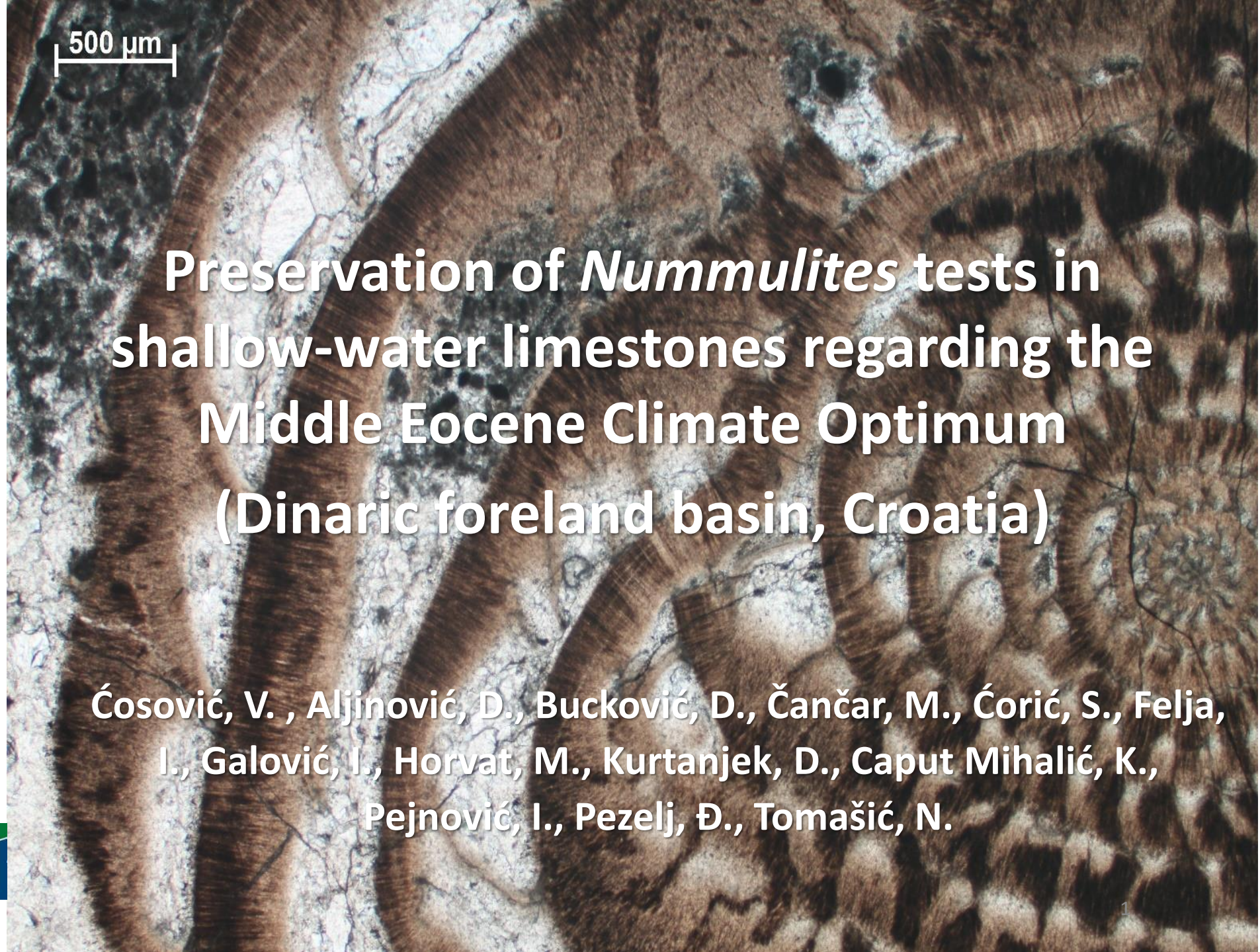
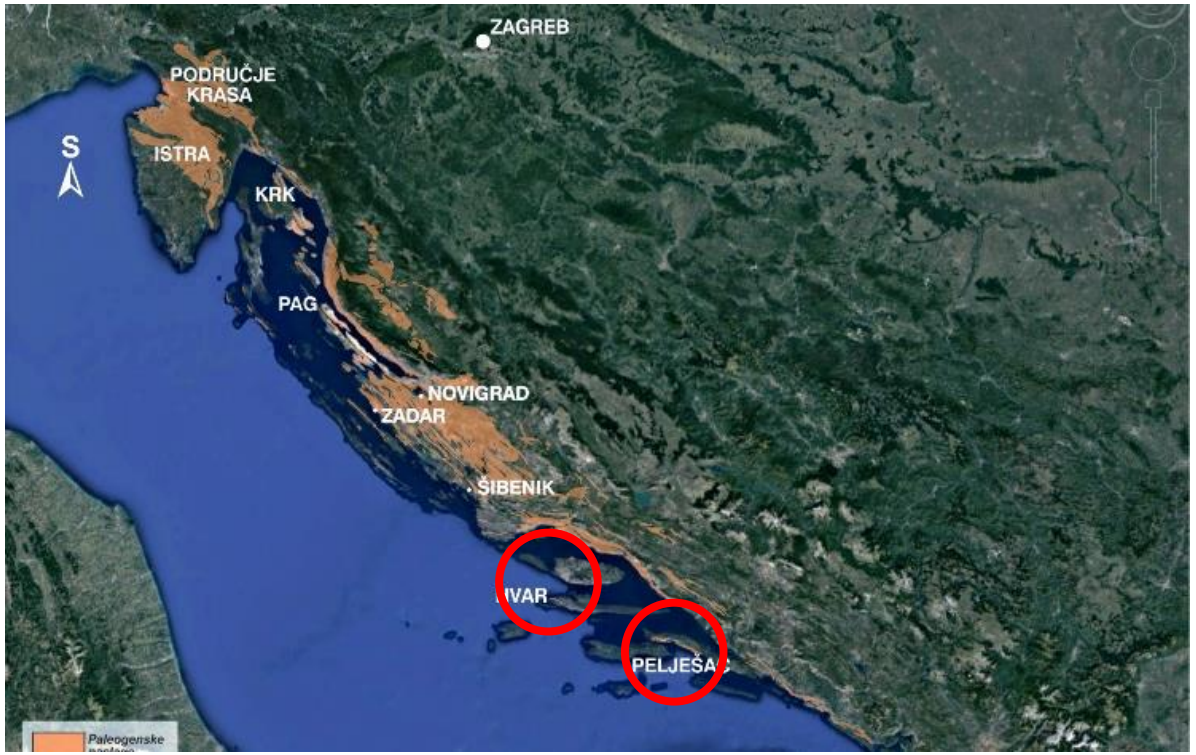


Preservation of *Nummulites* tests in shallow-water limestones regarding the Middle Eocene Climate Optimum (Dinaric foreland basin, Croatia)

Ćosović, V. , Aljinović, D., Bucković, D., Čančar, M., Ćorić, S., Felja, I., Galović, I., Horvat, M., Kurtanjek, D., Caput Mihalić, K., Pejnović, I., Pezelj, Đ., Tomašić, N.

Paleogene sediments in the Outer Dinarides: **distribution**, origin

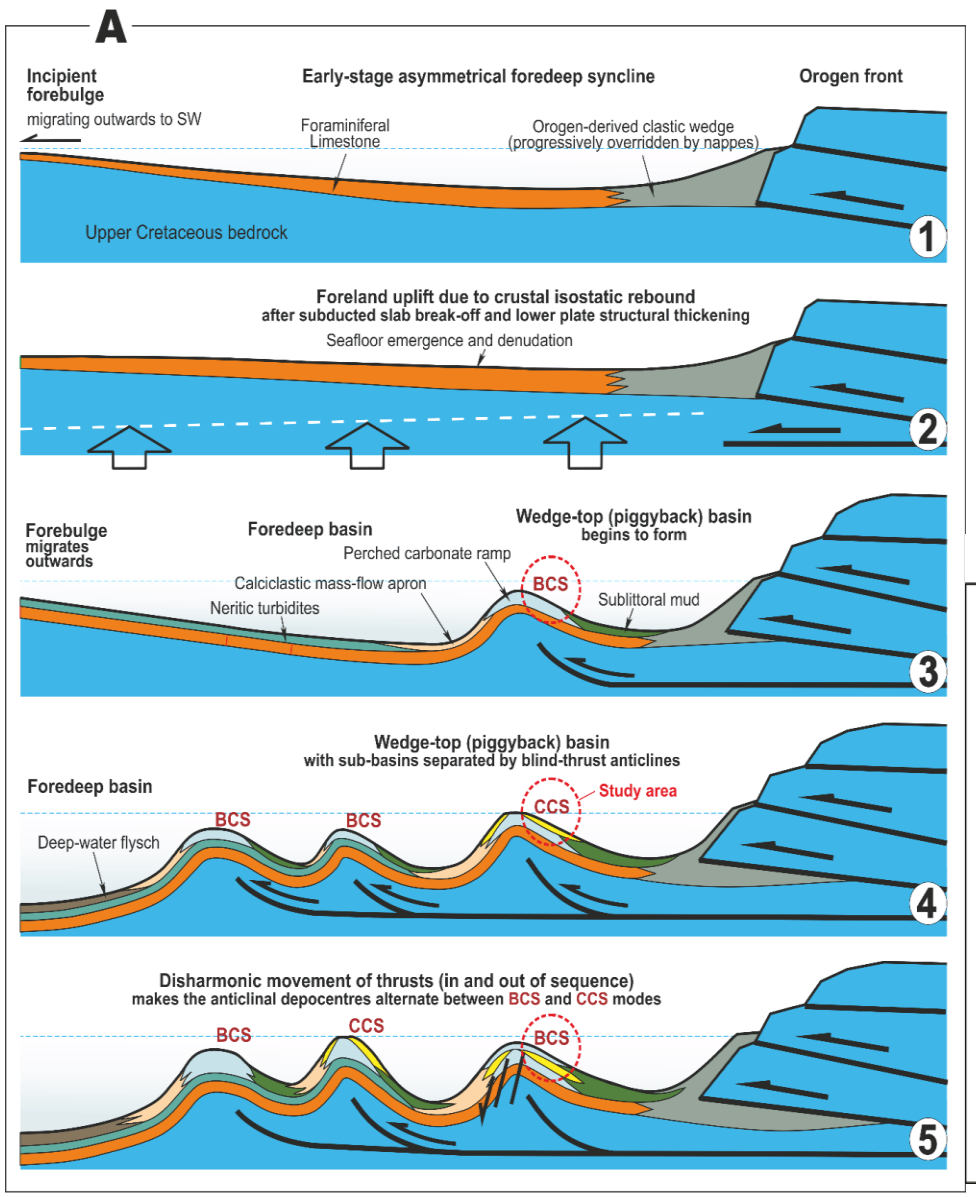
Paleogene sediments (Thanetian – Priabonian) cropping out along the eastern Adriatic coast (Španiček, 2017).



Facies variations

- Various lagoonal limestones including facies with larger conical foraminifera
- Inner to middle platform Alveolinid to Alveolinid-Nummulite limestones
- „Detrital" limestones with mollusks and larger benthic foraminifera
- „Nummulite-accumulations"
- Limestones with flat, large rotaliid foraminifera (*Nummulites*, *Assilina*, *Operculina* and orthophragminids)
- Marls with *Operculina* and orthophragminids
- Flysch (shales with planktonic foraminifera interbedded with clastic carbonates with redeposited LBF)

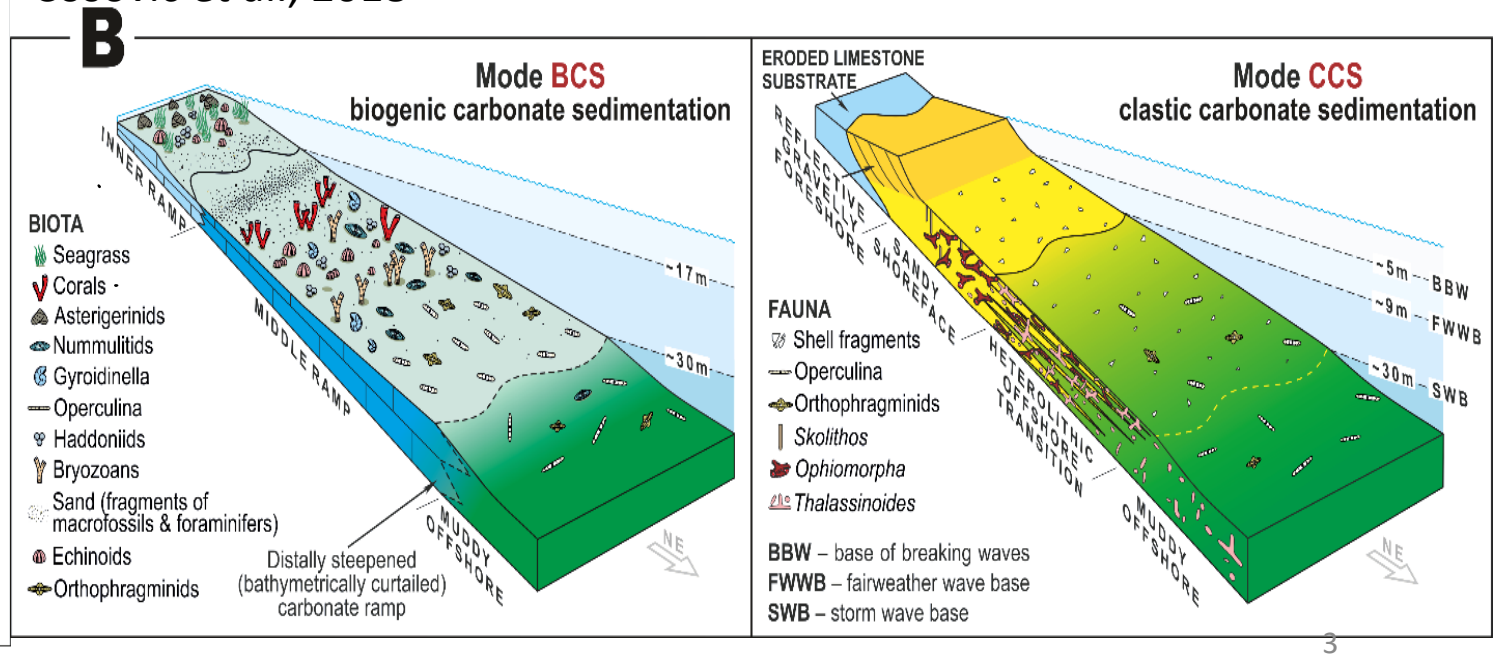
Paleogene sediments in the Outer Dinarides: distribution, **origin**



Diferentiation due to tectonic activity from the Late Cretaceous to the Oligocene, and the formation of the **Dinaridic foreland basin**, where carbonate ramps developed (transient forms).

Deposition of different facies, ranging from the intertidal to the basin, in correlation with sea level changes. An important role, however, was played by **climatic conditions**…

Ćosović et al., 2018



Study area: field- and cabinet-work

- Detailed sampling (Pelješac peninsula, Hvar Is.)
- Viganj section, 22 m thick succession
- Homogenous, karstified beds are characterized 2 to 30 cm thick layers mostly composed of nummulitids
- Thin-sections and micro-slides

Aims of study:

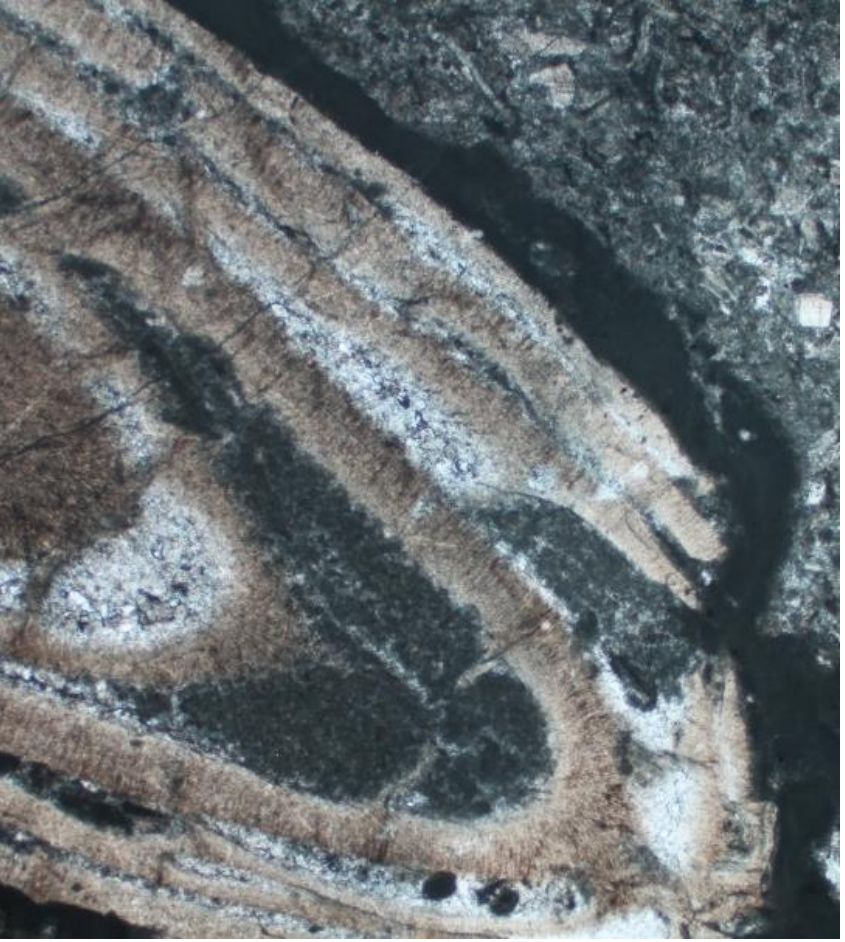
1) Identification of *Nummulites* and other LBF species
- Key to identification of Nummulite accumulation:

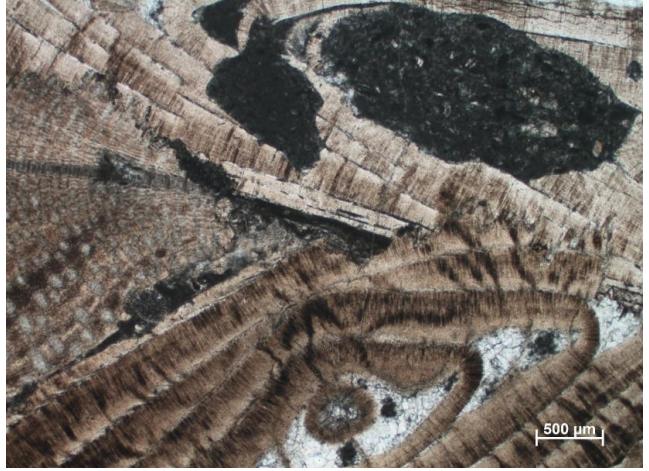
A) Taphonomic conditions of LBF tests
B) Ratio between A- and B-forms
C) Encrustation (one side or whole test)
D) Borings within the tests

2) Sedimentary texture and sedimentary setting

Results (1)

- LBF floatstone to rudstone in packstone matrix.
- Matrix consists of bioclastic coarse to fine packstones with skeletal debris of **red algae**, echinoids, LBF foraminifera debris, small benthic and planktonic foraminifera.
- *N. maximus,* ***N. puschi*** and ***N.* gr. *perforatus***
- Age: SBZ 17 (**Early Bartonian**)
- Slightly linear and chaotic stacking of bioclasts.
- Contact imbrication
- A- and B-specimens together
- Diagenetic changes in *Nummulites* tests





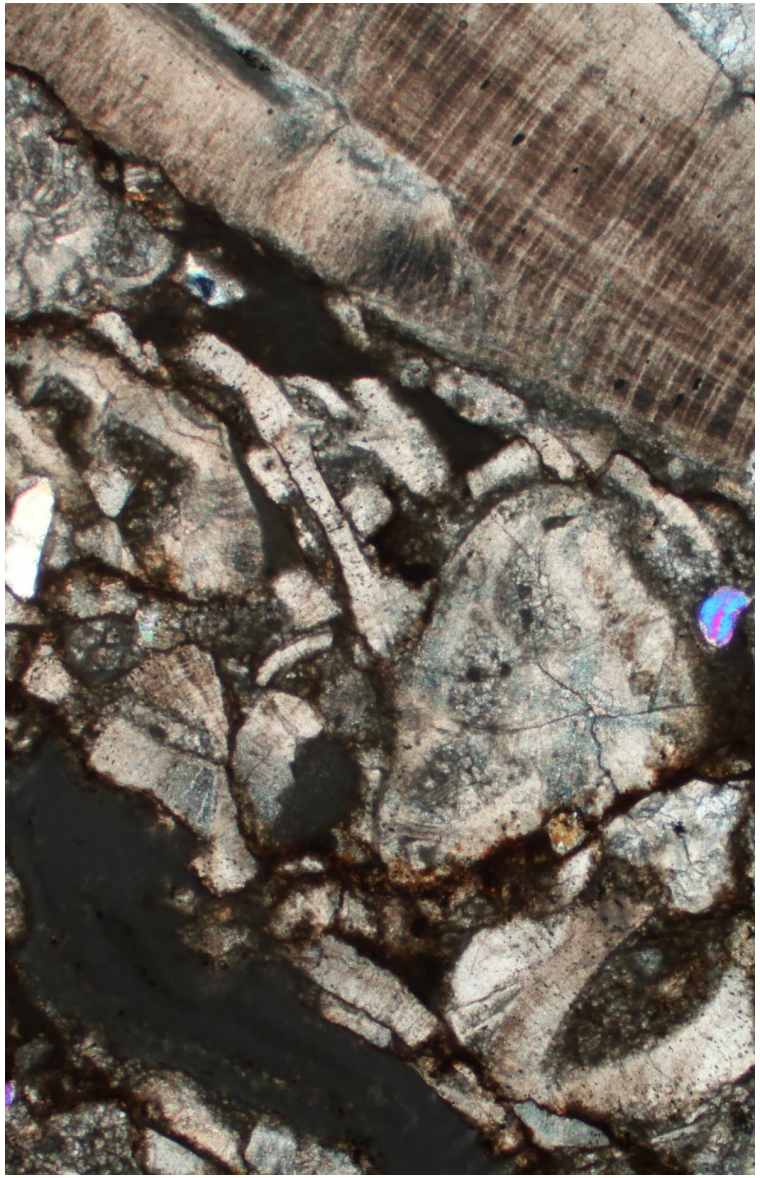
Results (2)

- Encrustation of the *Nummulites* tests (thin to thick enveloping)
- Boring (from surface to deep into interior)
- Fragmentation – abrasion - recrystallization

Results (3)

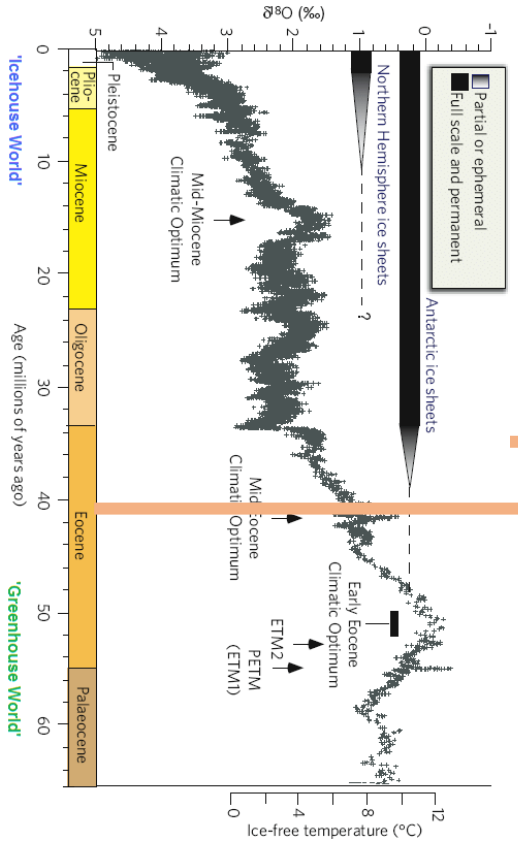
- A / B-generation ratio: 10 / 2
- **Bioerosion:**

1. The B-specimens are more often affected by borings
2. The proportion of bored tests per 10 cm^2 varying from 10 to 40% of total nummulitid tests depending of structure of beds („Nummulitic beds" s. l. or beds with a lot of nummulitids).
3. **Differentiation between beds based on quantity of packstone matrix**.
4. The Lutetian LBF assemblages (Ćosović et al., 2012) contained max. 5% of bored shells.

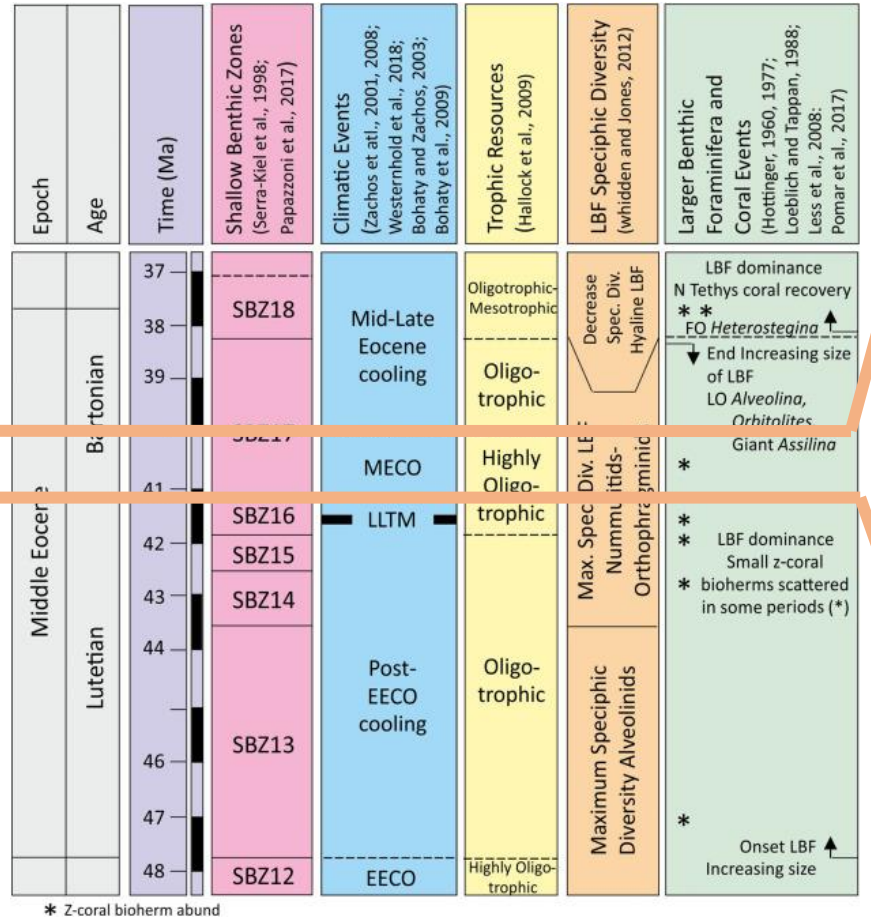


Discussion (1)

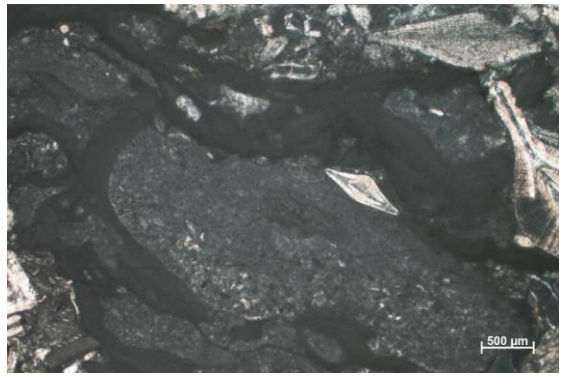
• The greater proportion of annelids, greater proportion of coralline algae and Solenomeris and „unusual tests”… How do these fit with climatic conditions?

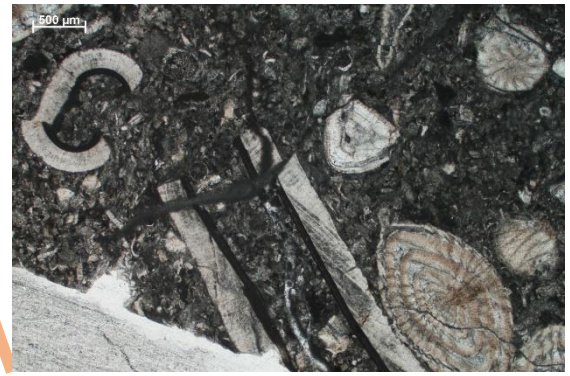


Zachos et al., 2008



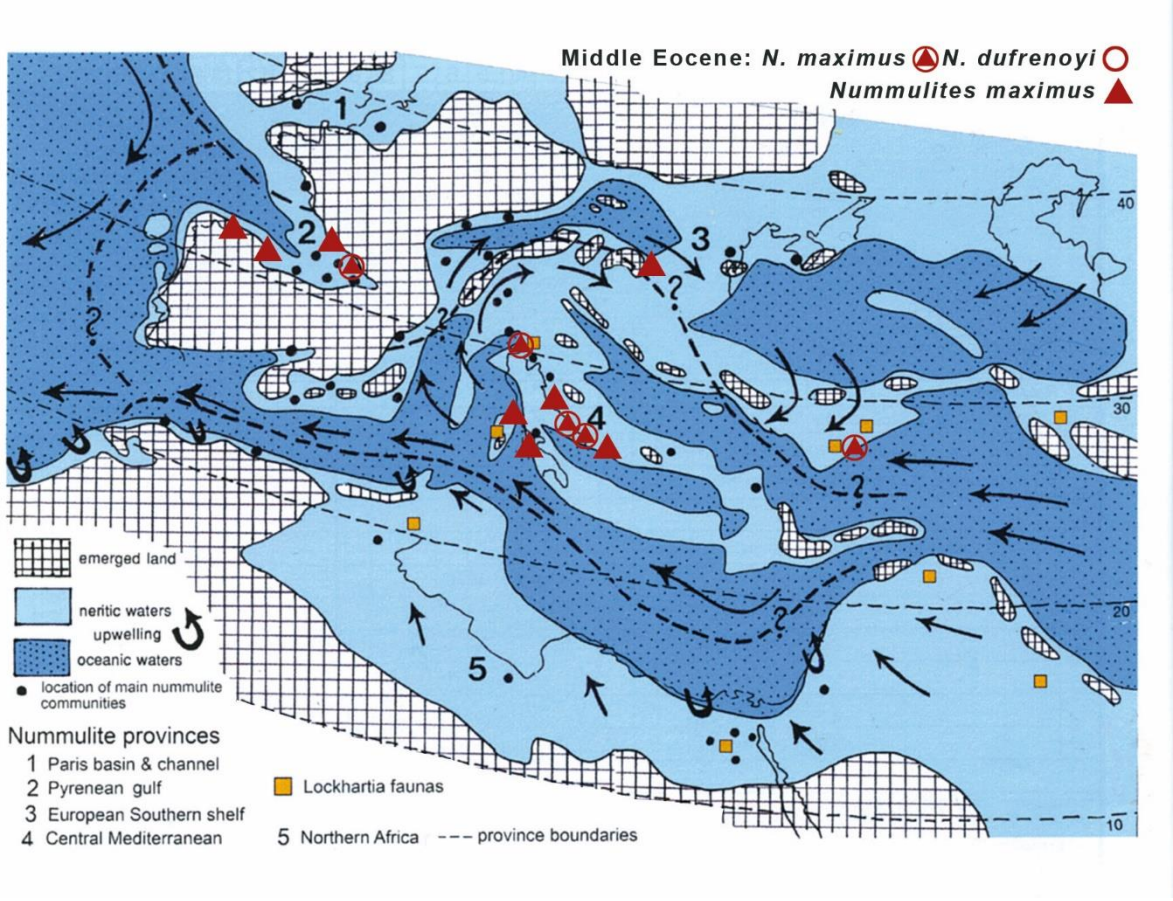
Martin - Martin et al., 2021





Discussion (2)

- Distribution of „giant” *Nummulites* in Neo-Tethys area (after Hottinger, 2001; Schaub, 1981; Pignatti, 1995; Less, 1998; Machniec et al., 2011)



Conclusions (general remarks)

- Middle ramp settings during the early Bartonian
- Periodically high energy on middle ramp settings to affect the sea floor
- Presence of chaotic stalking may be indicative of wave action and the activity of burrowing organisms
- Great diversity of benthic organisms (burrowing) in relation with terrigenous input (quartz grains)?
- The study of the southern Adriatic outcrops added another puzzle in the reconstruction of the geological evolution of the Dinaridic Foreland Basin


Thank you!