES…***

# WHAT IS NEXT: SOURCE-TO-SINK

**57 Ma (Ypresian)**



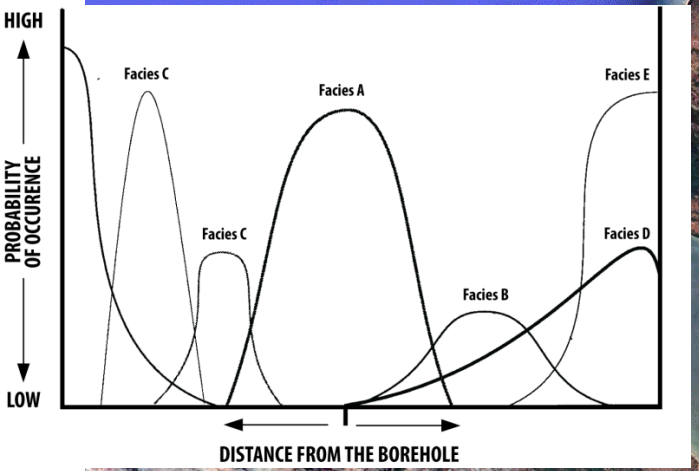

*ca. 70-65 Ma: emersion and weathering*

- ✓ **SOURCE: Produced sedimentary grains**

  [Mineralogy, Shape, Grain-size..]

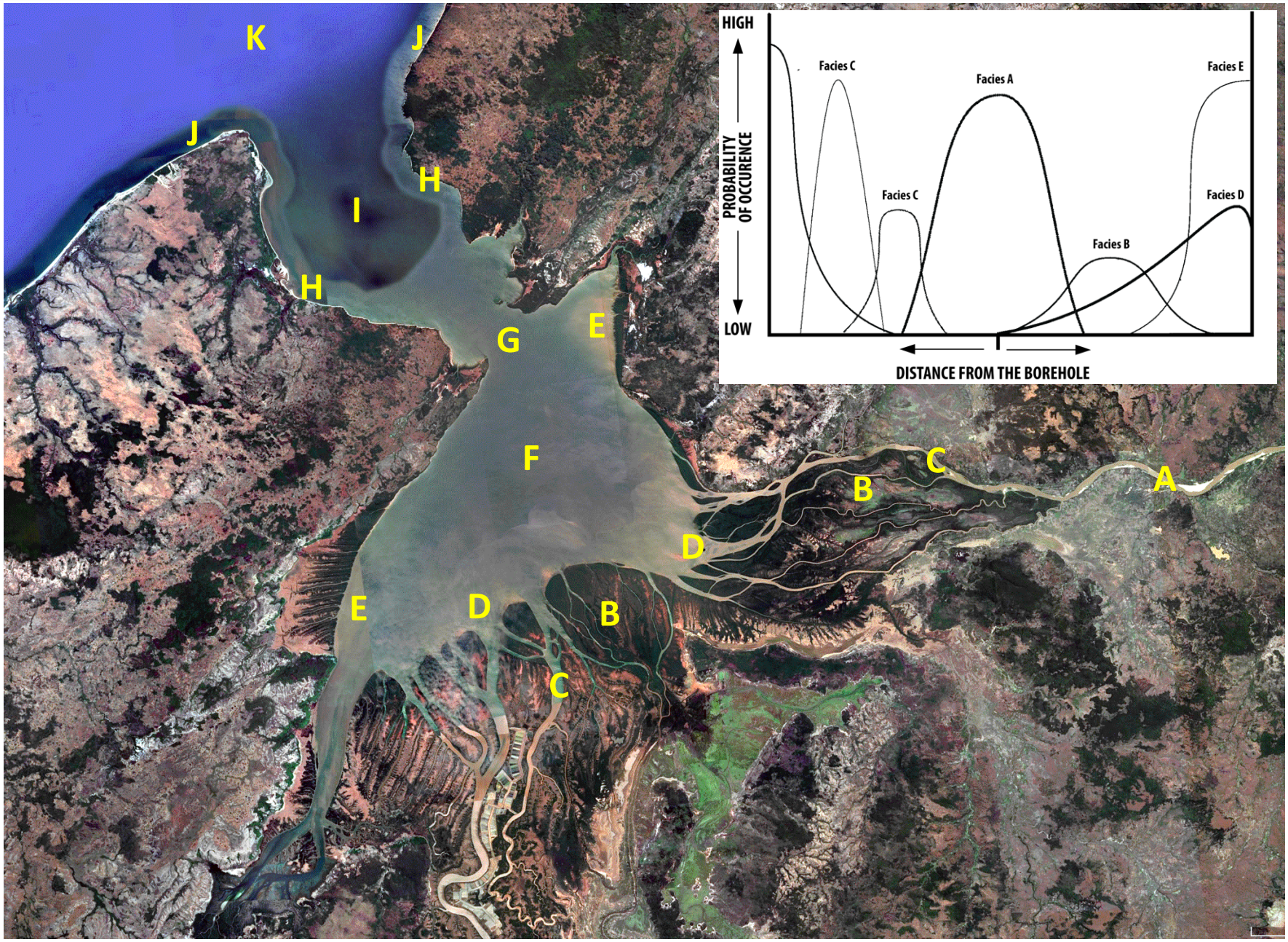
- ✓ **SINK: location and volume of sediment volumes**

# WHAT IS NEXT: FACIES SEDIMENTOLOGY

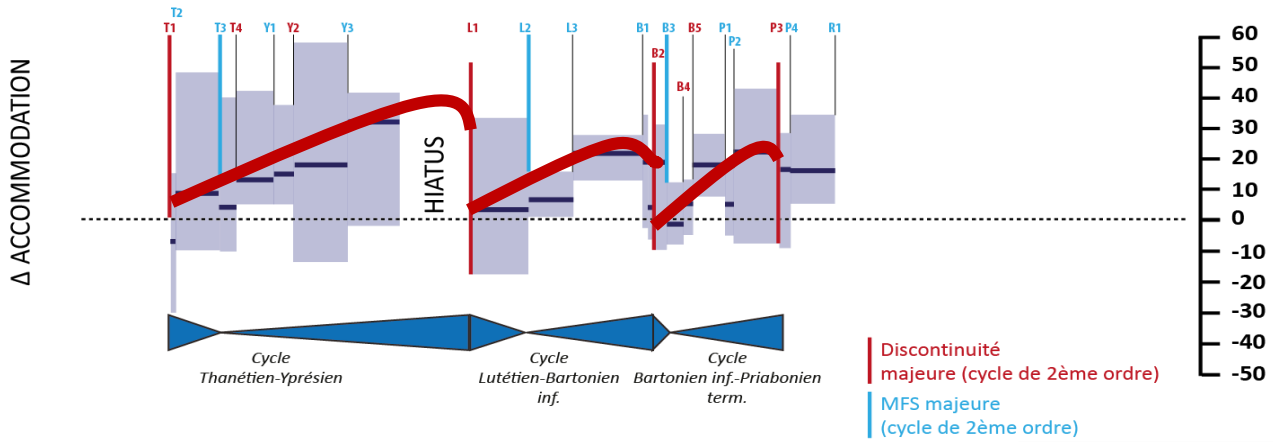


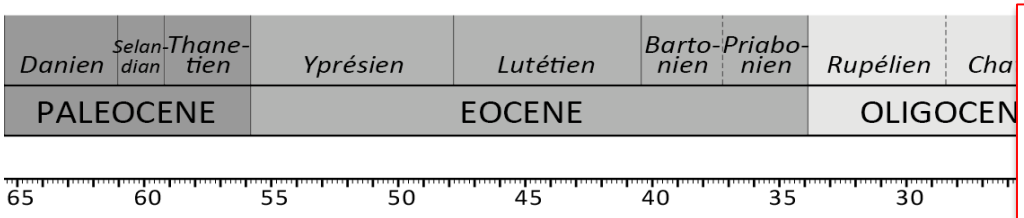

NORTH OF MADAGASCAR: **Helodrano Mahajambe**

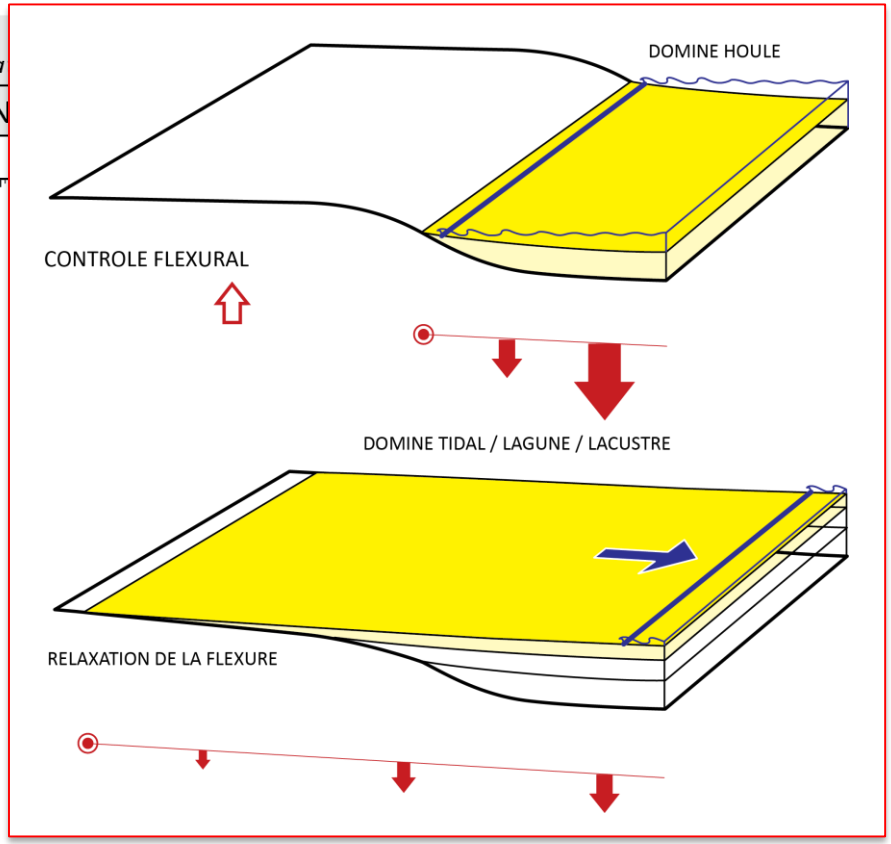
# WHAT IS NEXT: FACIES SEDIMENTOLOGY



# WHAT IS NEXT: BASIN DEFORMATION and FRACTURATION




(Briais, 2016, Thèse)

# WHAT IS NEXT: NEW DATA

- ✓ BOREHOLE IMAGES