



Fig.1: Map of Western Turkey

## Pergamon and Elaia

During Hellenistic and Roman times Elaia, the harbour city of ancient Pergamum, was an important place of trading and traffic in the eastern Mediterranean Sea. Intense mercantile and military activities are documented by literary sources and archaeological evidences. The aim of the present study is to reconstruct the history of Elaia's harbour within the context of coastal evolution.

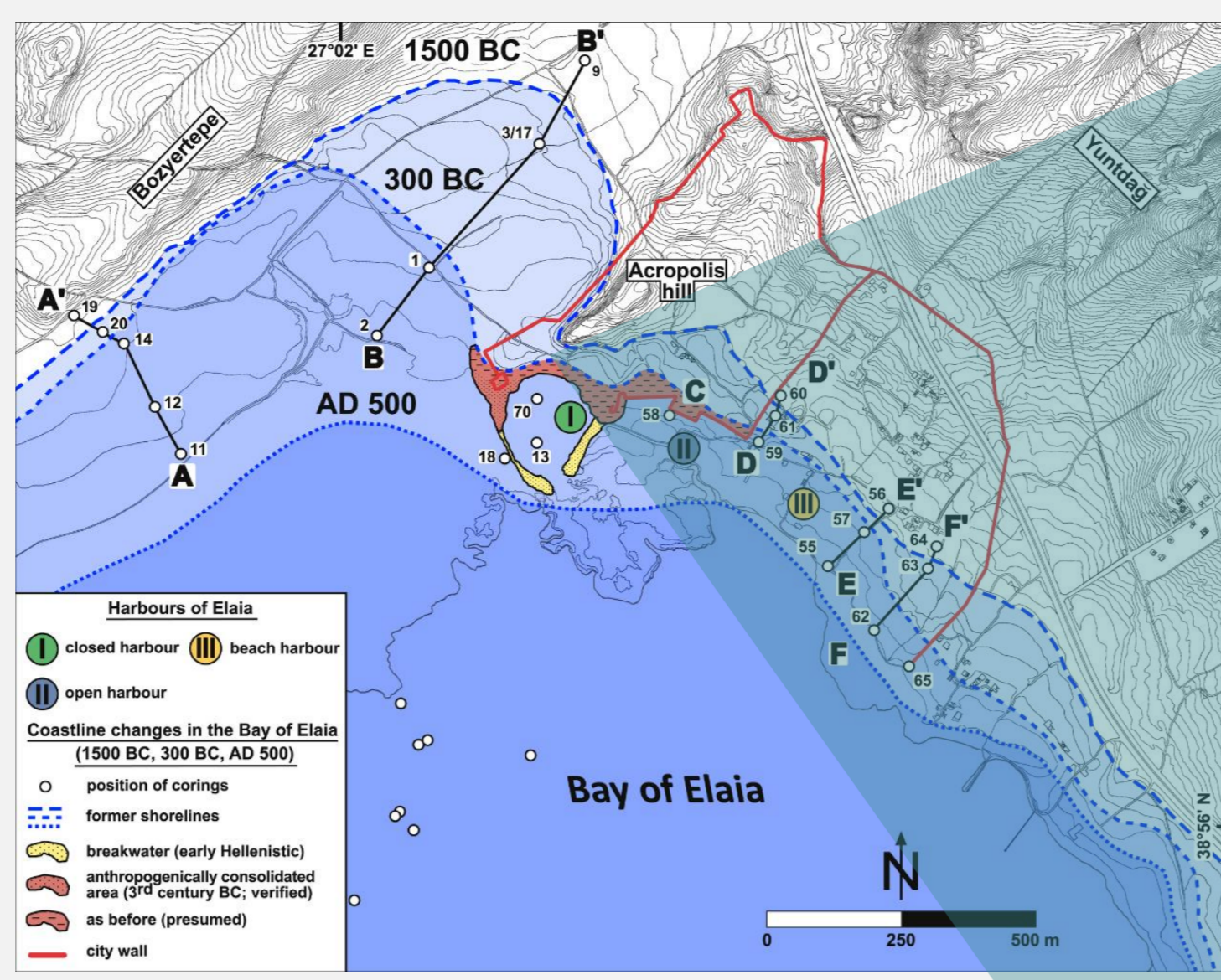
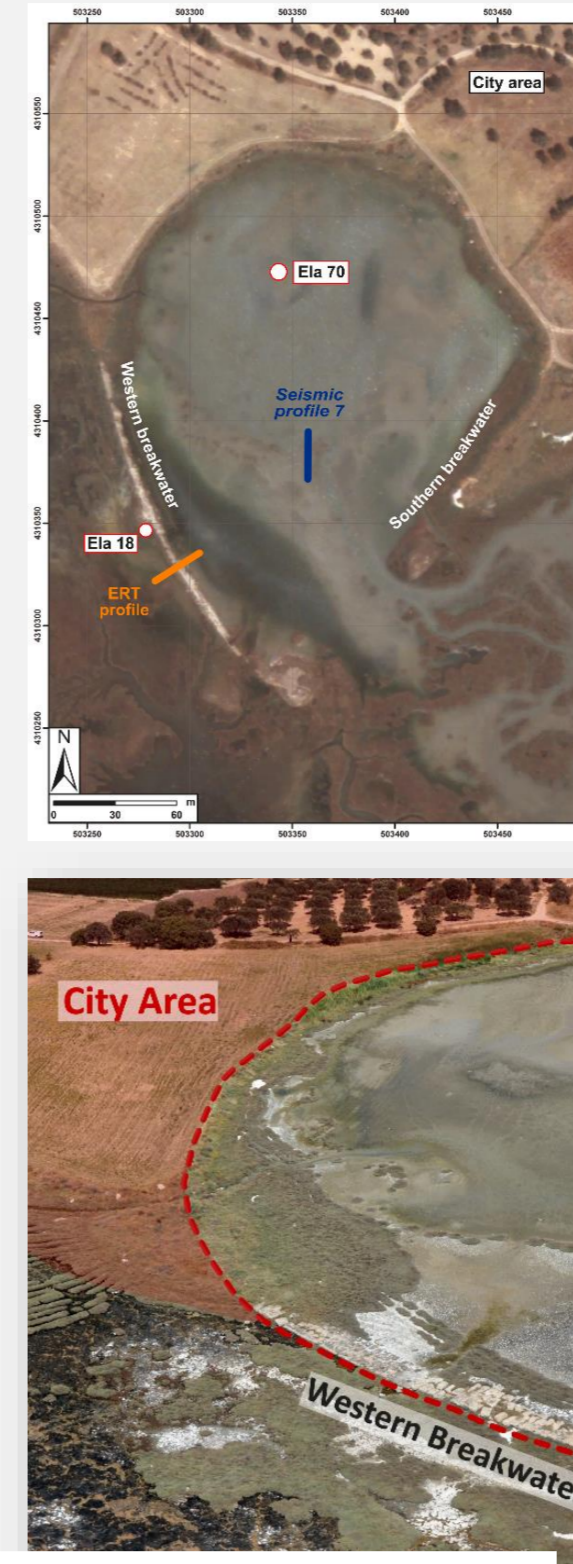


Fig. 4: Location of the harbours and the shorelines during 1500 BC and AD 500. (Seeliger et al., 2017, JQS)



## The closed harbour of Elaia

The closed harbour of Elaia is one of the three ship landing places of the city Elaia (figs. 2, 4, 5, 6). It has a almost a shape of a circle and is surrounded by two breakwaters (fig 5). The current position is in a modern coastal salt marsh (figs. 5, 6). With construction of the breakwaters around 300 BC, the environment of the harbour and its surrounding shifted into calm and protected conditions.

Fig. 5, 6: The closed harbour basin (harbour 1, see figs. 2, 4)

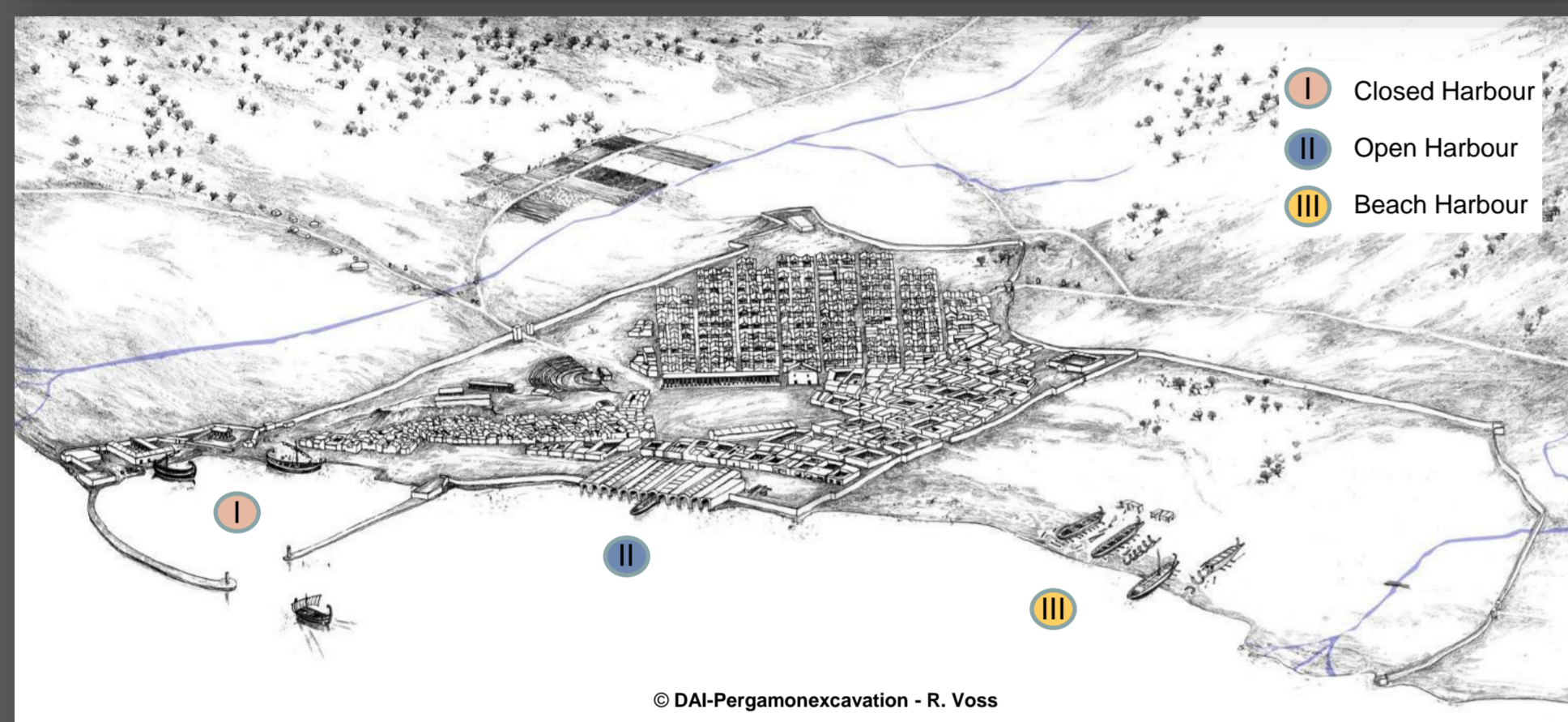


Fig.2: Drown flight image of the modern landscape and a drawing of the area of Elaia during its heyday

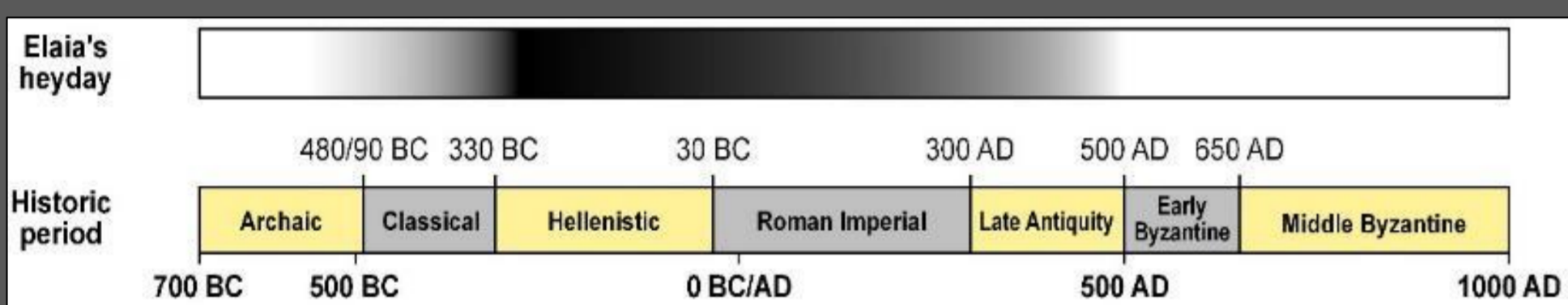
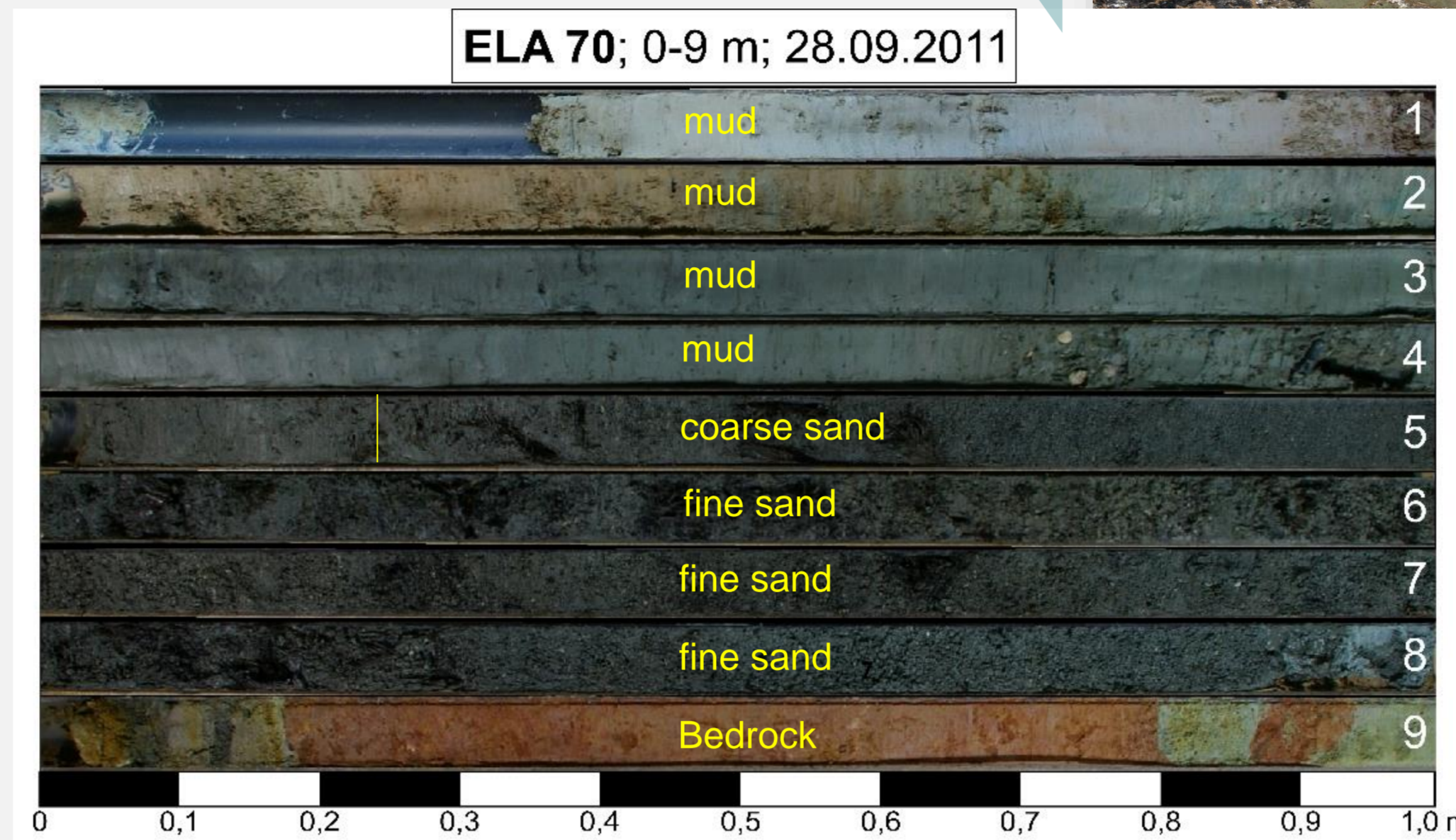


Fig. 3: Historic periods of Elaia. (Seeliger et al., 2017, JQS)

Figs. 4-7 from Seeliger et al., 2019, JQS)

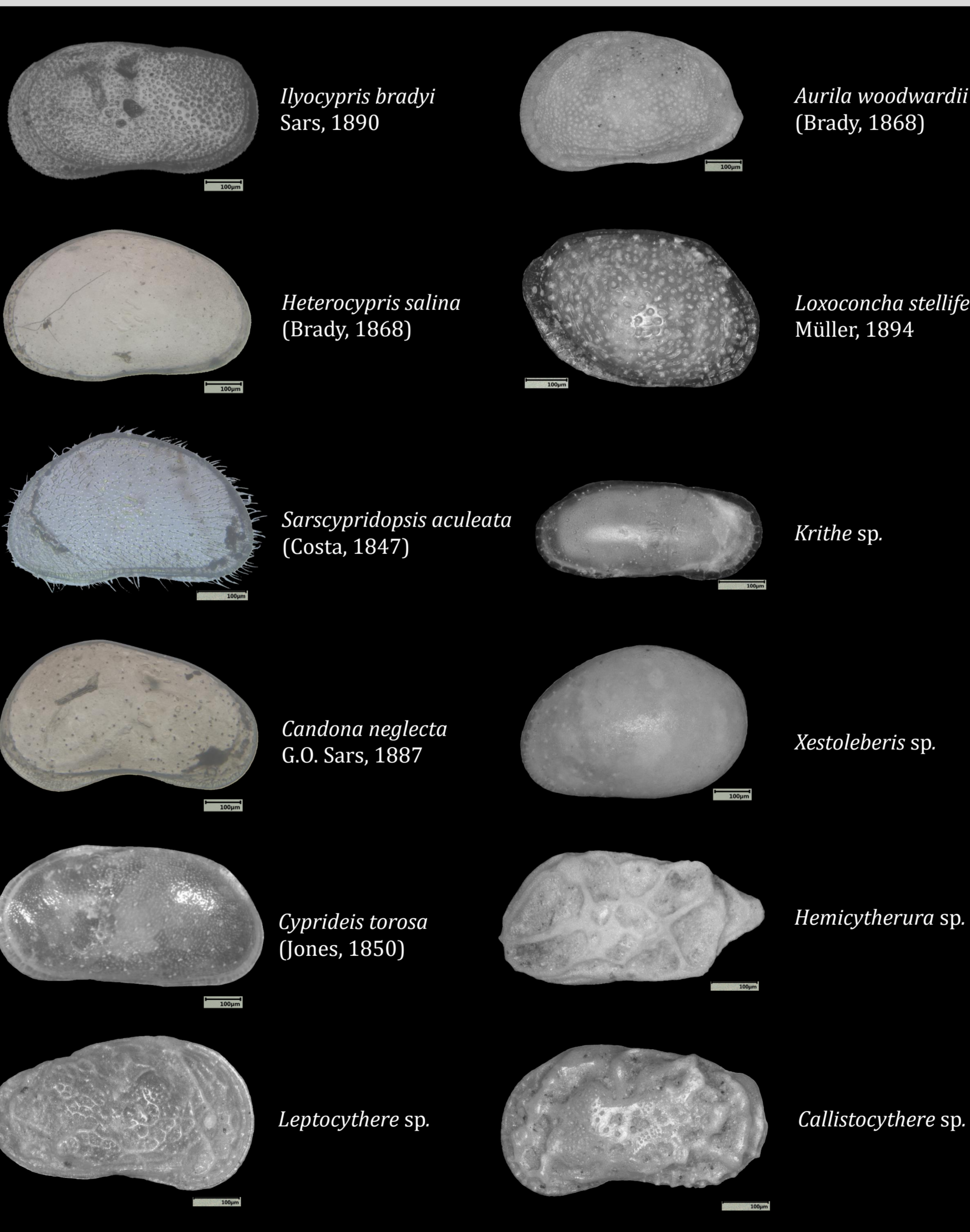
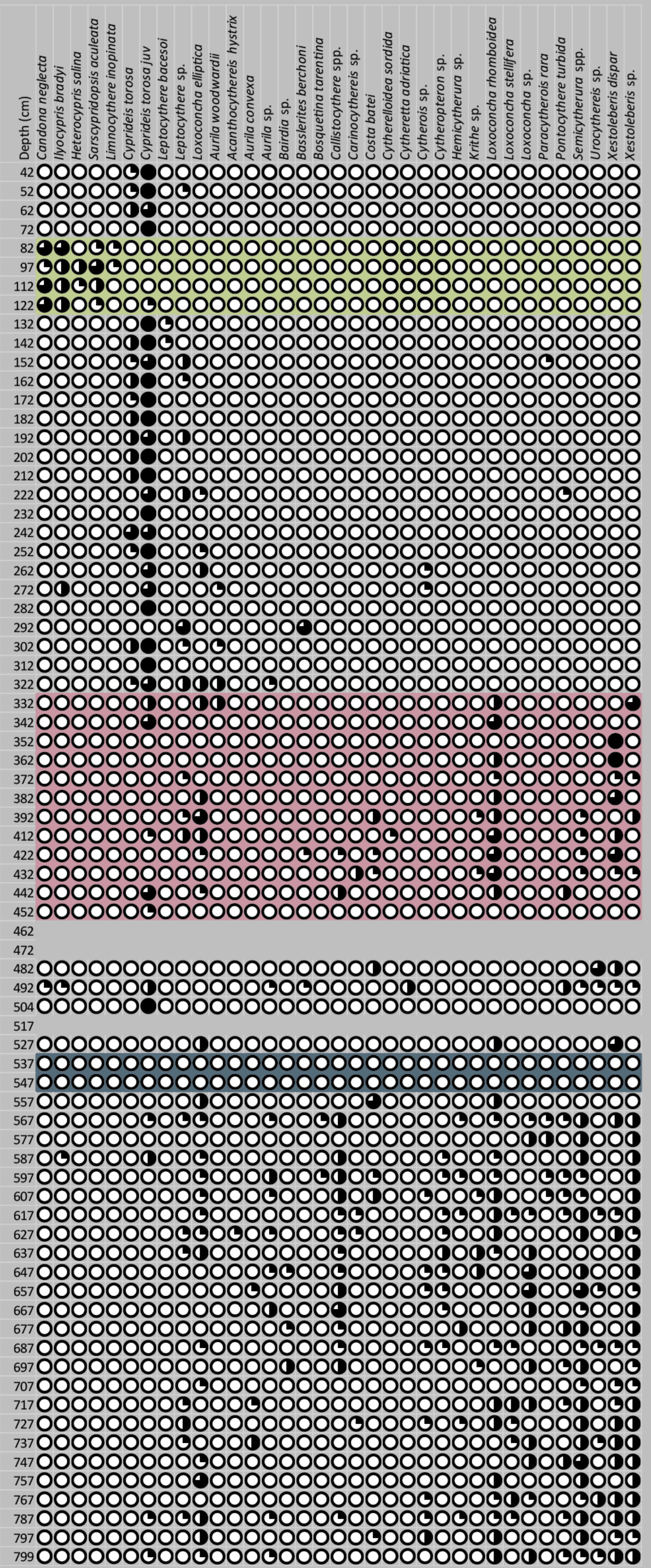


## Reconstruction of the environs of Elaia's ancient harbour using ostracods and foraminifers

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## Results and Interpretation

### Post harbour phase, Hypersaline saltmarsh

Likeley a wetter climate (Little Ice Age?) in the Mediterranean region cause more freshwater input in the harbour basin indicated by a decline of all species

**Post harbour phase:** After the harbour was abandoned, the environment of the basin shifted to very flat lagoonal, hypersaline conditions.

**Active harbour phase:** The diversity is restricted and lagoonal species indicate more lagoonal conditions

**Pre harbour phase:** After sedimentation of a sandy layer, likely caused by an earthquake, phytal species abruptly decreased.

### Event layer (Satorini event?)

**Pre harbour phase:** It is characterized by a high diversity of marine species, typical for an open coastal environment, and the dominance of phytal and oxygene preferring taxa

Fig.10: Distribution of ostracods in core ELA 70

## Methods and Material

For the investigation, a sediment core was drilled in the centre of the ancient closed harbour (figs 6, 7). Sediment classification, grain size and radiocarbon dating were carried out. For the microfaunal investigation microfossils were picked and counted from the dried and sieved sediment. In this study foraminifers and ostracods assemblages are investigated but only the ostracods are presented here. A principle component analysis (PCA) were created using both datasets. For the salinity reconstruction sieve-pore analyses of *Cyprideis torosa* were carry out.

Fig. 7: Sediment core "ELA 70"

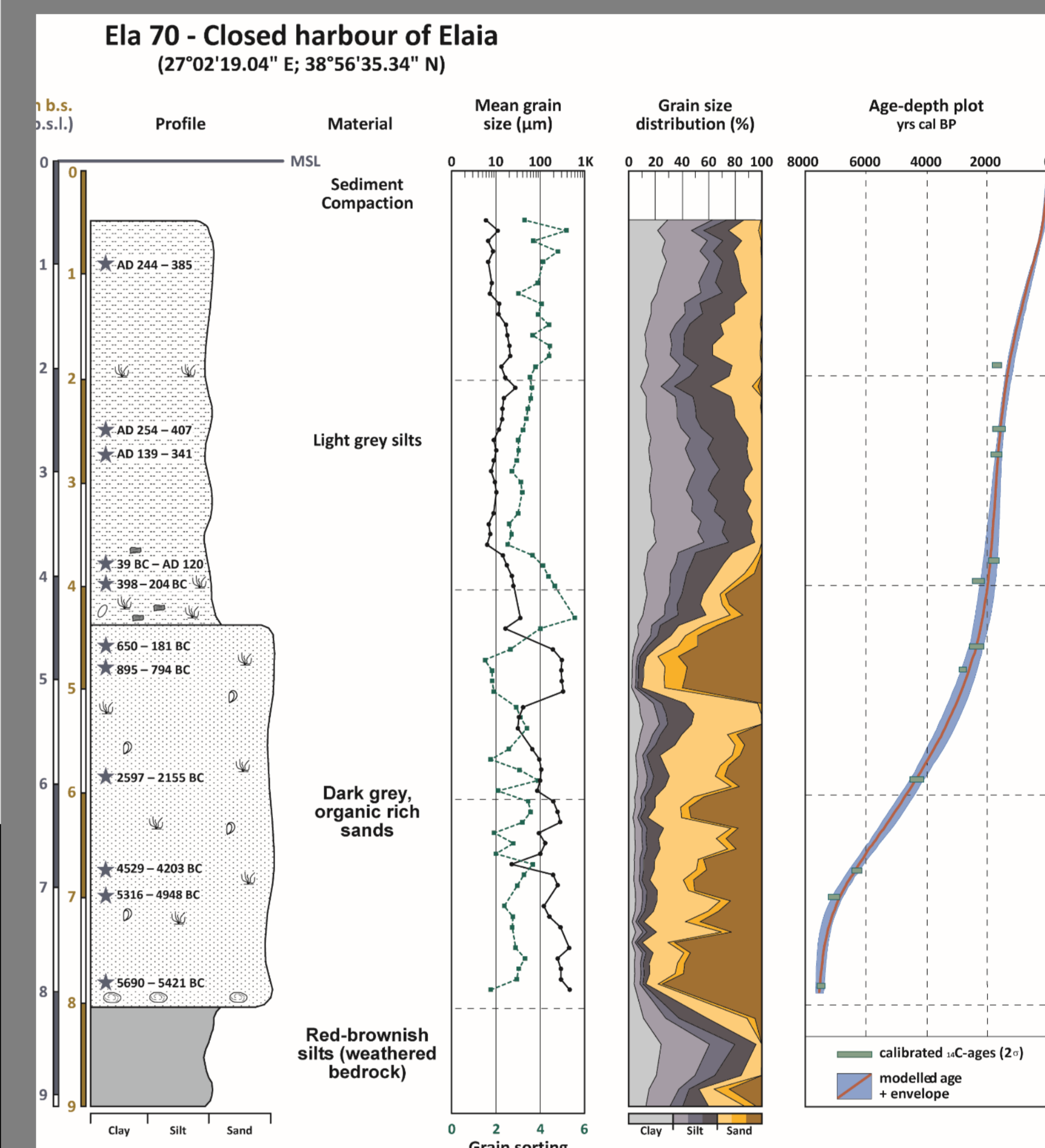


Fig. 8: Drilling core "ELA 70" of the closed harbour basin (harbour 1, see figs. 2, 4, 5, 6)

Fig. 9: Light microscope images of selected ostracod species

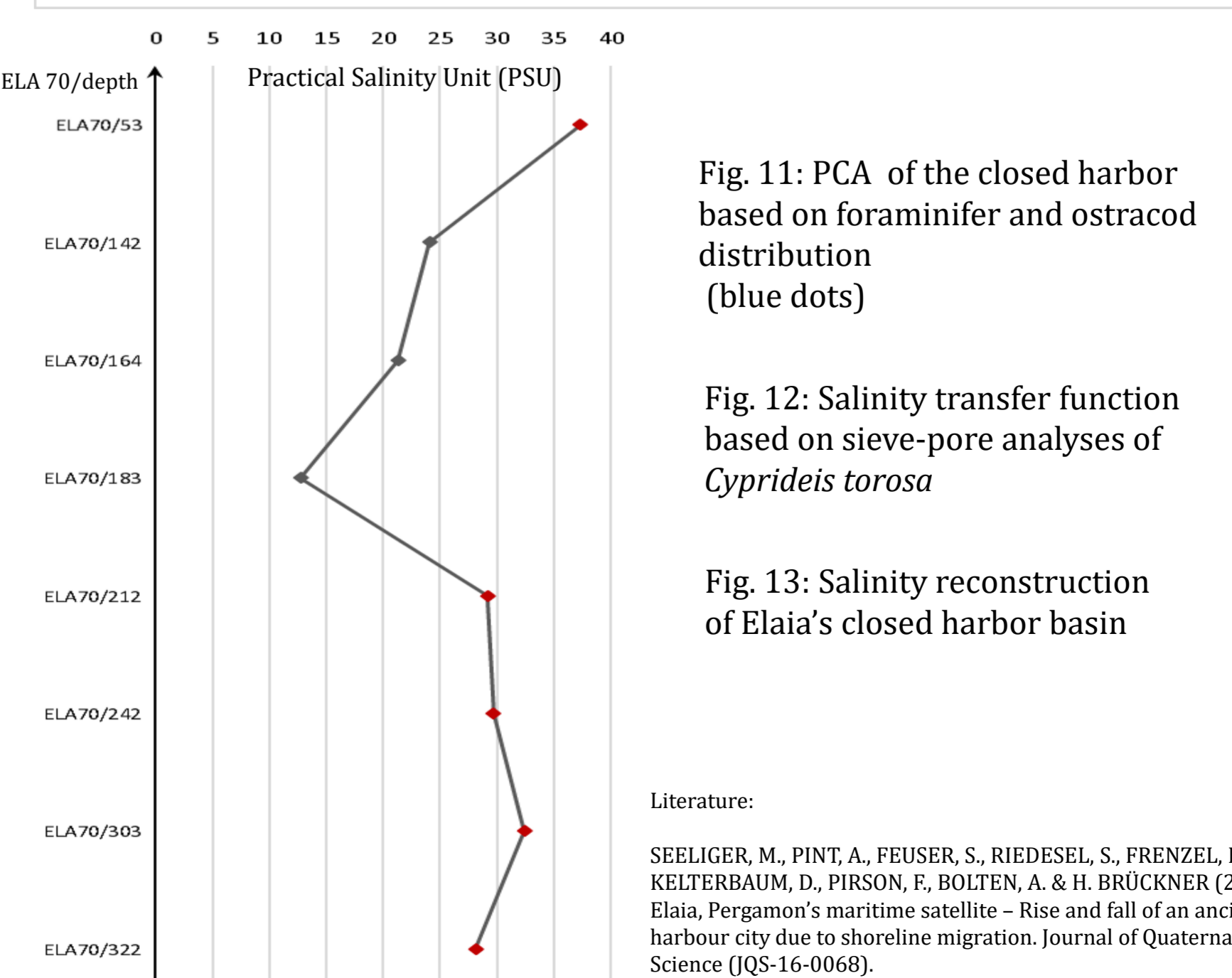
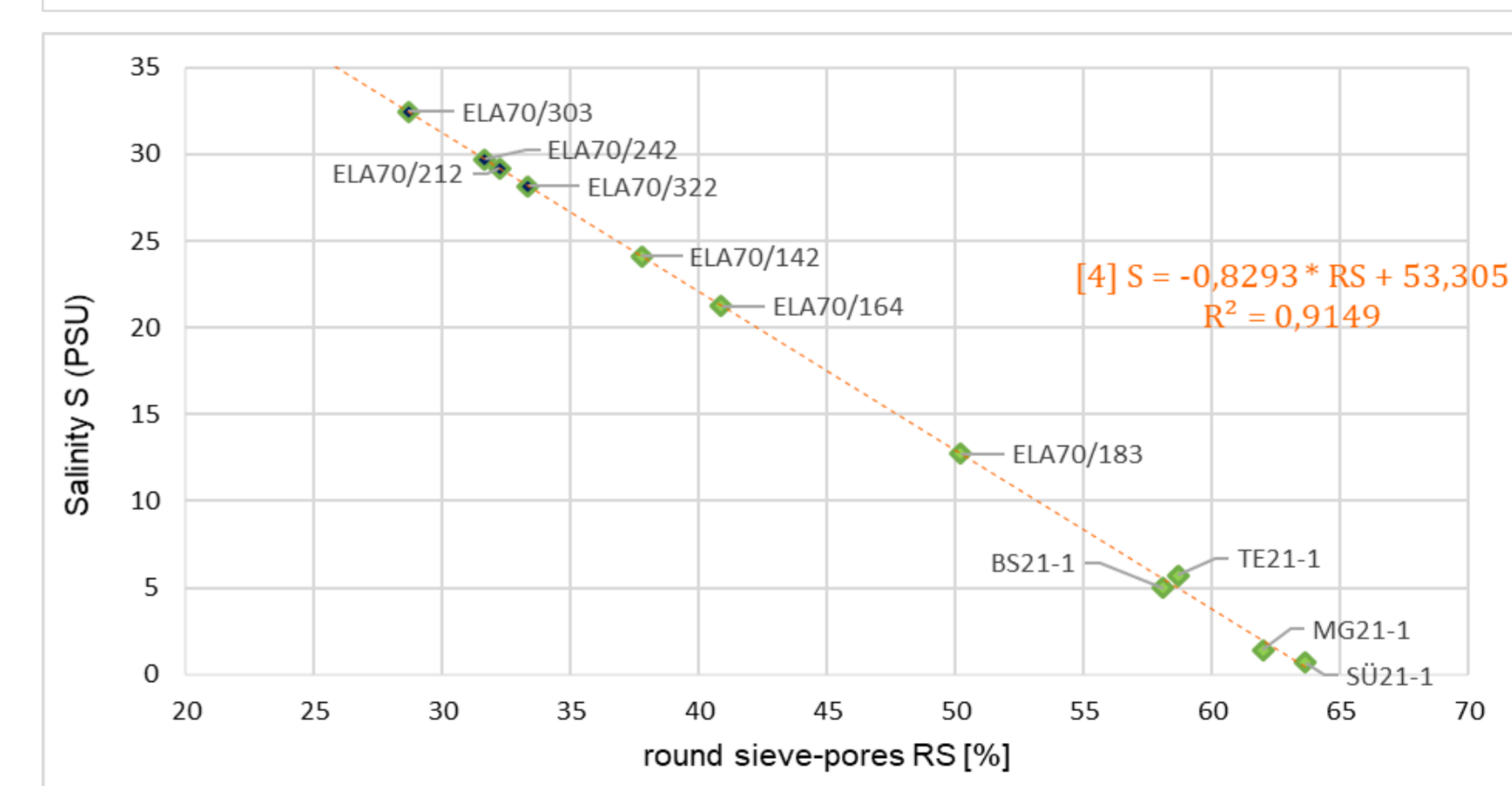
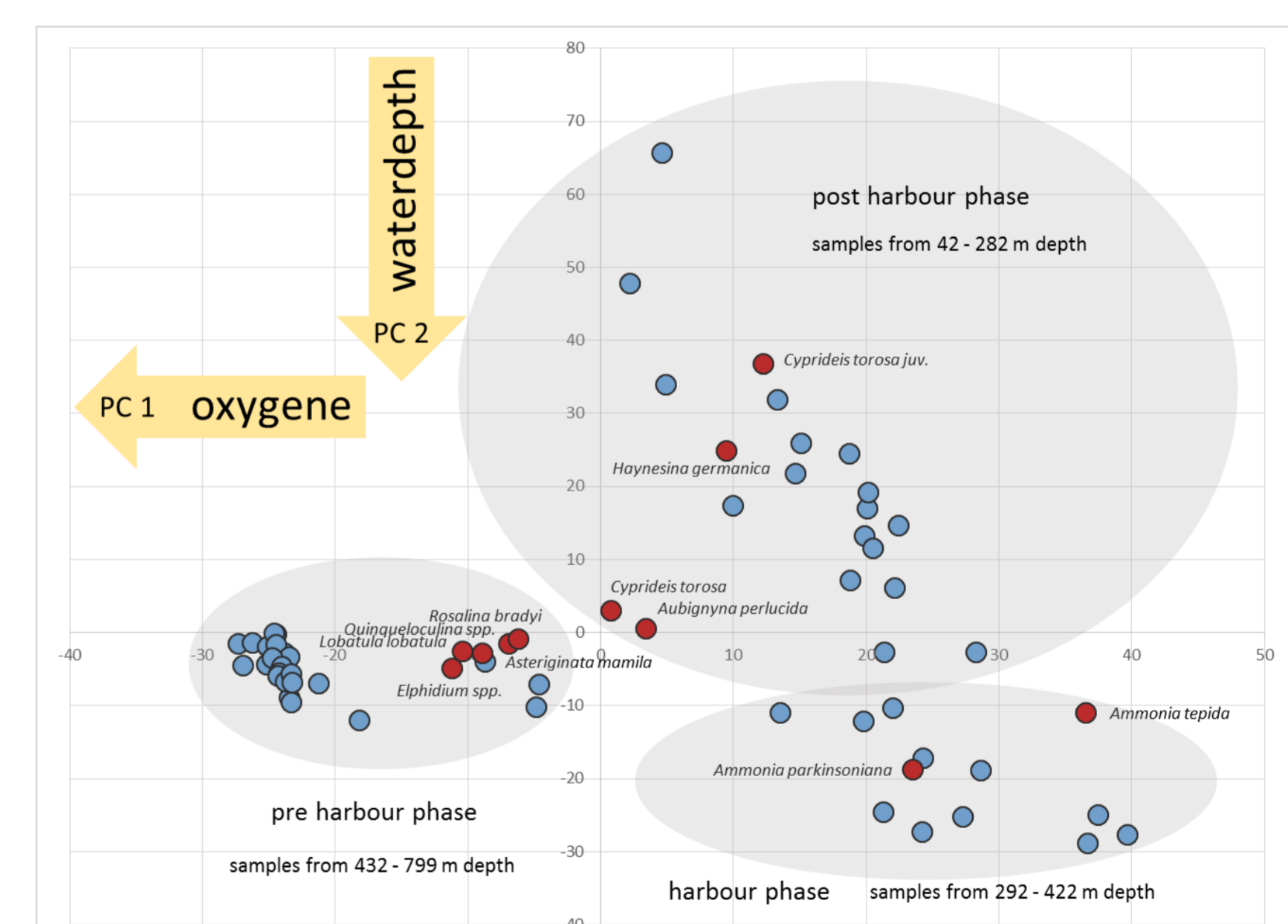


Fig. 11: PCA of the closed harbor based on foraminifer and ostracod distribution (blue dots)

Fig. 12: Salinity transfer function based on sieve-pore analyses of *Cyprideis torosa*

Fig. 13: Salinity reconstruction of Elaia's closed harbor basin

Literature:  
SEELIGER, M., PINT, A., FEUSER, S., RIEDESEL, S., FRENZEL, P., KELTSERBAUM, D., FRIEDL, F., BOLTEN, A. & H. BRÜCKNER (2019): Elaia, Pergamon's maritime satellite - Rise and fall of an ancient harbour city due to shoreline migration. Journal of Quaternary Science [JQS-16-0068].