



Anchorage, ports and harbours: from the Bronze Age to the Hellenistic Aegean. A palaeogeographic approach while the sea level was changing.

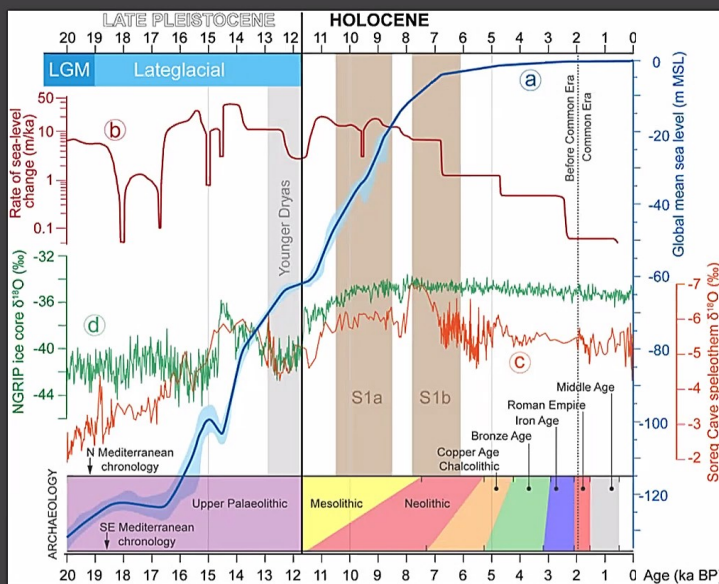
Dr Nikos Mourtzas



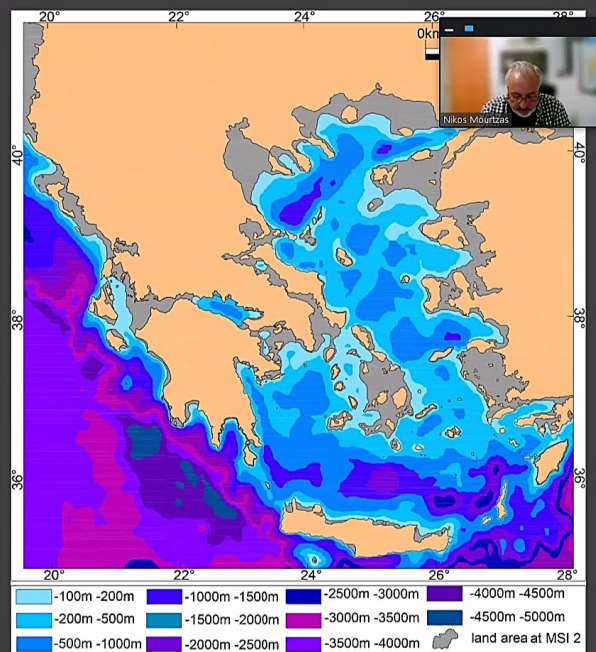
Online International Conference
Palaeogeography, history and sea level fluctuations:
Harbours and Ports of the eastern Mediterranean
4 May 2022

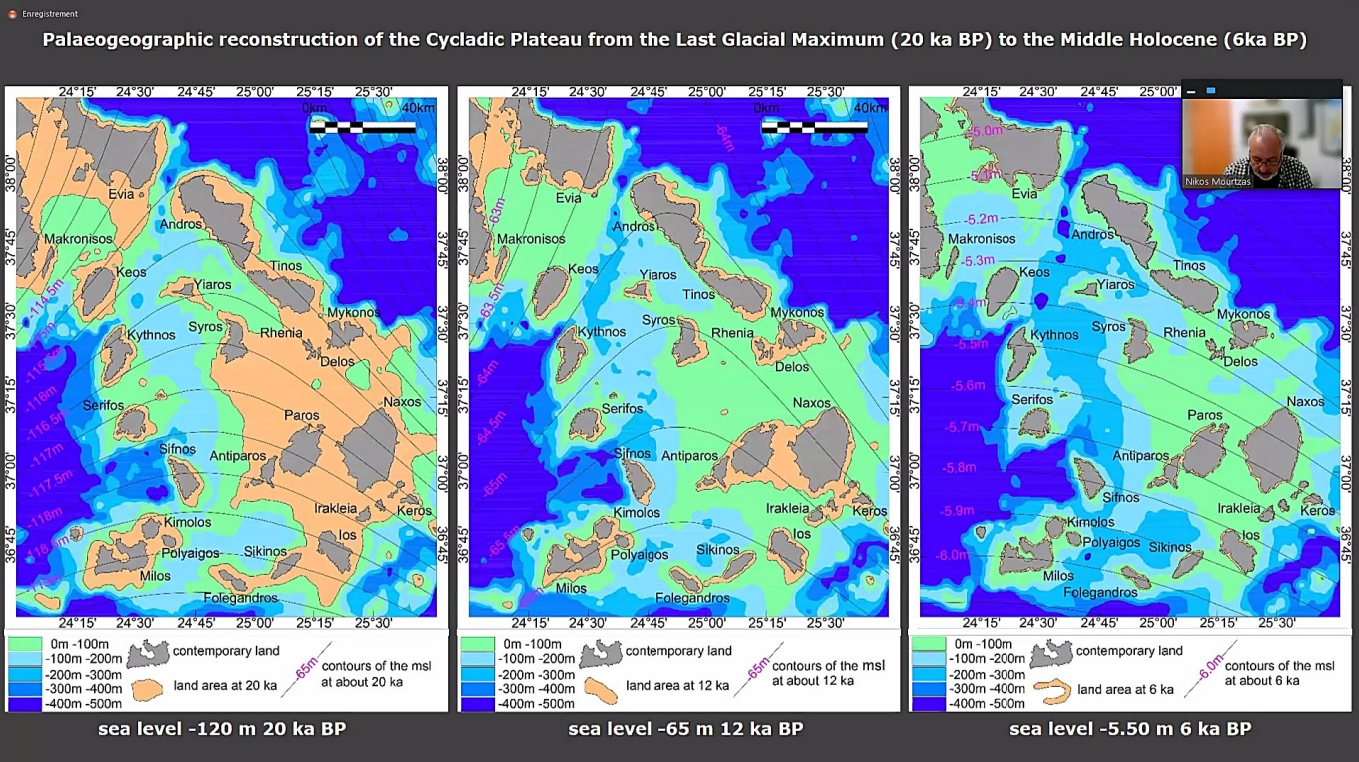


Global mean sea-level curve for the last 20 ka yr

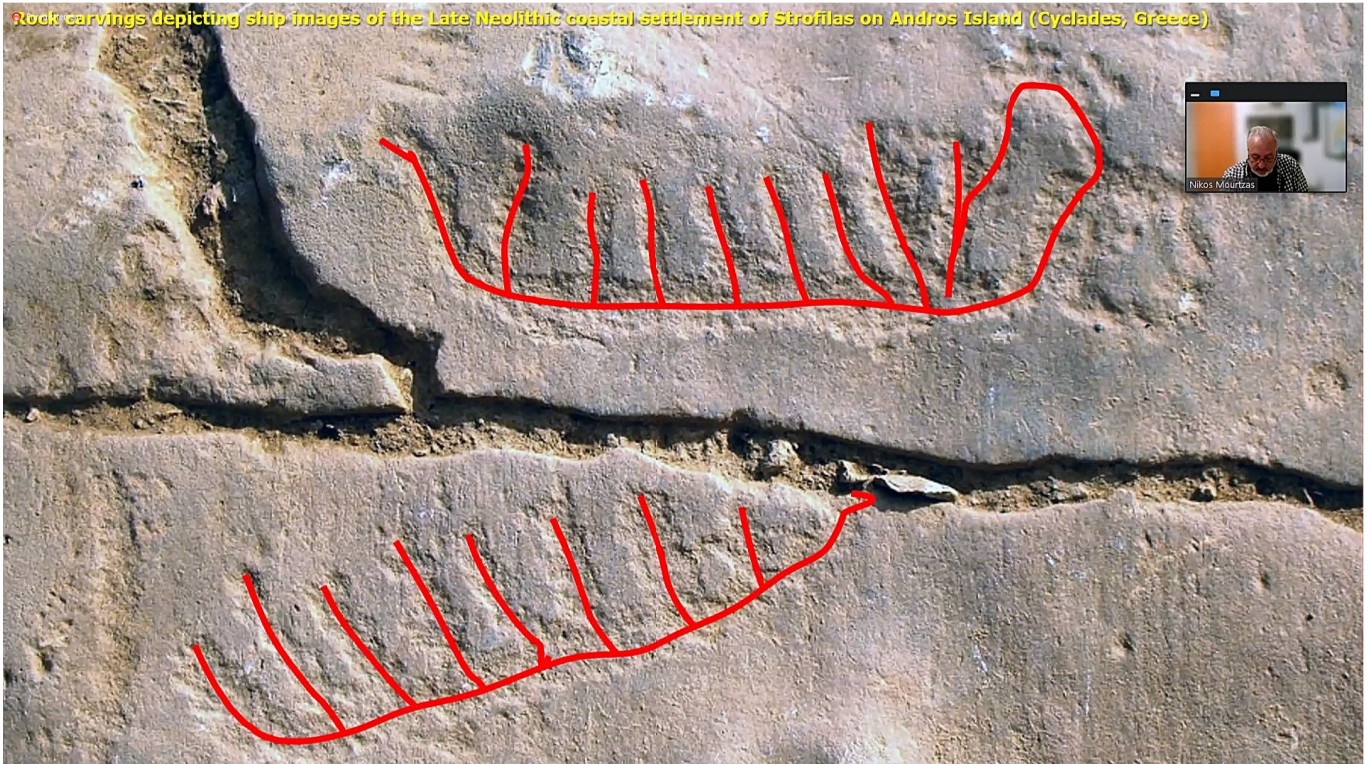


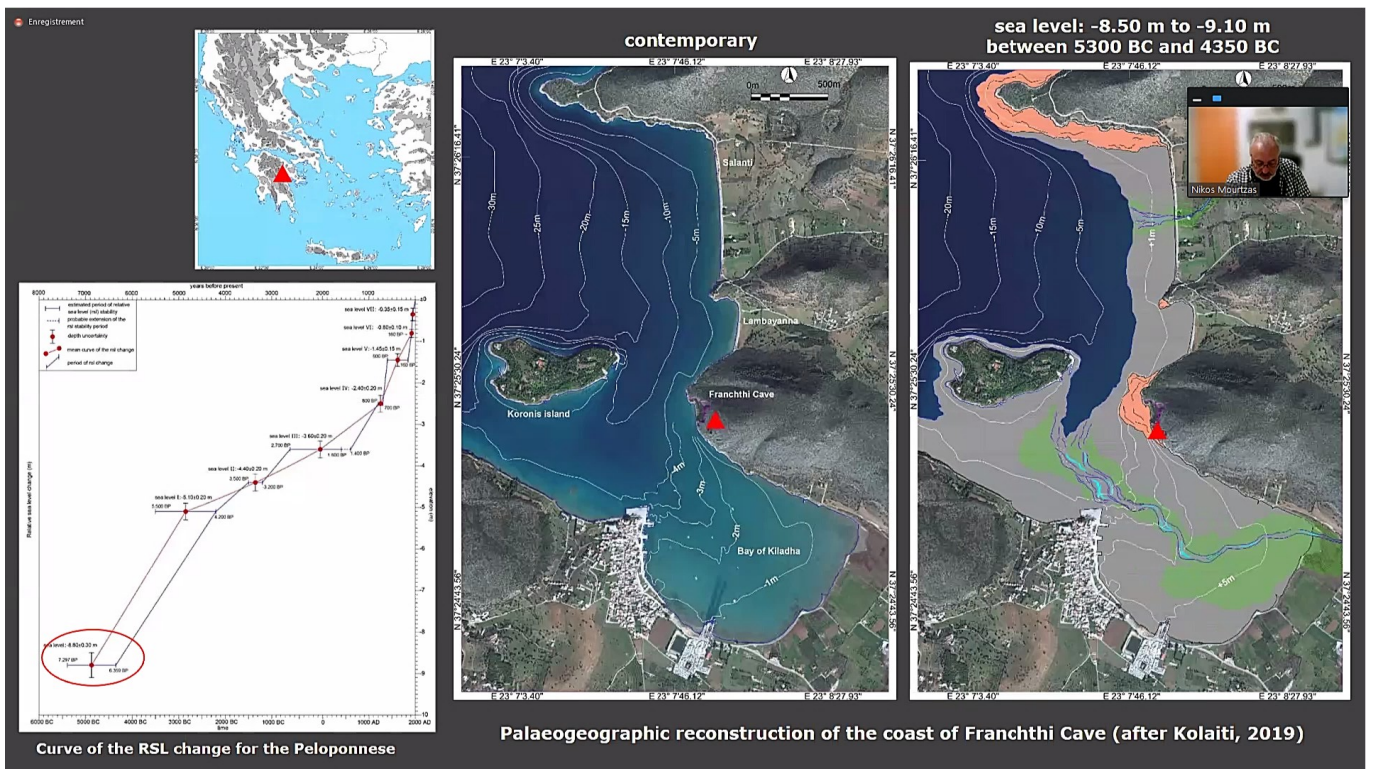
Greek area during the Last Glacial Maximum: sea level at -120 m 20 ka BP

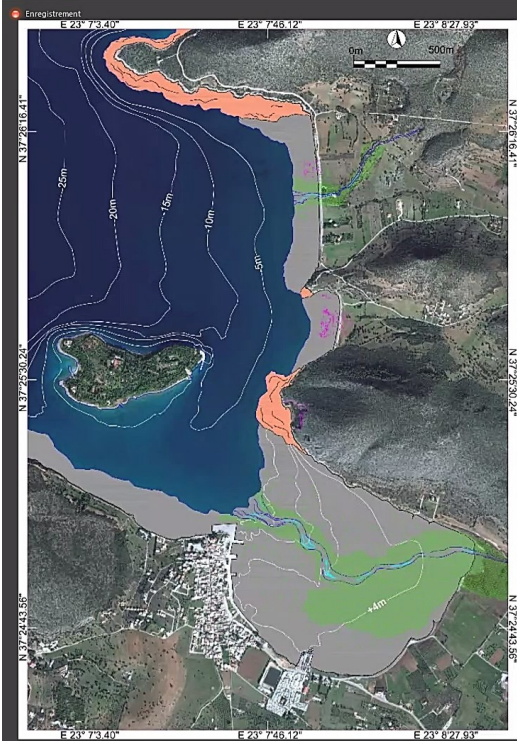




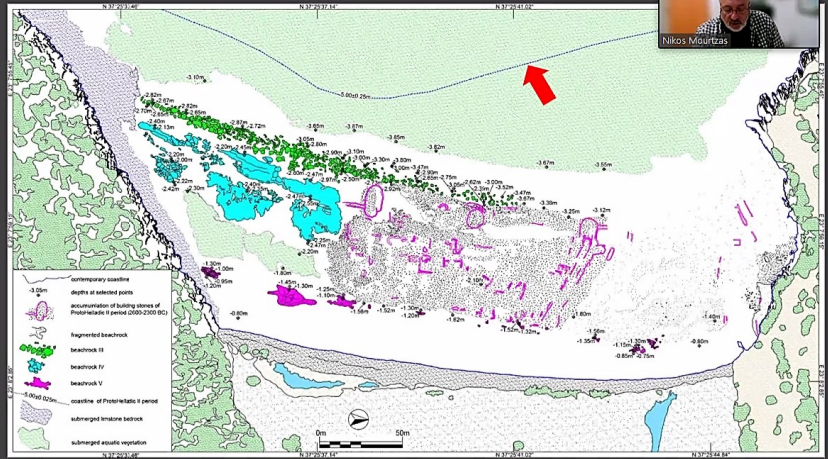
Rock carvings depicting ship images of the Late Neolithic coastal settlement of Strofilas on Andros Island (Cyclades, Greece)







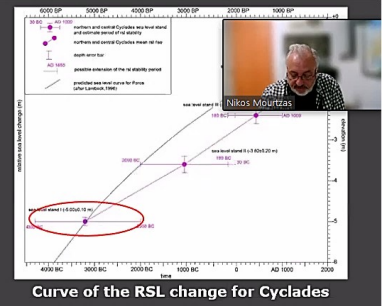
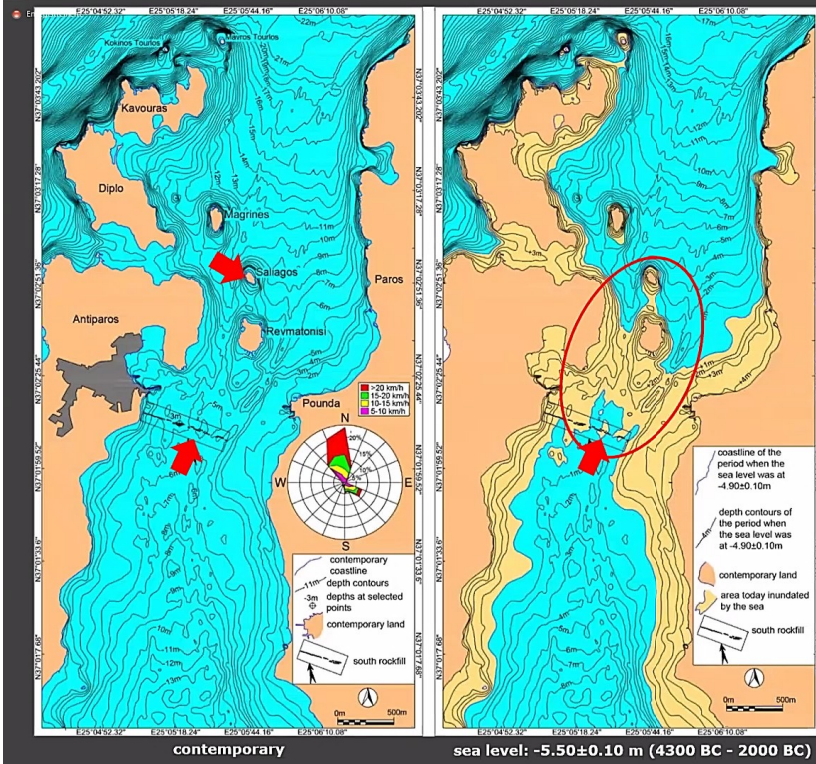
sea level: -5.0 m between 3500 BC and 2200 BC



Palaeogeography of Kiladha Bay and Lampagianna coast where the Early Helladic settlement is located (after Kolaiti, 2019).



Paros - Antiparos Strait



Palaeogeographic reconstruction of the Paros-Antiparos Strait (after Kolaiti and Mourtzas, 2020)

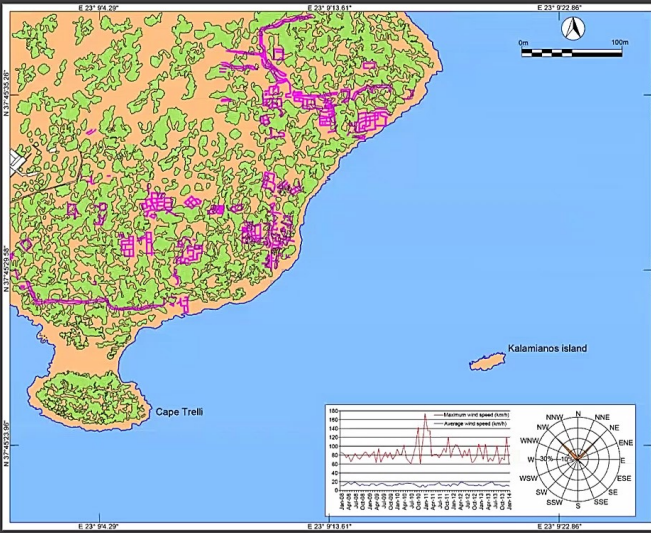


Early Helladic II (2700 BC - 2200 BC) settlement of Kalamianos (after Kolaiti, 2019)

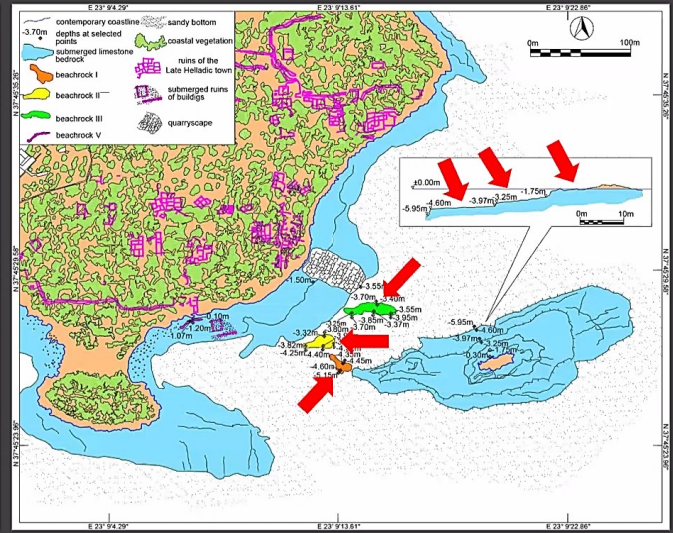




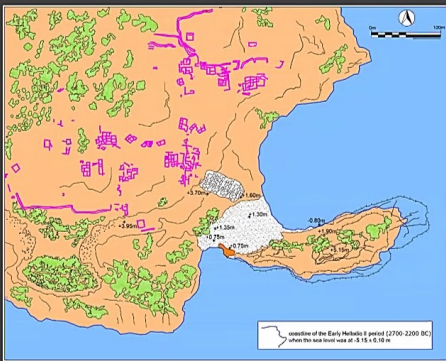
the coast of Kalamianos as it now stands



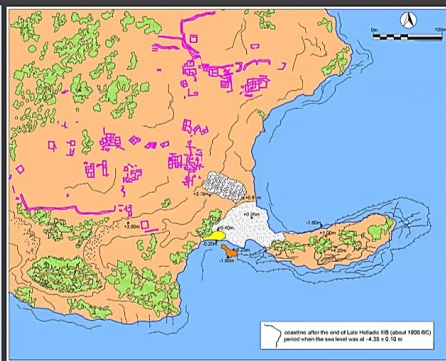
Submerged geomorphological features and archaeological remains on the coast of Kalamianos



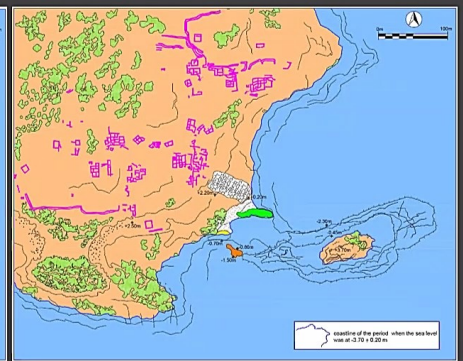
sea level: -5.15 m between 2700 and 2200 BC



sea level: -4.20 m after 1190 BC

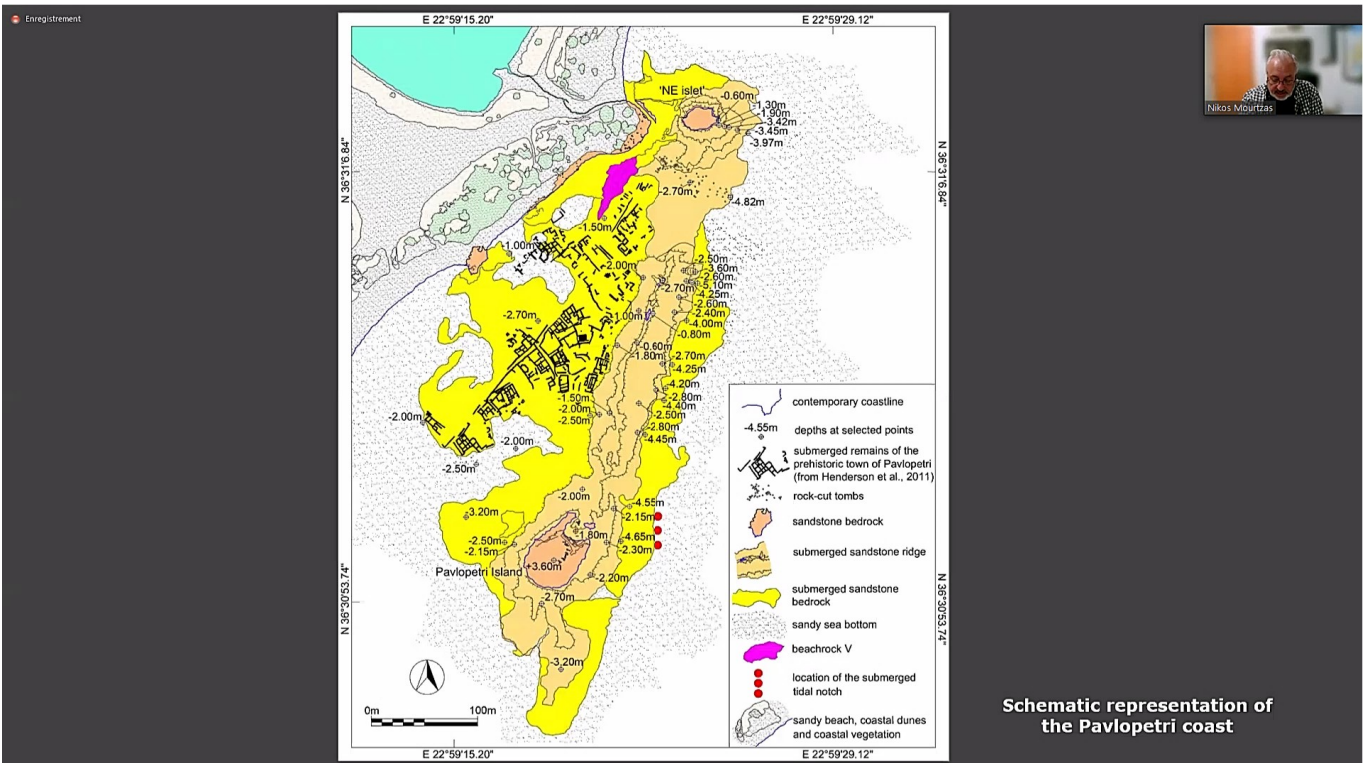
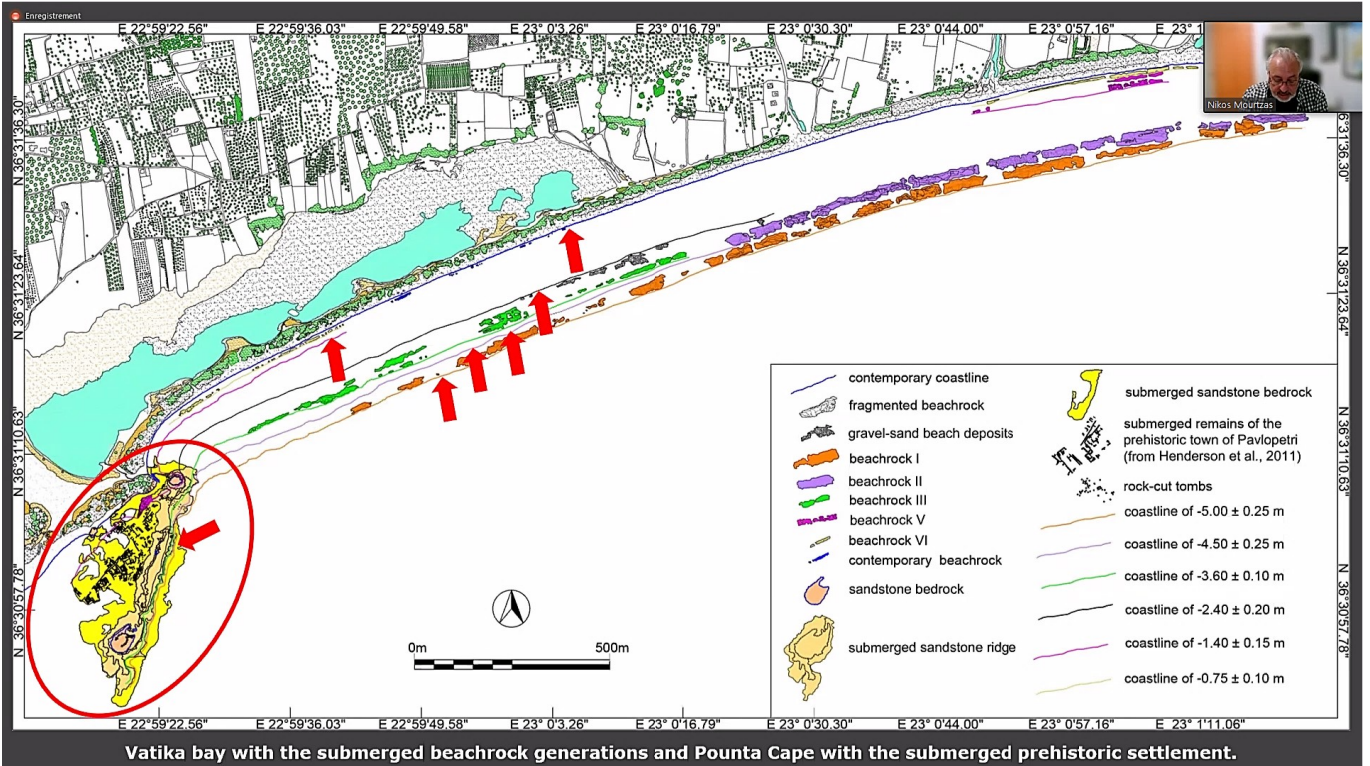


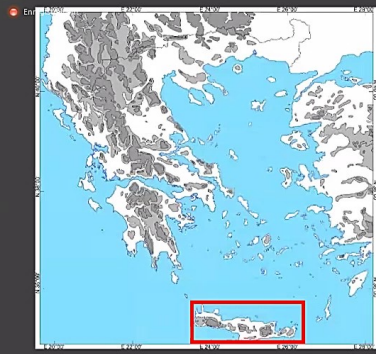
sea level: -3.70±0.20 m between 1700 BC and 600 AD



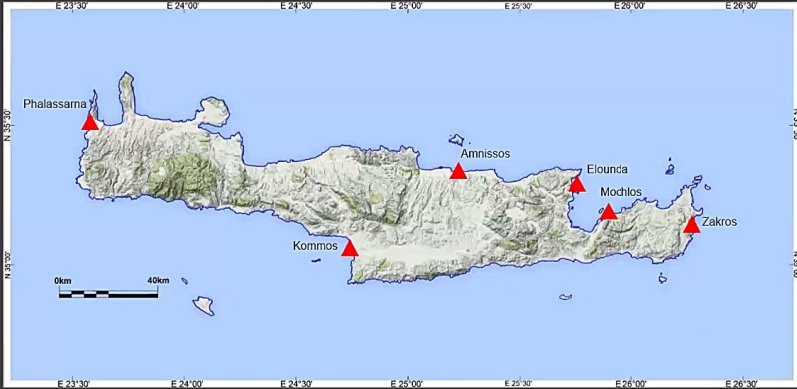
Palaeogeographic reconstruction of the coast of Kalamianos settlement (after Kolaiti, 2019)



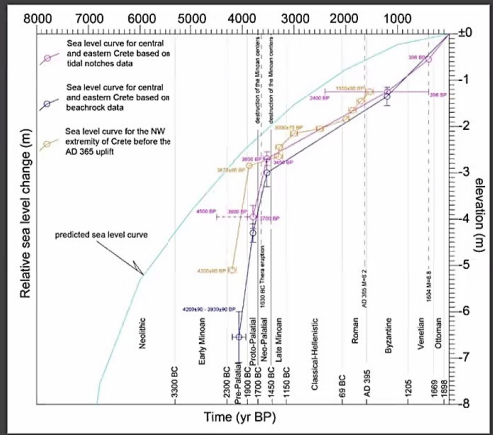




Location map of Crete with the sites of interest



Curve of the RSL change for Crete



Enregistrement
Palaeogeography of Elounda Gulf (NE Crete)

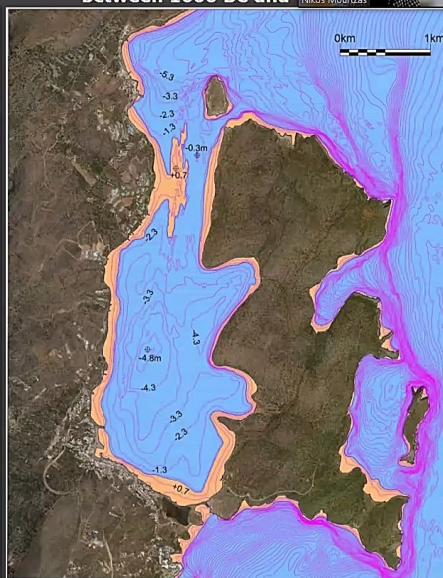
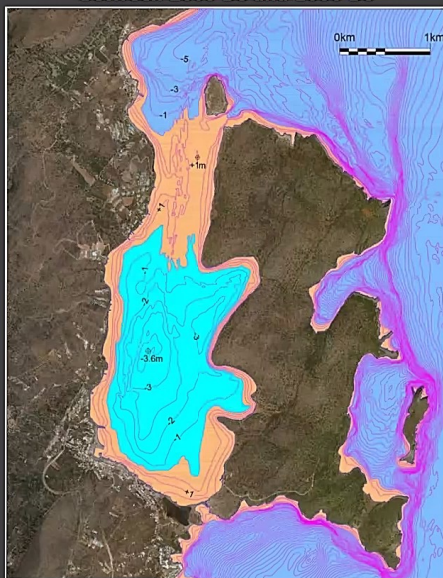
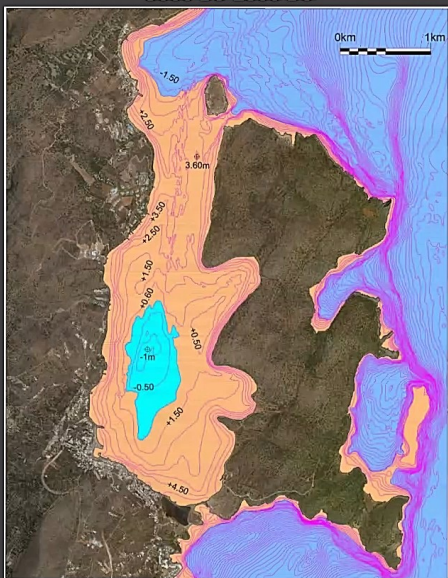




sea level: -6.55 ± 0.55 m
3000 BC-2800 BC

sea level: -3.95 ± 0.25 m
between 2000 BC and 1600 BC

sea level: -2.70 ± 0.1 m
between 1600 BC and

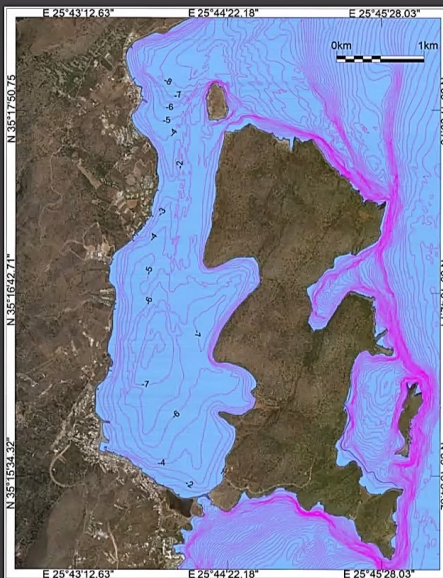
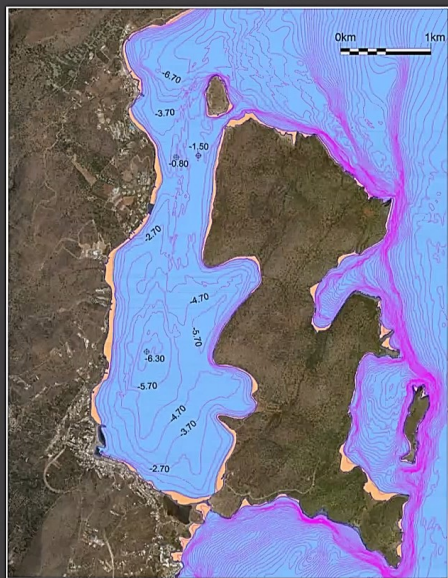


Palaeogeography of Elounda Gulf (NE Crete)



sea level: -1.25 ± 0.05 m
between 1200 BC and AD1604

contemporary



Palaeogeography of Elounda Gulf (NE Crete)



submerged road (Mirabello Gulf W coast)

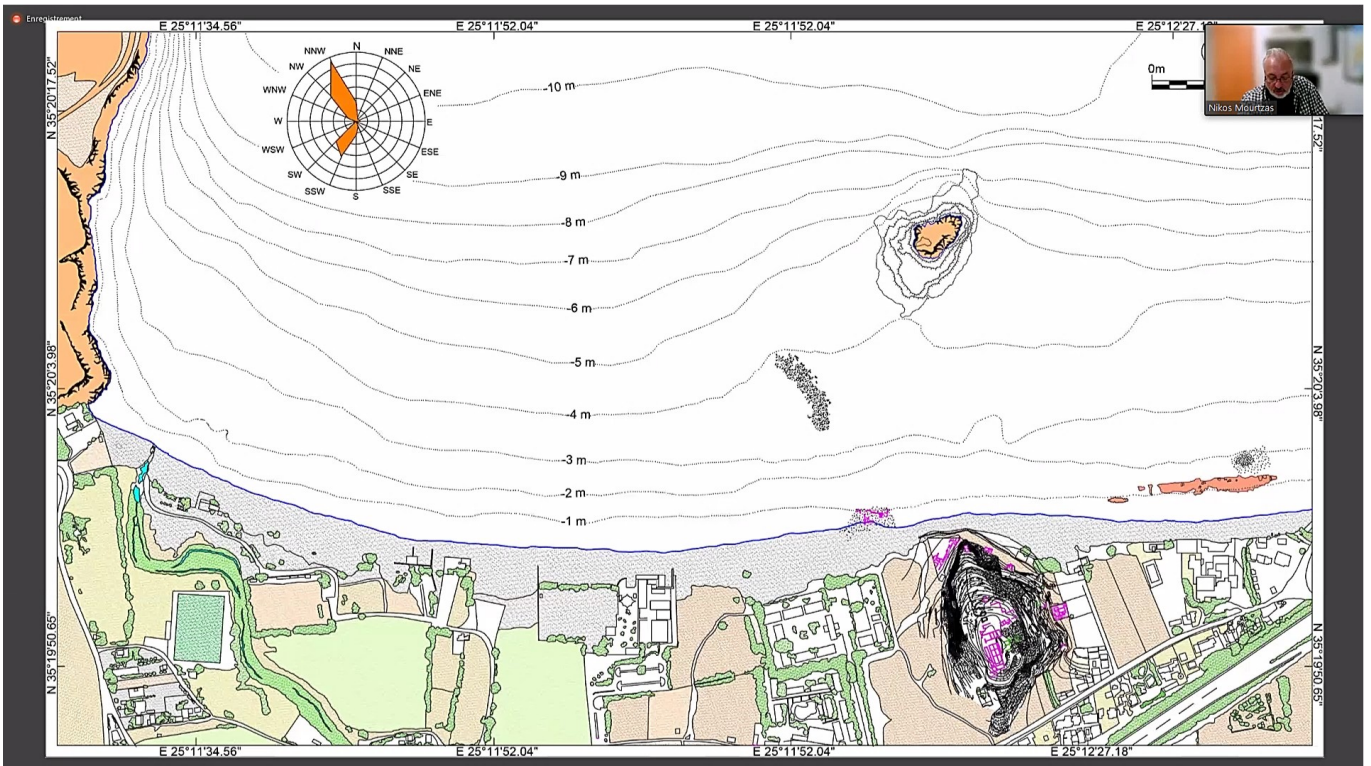


submerged Byzantine building relics (Poros Eloundas Strait)

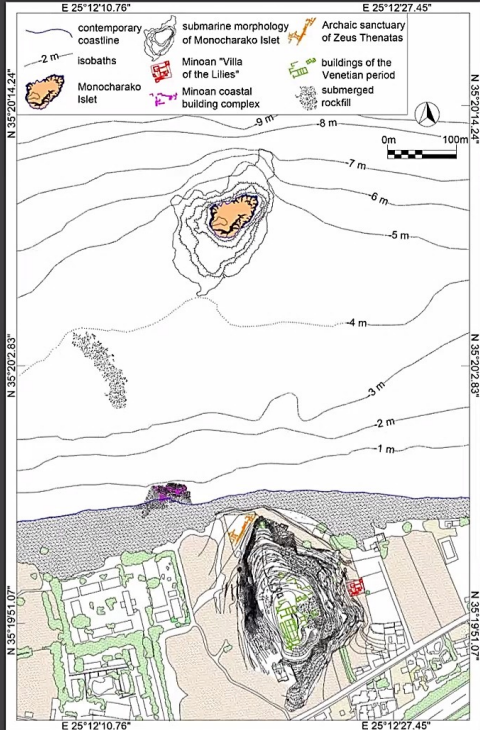


submerged post-Venetian salt pans (Poros Eloundas Strait)

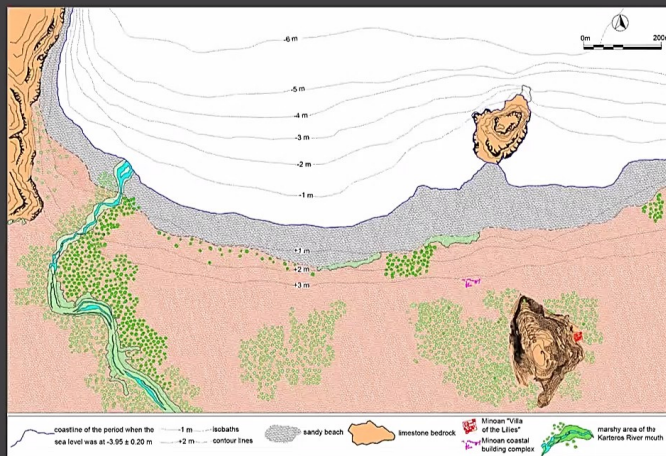
Palaeogeography of Amnisos coast (N Crete)



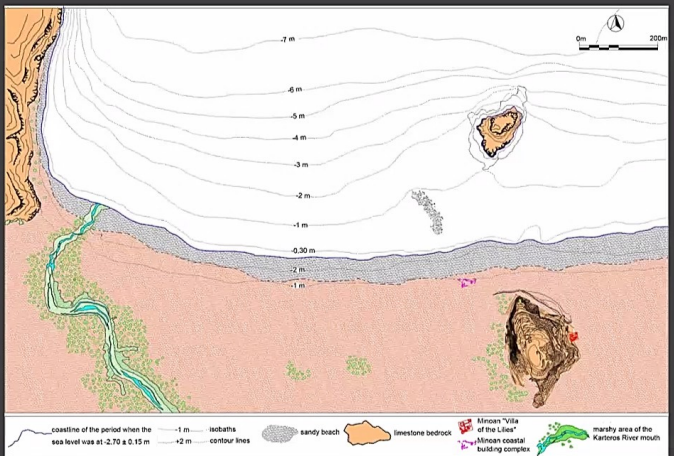
Enregistrement **Plan of Amnisos coast as it now stands**



Enregistrement **sea level: -3.95m during the Protopalatial period (MM IA to LM IA, c. 2000–1600 BC)**



Enregistrement **sea level: -2.70±0.15 m between the Neopalatial period (1600–1425 BC) and the end of the Postpalatial period (c. 1200 BC)**

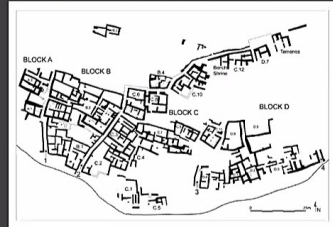
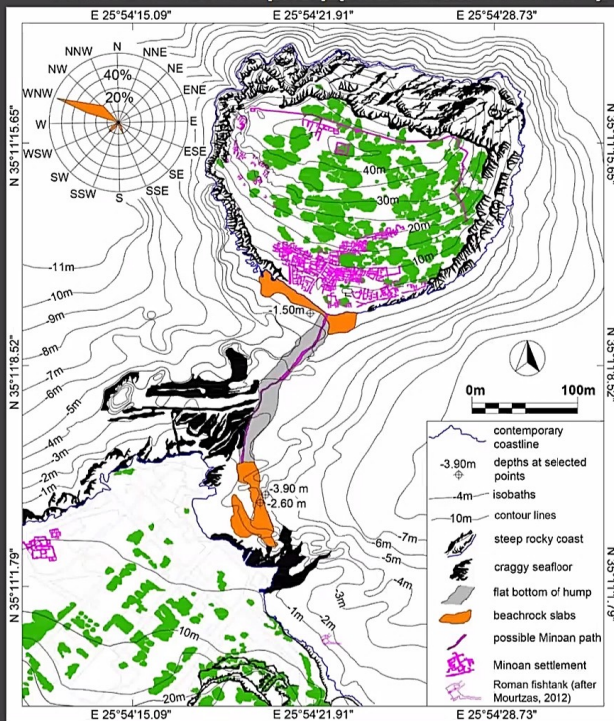


Palaeogeography of Amnisos coast (N Crete)

Palaeogeography of Mochlos coast (NE Crete)

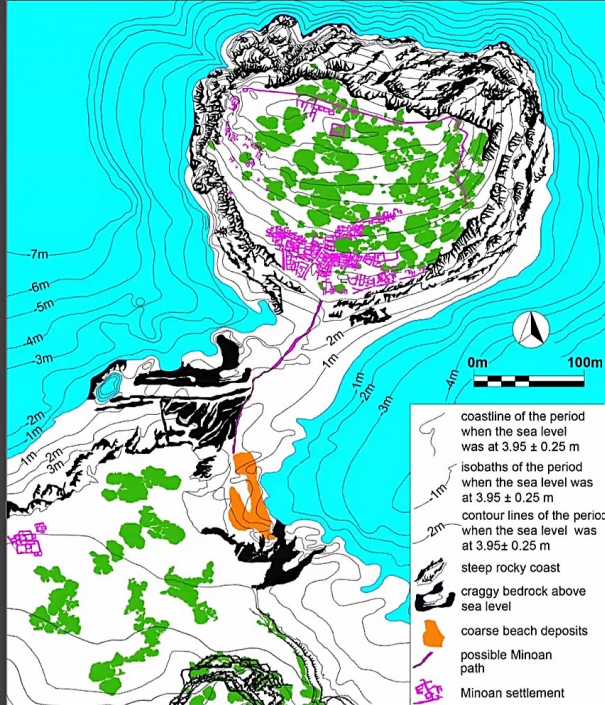


Mochlos coast: contemporary (Mourtzas and Kolaiti 2021)

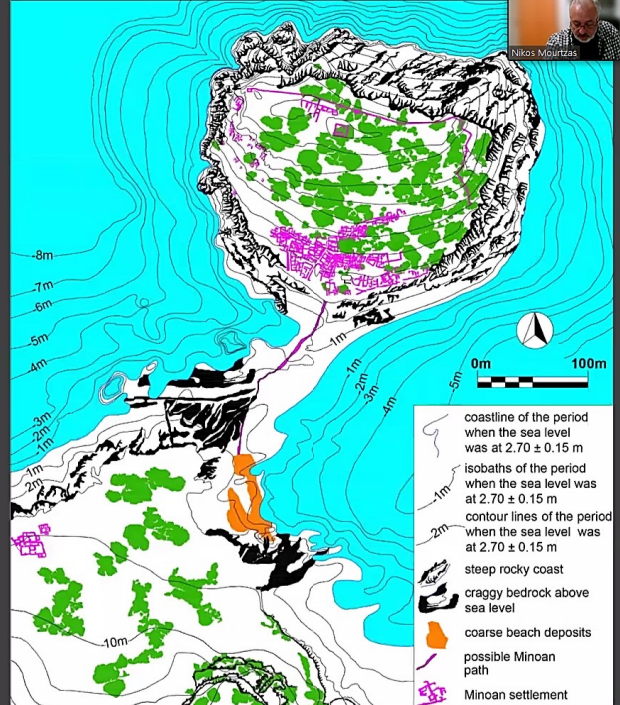


Aerial views and plan (after Soles and Davaras, 1996) of the Minoan settlement at Mochlos.

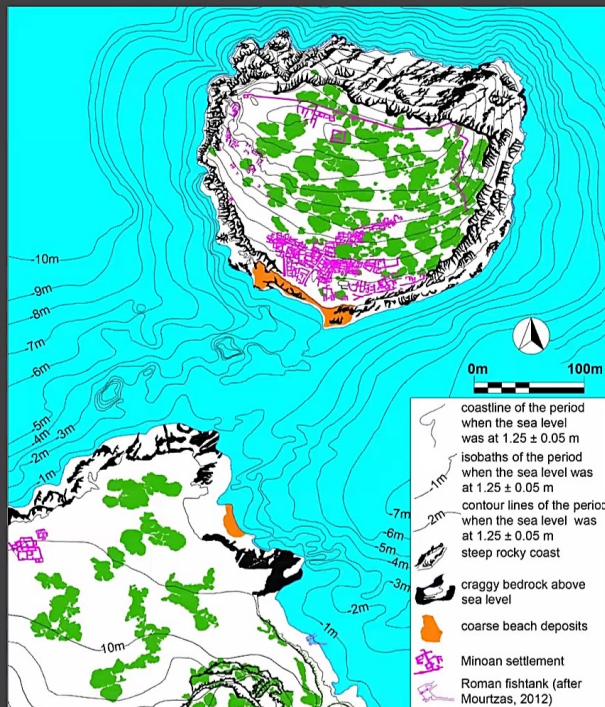
Enregistrement
sea level: -3.95 ± 0.25 m during the Protopalatial period (MM IA to LM IA, c. 2000–1600 BC)



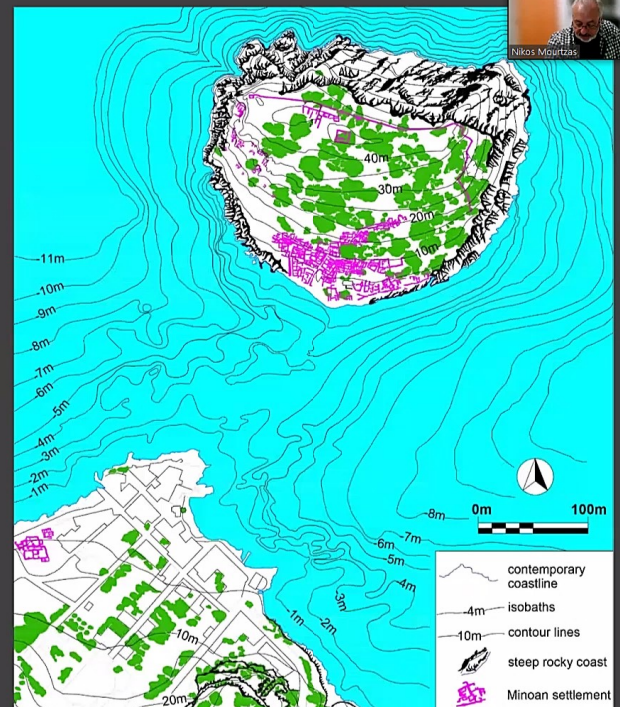
sea level: -2.70 ± 0.15 m between the Neopalatial period (LM TR c. 1600–1425 BC) to the end of the Postpalatial period



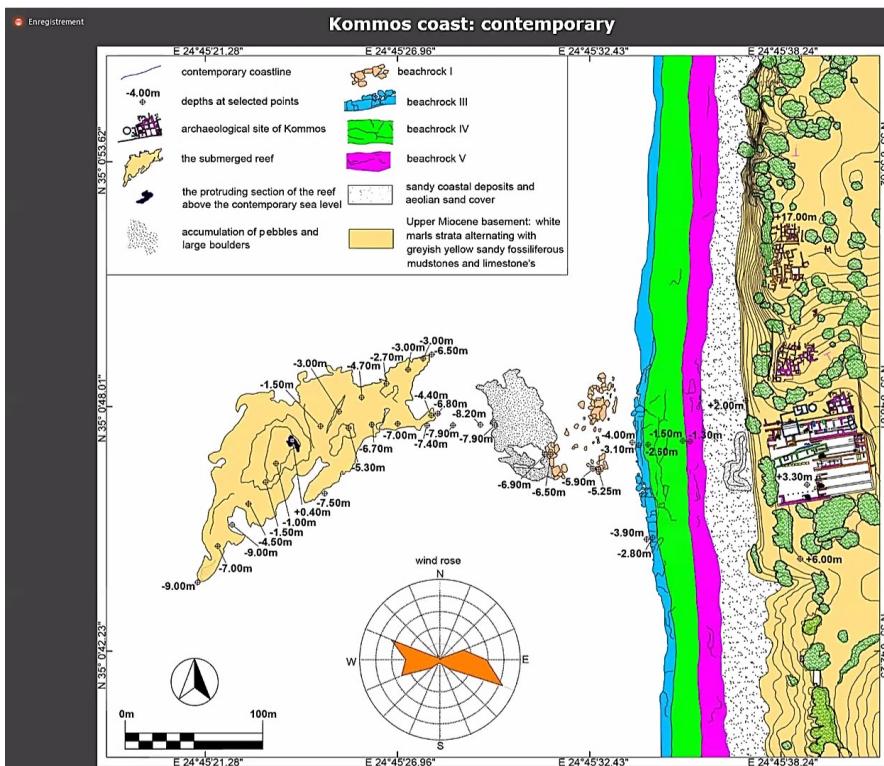
Enregistrement
sea level: -1.25 ± 0.05 m from the end of the Postpalatial period (c. 1200 BC) to 1604 AD



contemporary

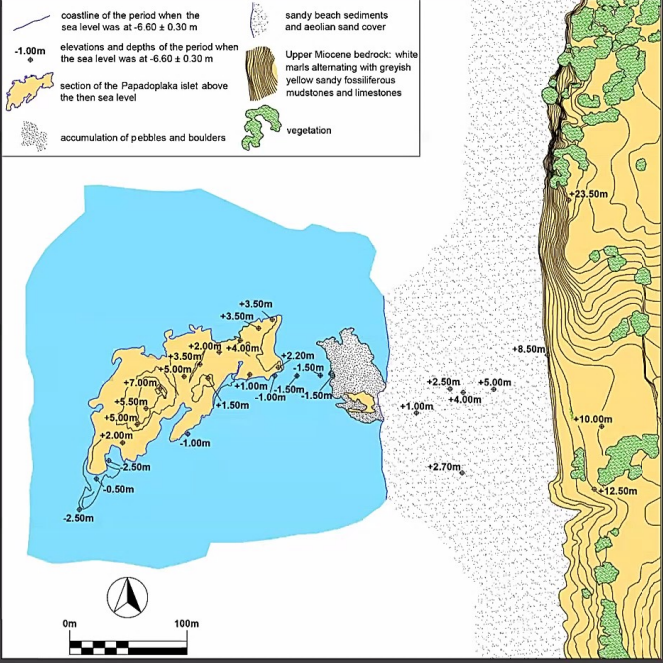


Palaeogeographic reconstruction of the coast of Kommos (SE Crete)



sea level: -6.60 ± 0.30 m before the Protopalatial period (before 2000 BC)

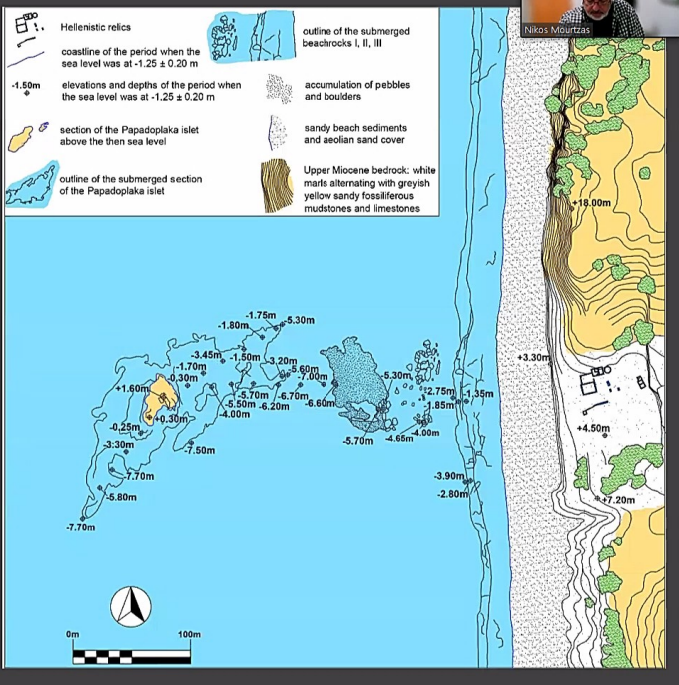
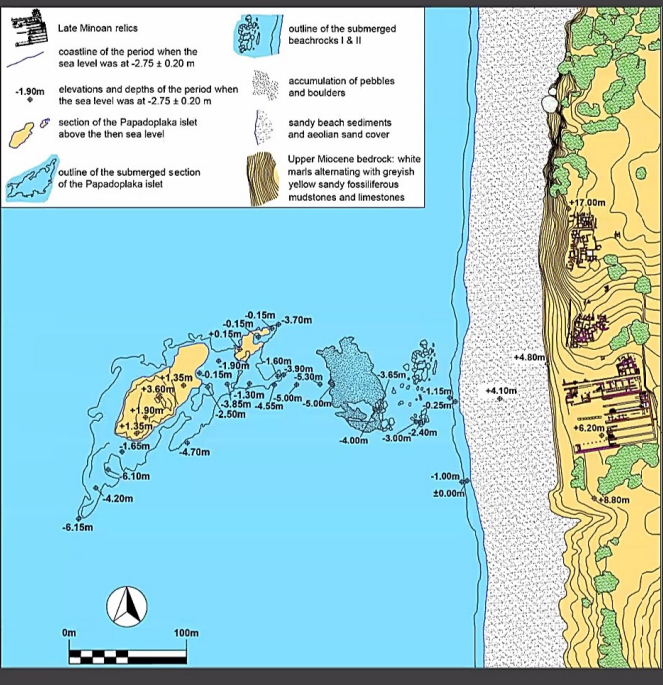
sea level: -3.90 ± 0.20 m during the Protopalatial period (MM IA to LM IA, c. 2000 - 1600 BC)



Palaeogeographic reconstruction of the coast of Kommos (after Mourtzas and Kolaiti, 2020, 2021)

sea level: -2.75 ± 0.20 m from the Neopalatial period (LM IB, c. 1600-1425 BC) to the end of the Postpalatial period (c. 1200 BC)

sea level: -1.25 ± 0.05 m from the end of the Postpalatial period (c. 1200 BC) to 1604 AD



views of the Minoan harbour-town of Kommos and its seafront, now fully exposed to weather



Nikos Mourtzas

Shoreline reconstruction of the submerged Minoan harbour morphology in the bay of Kato Zakros (E Crete)

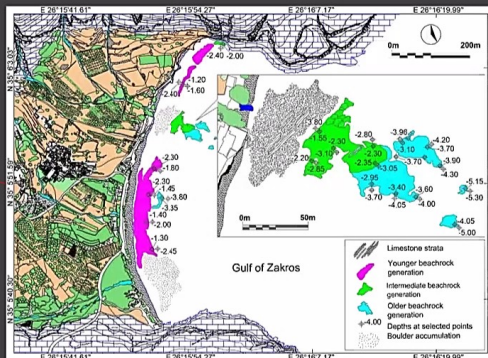
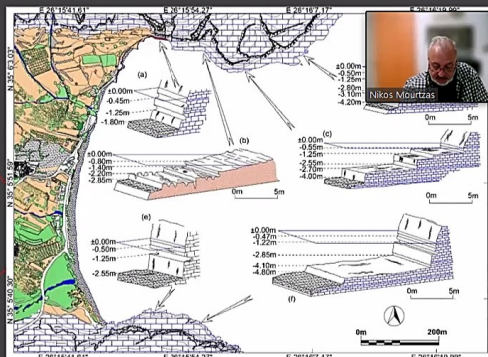
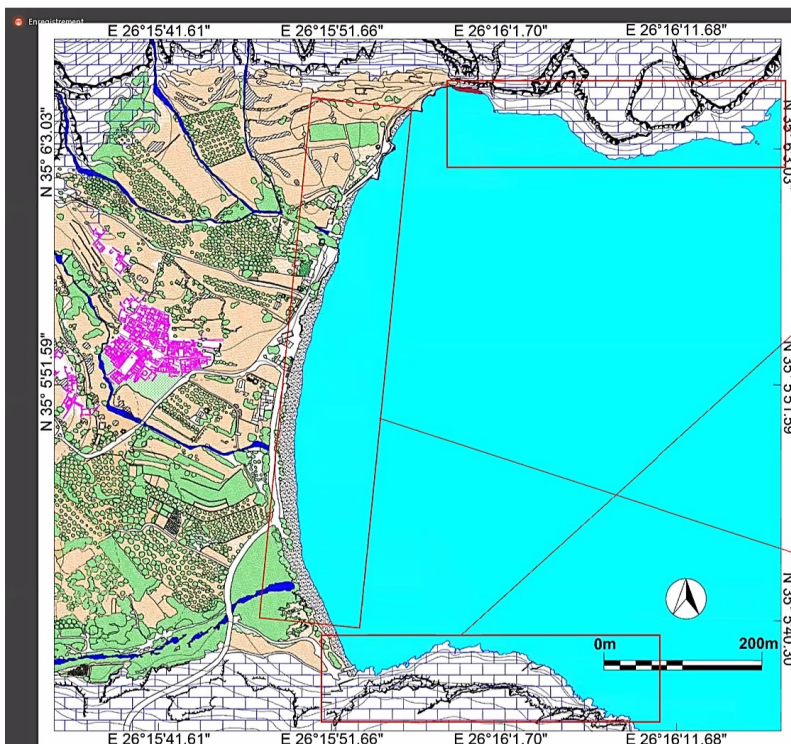
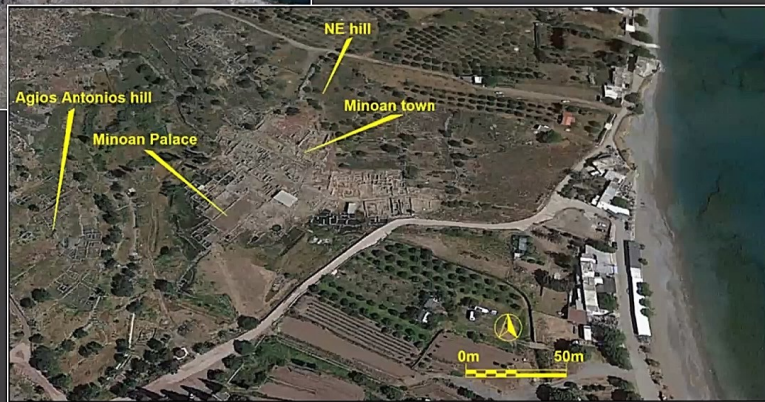


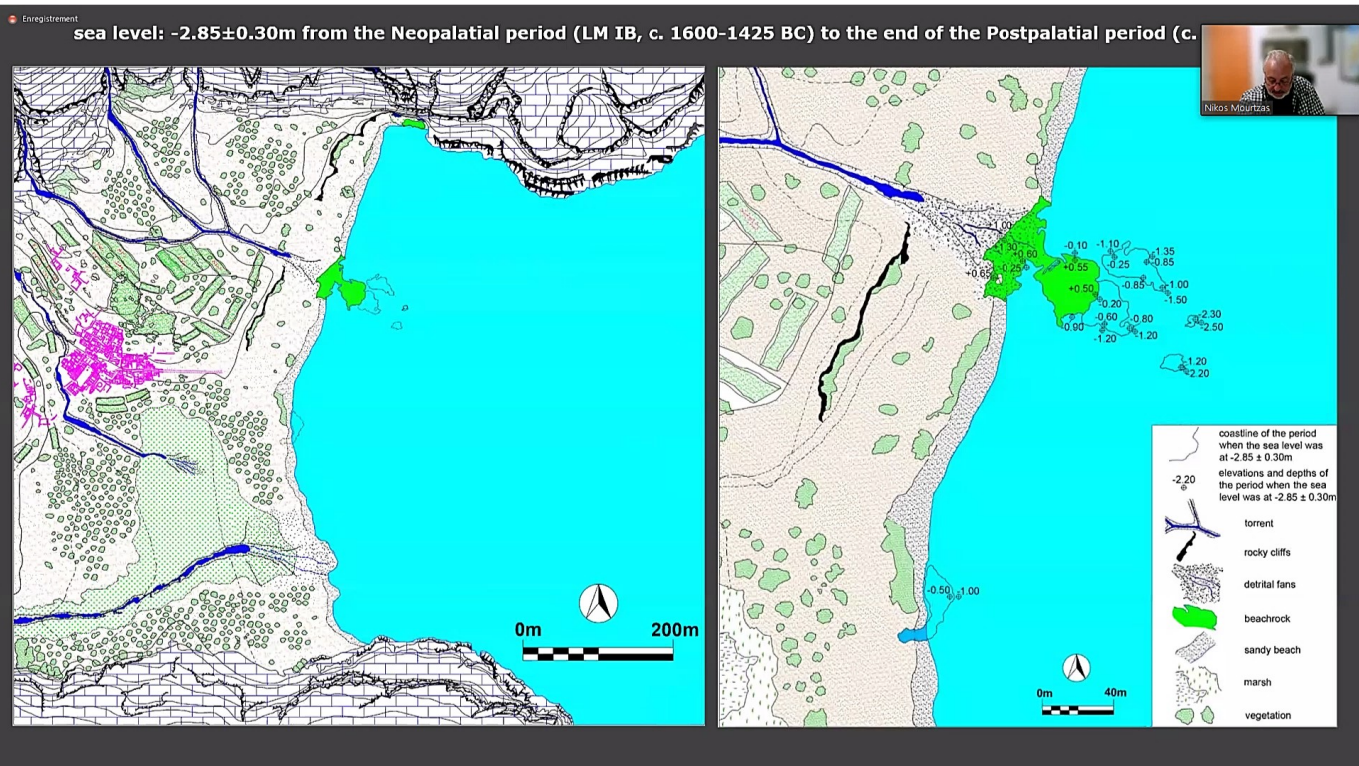
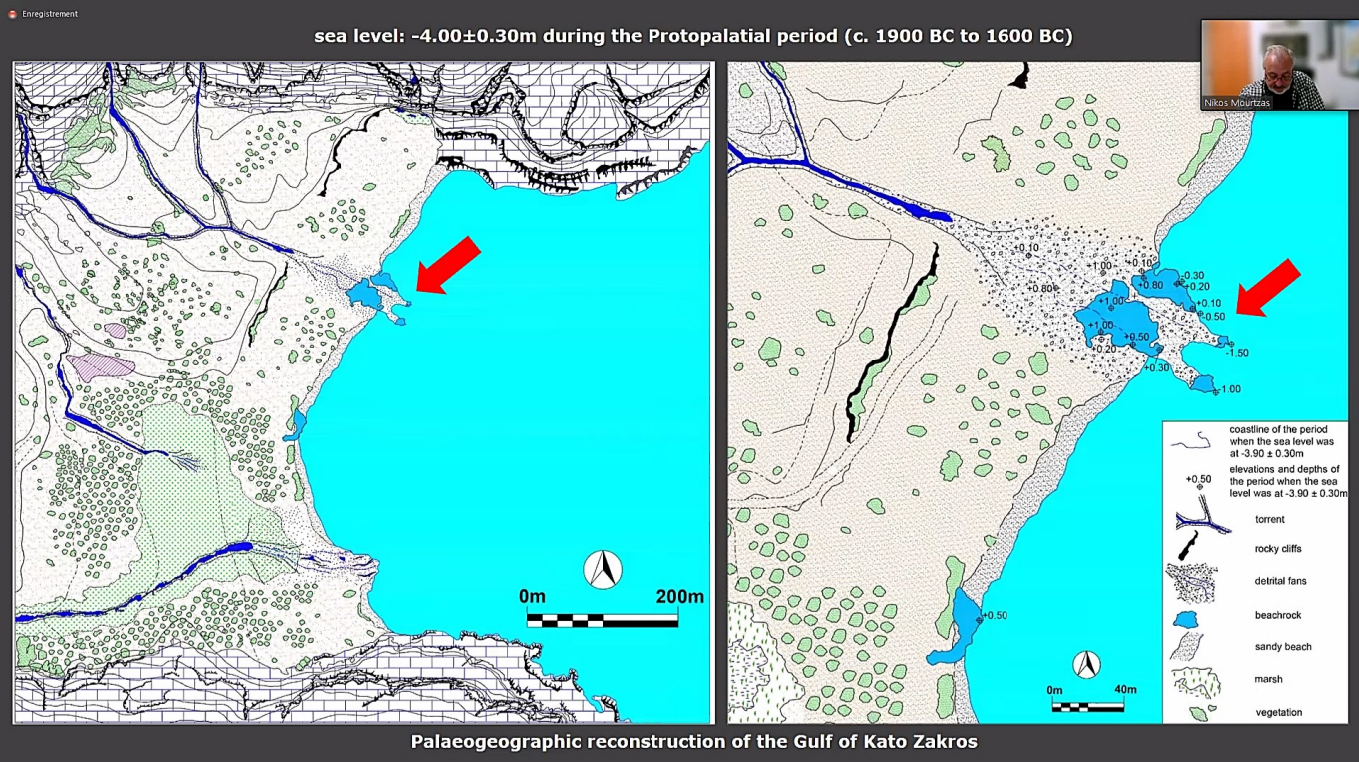
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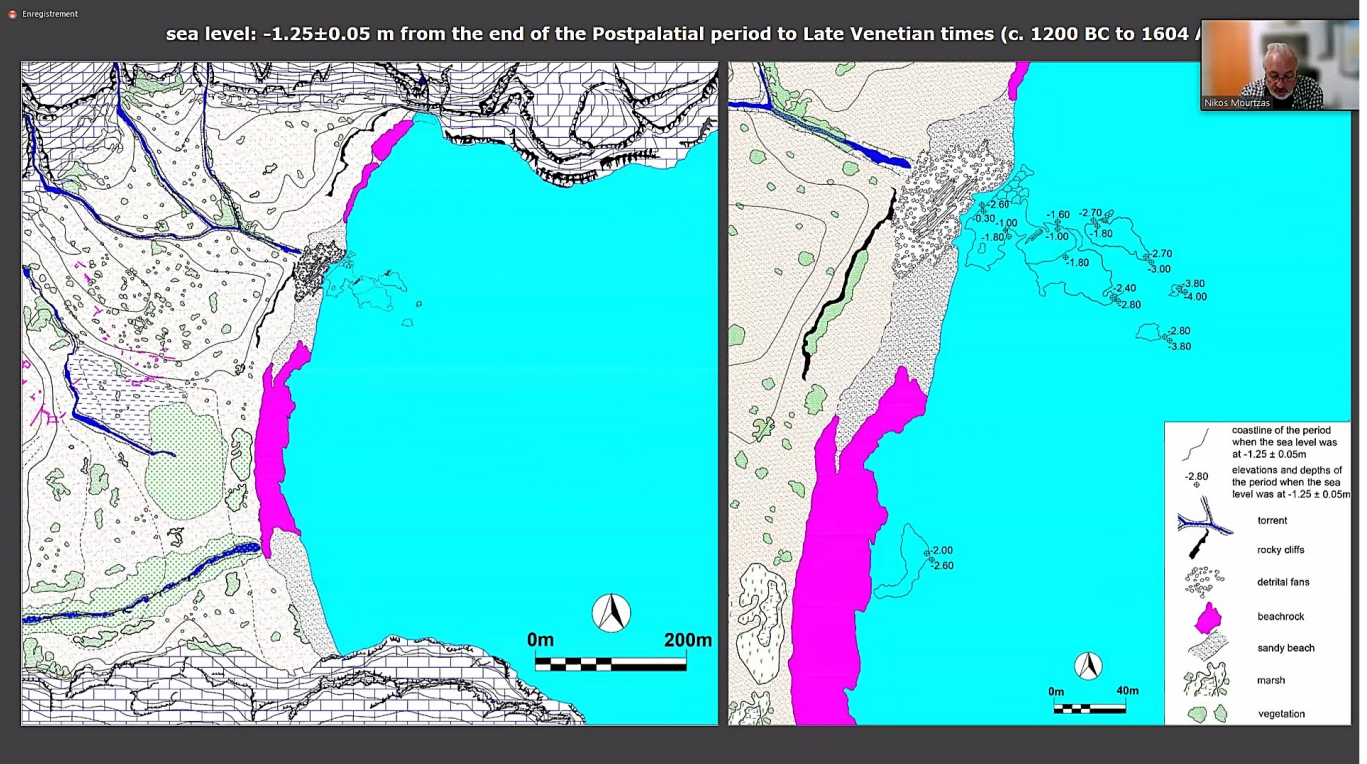


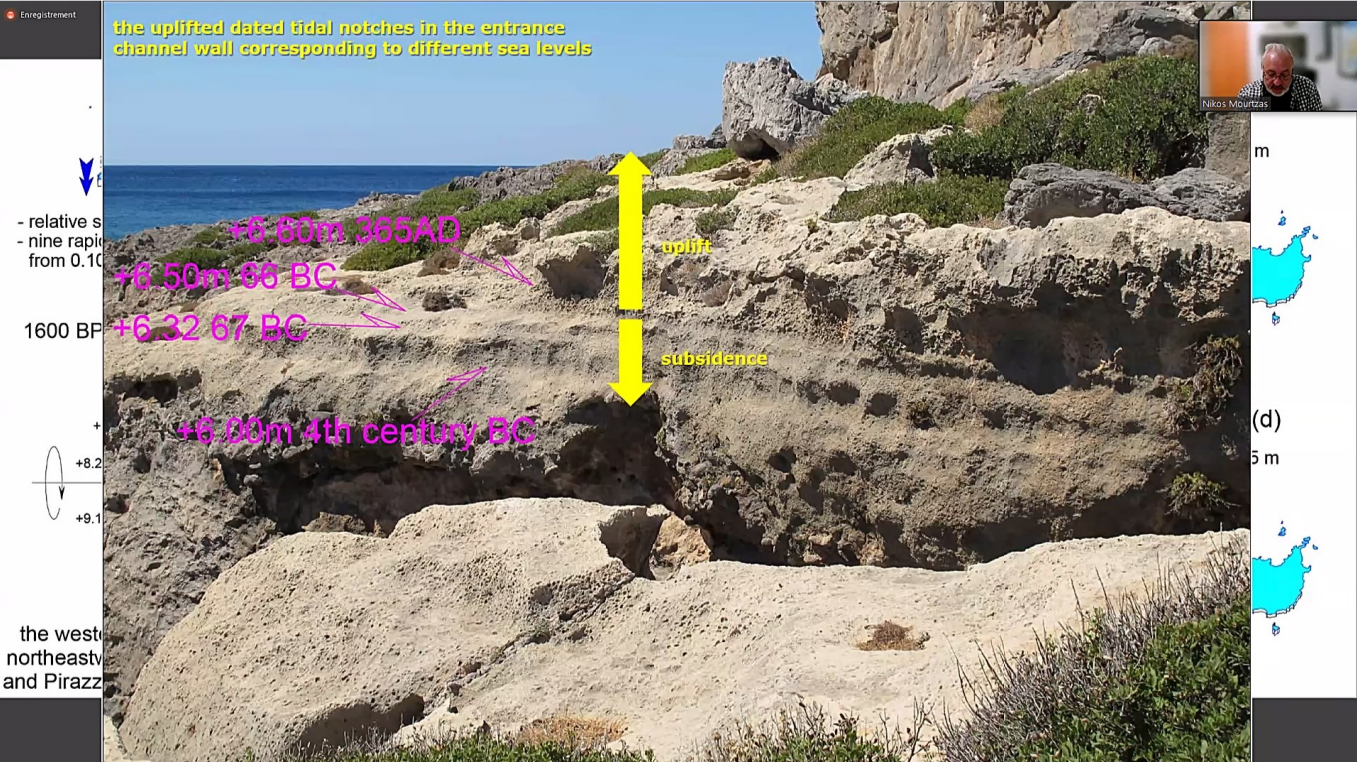
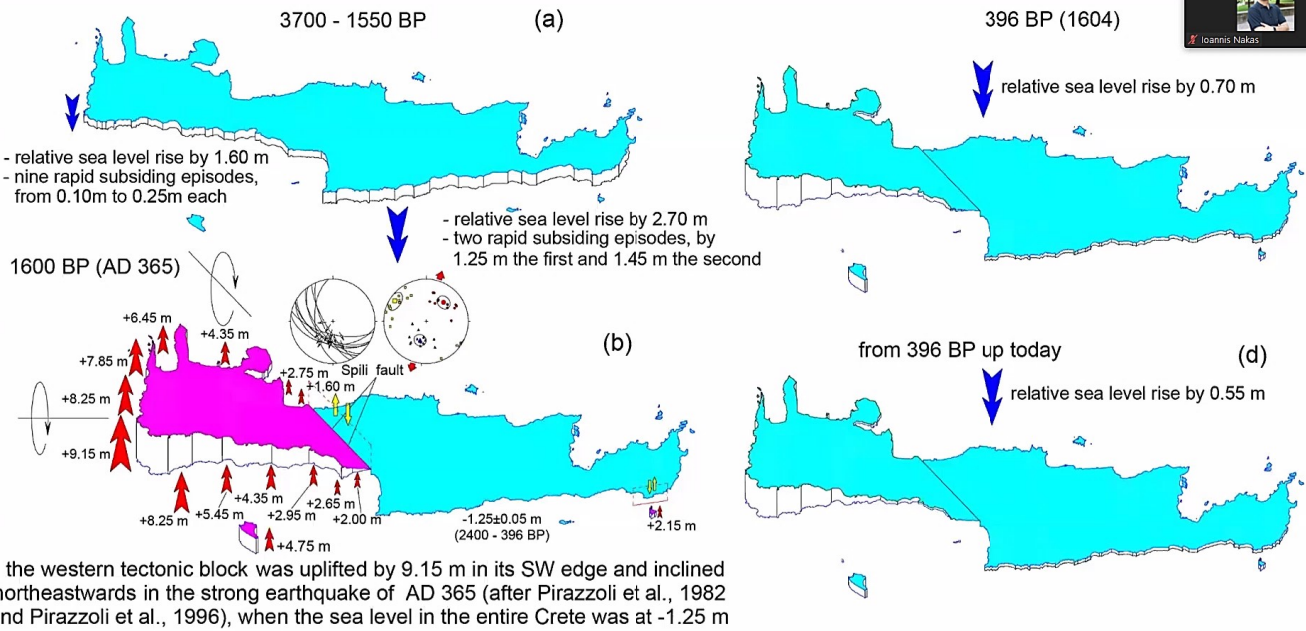
The bay and the valley of Kato Zakros

The Minoan Palace of Kato Zakros between the NE hill and the hill of Agios Antonios to the south, and the relics of the surrounding Minoan town on the hillside.













harbour basin



landward harbour entrance



seaward harbour entrance



curved entrance channel



quay

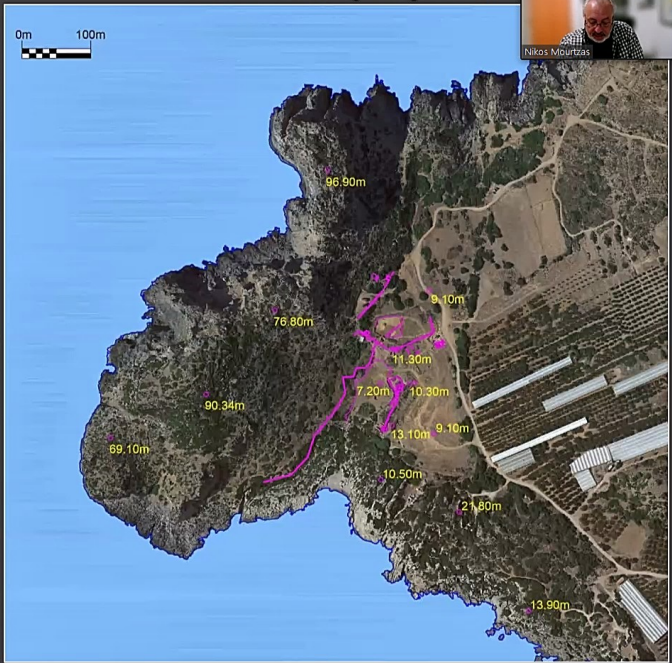
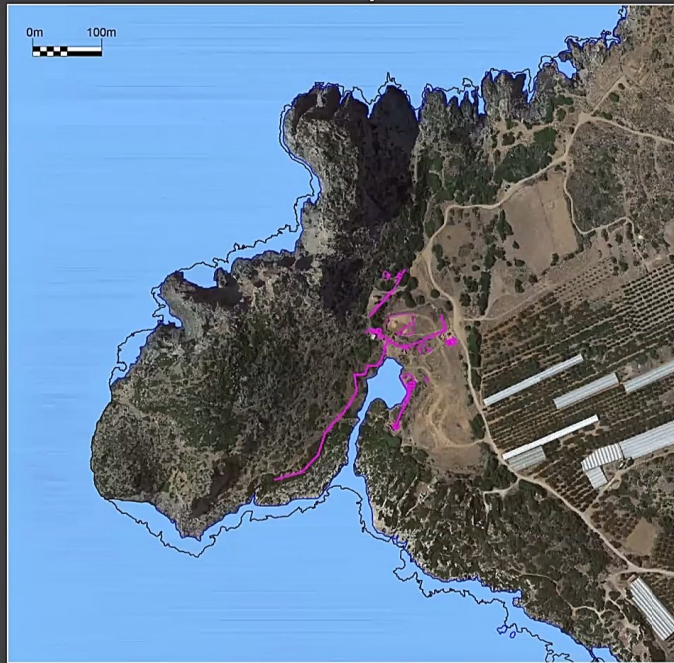


quay with bollards

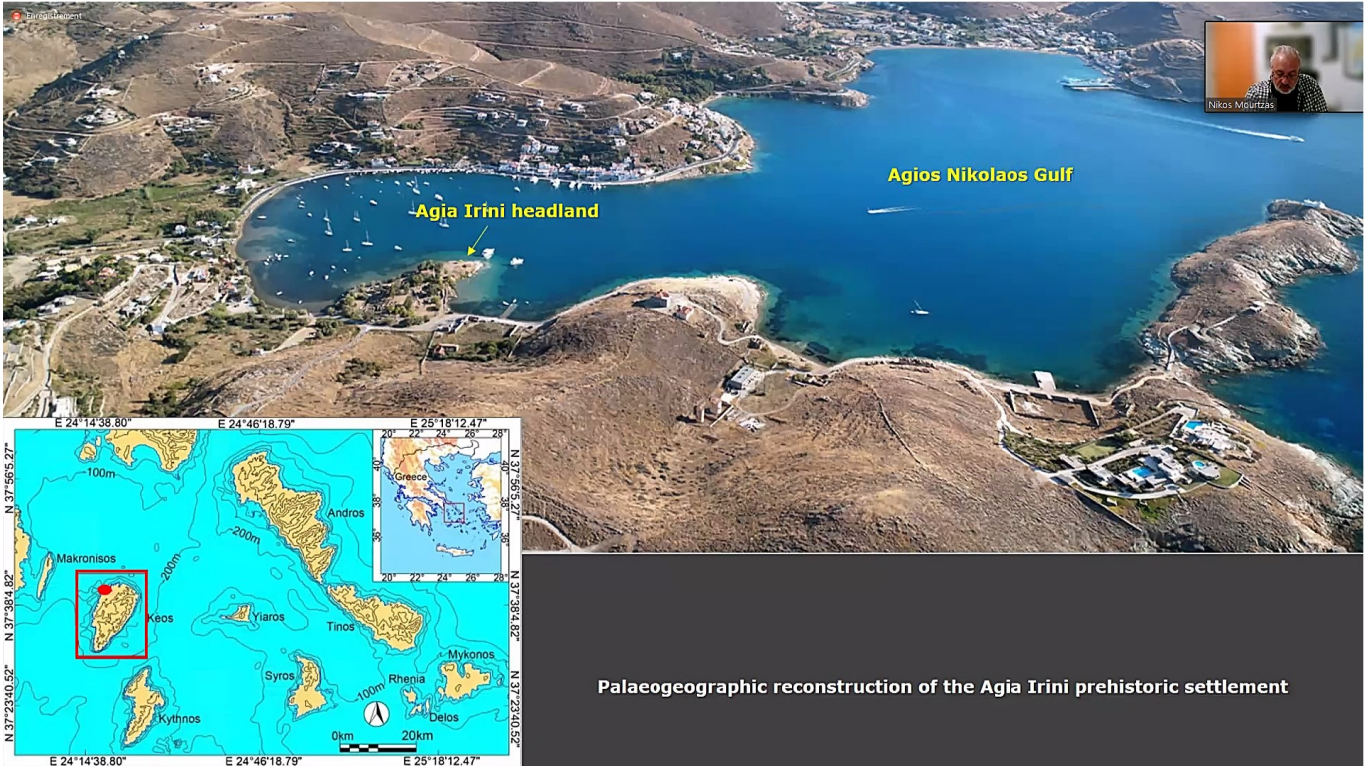


sea level: -1.75 m at the second half of the 4th century BC.
harbour basin depth: 1.10 m

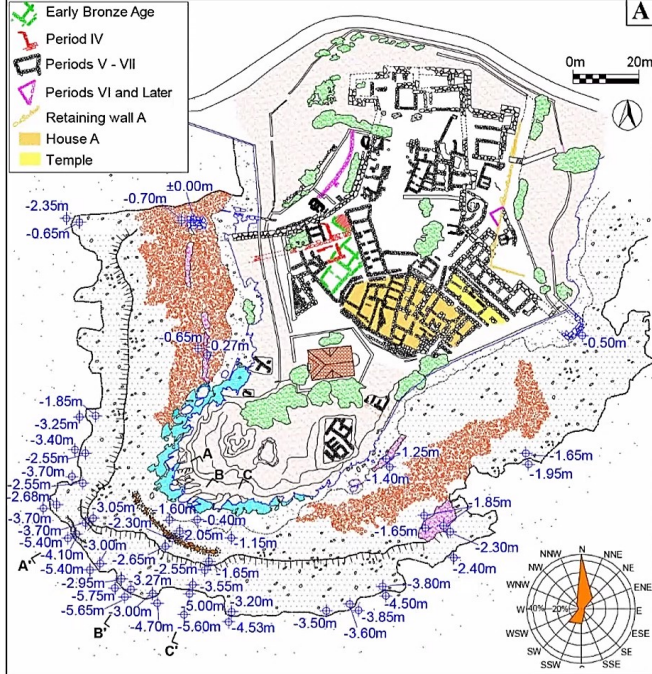
The harbour as it now stands, after the
365 AD tectonic uplift by 6.60 m



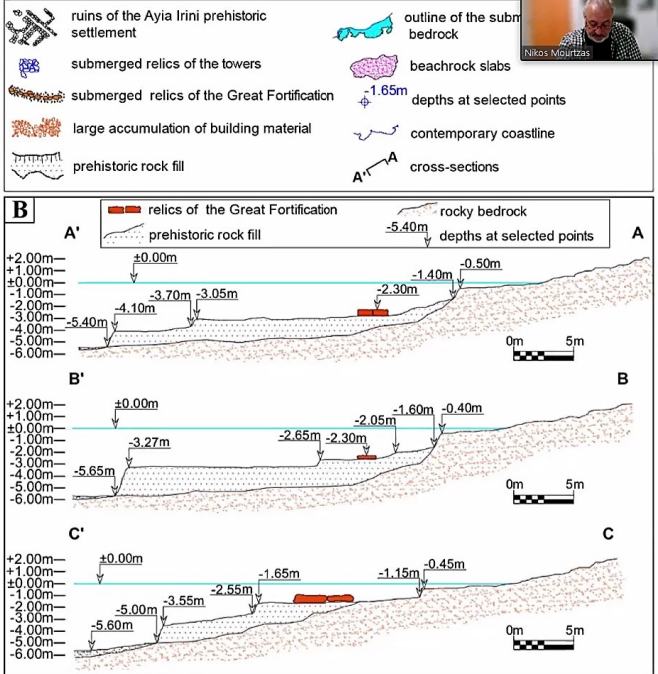
Palaeogeographic reconstruction of the Phalasarna harbour



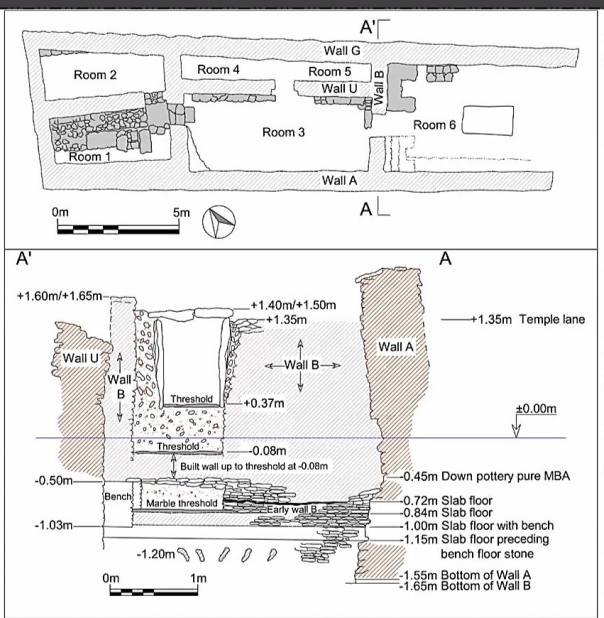
Plan of Ayia Irini headland and the surrounding submerged rockfill



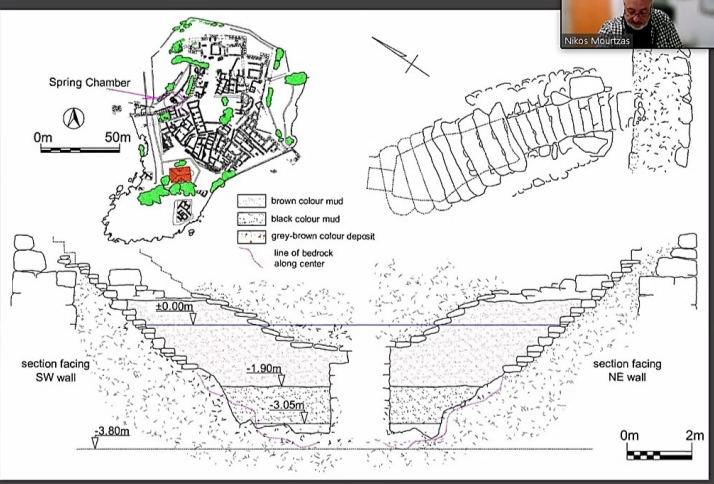
Cross sections of the southern section of the rockfill



Enregistrement

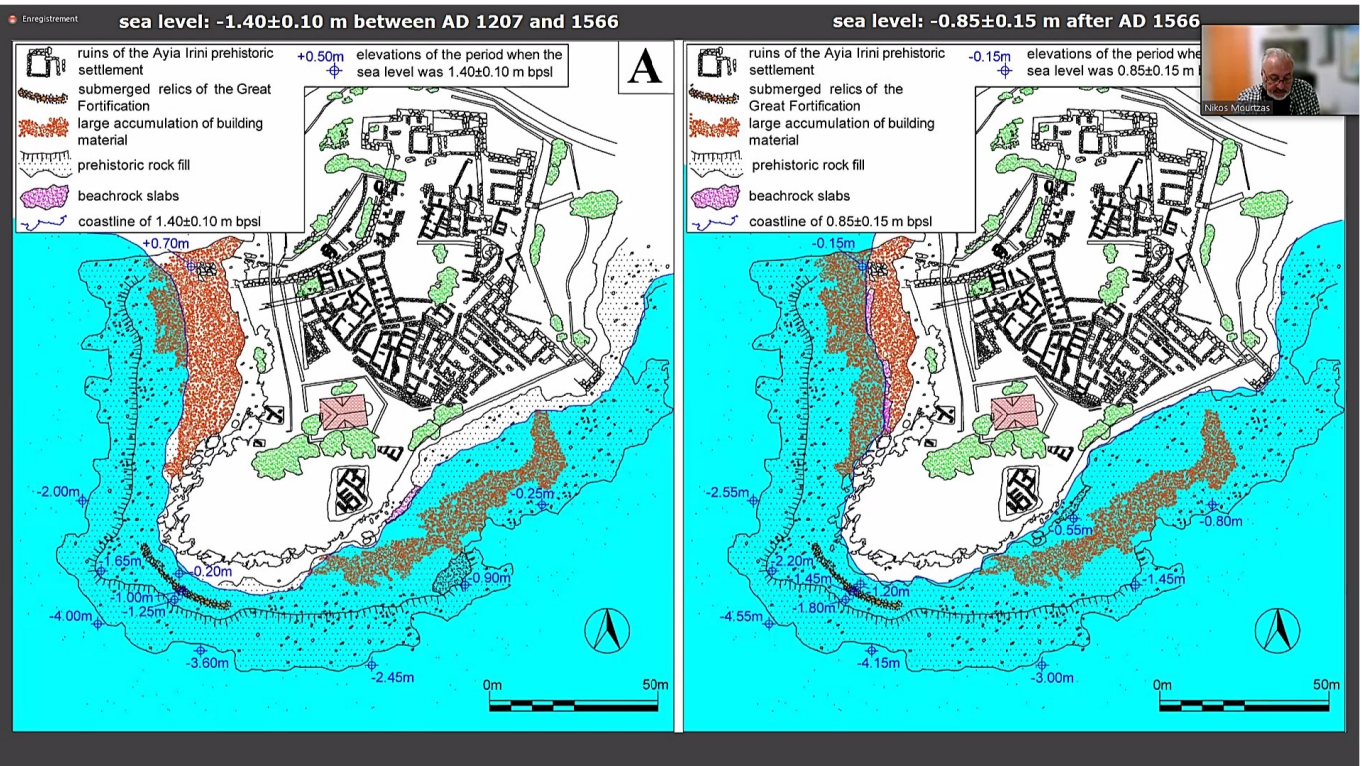
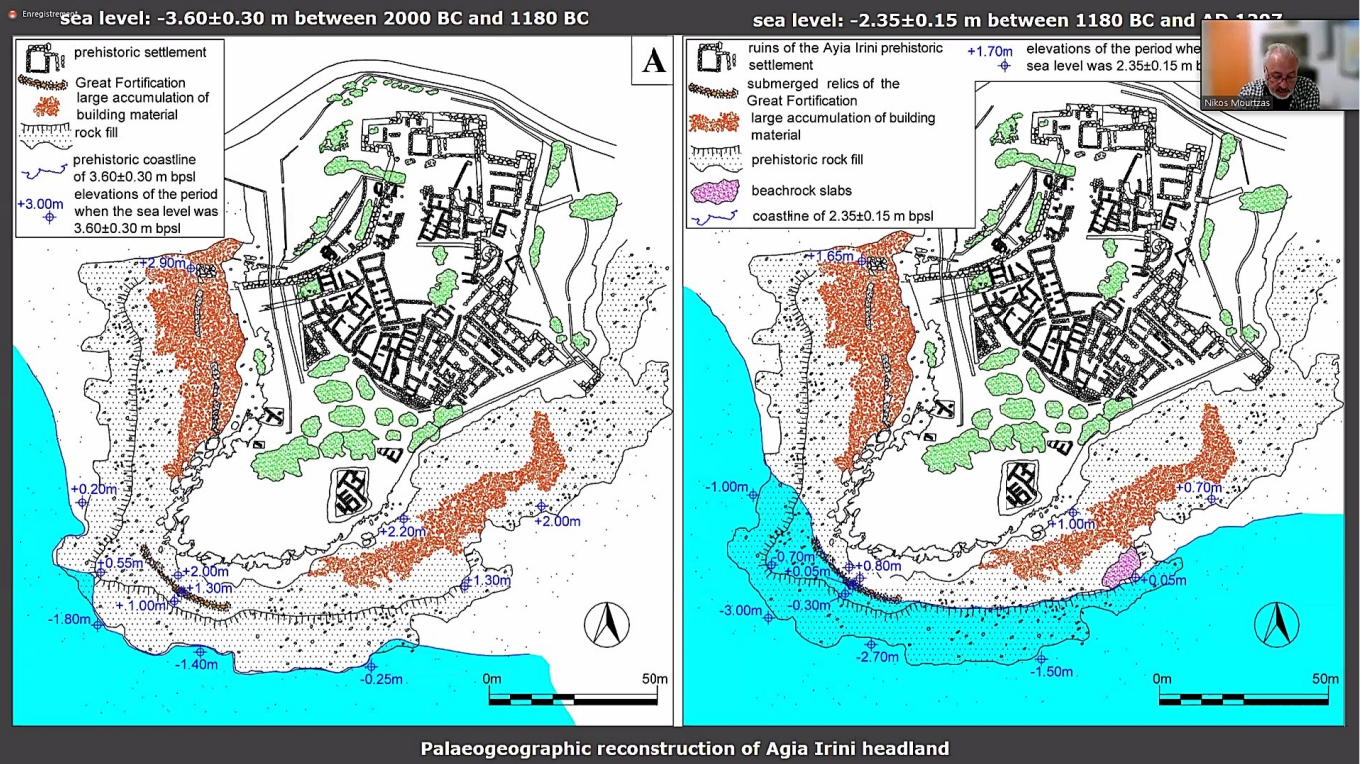


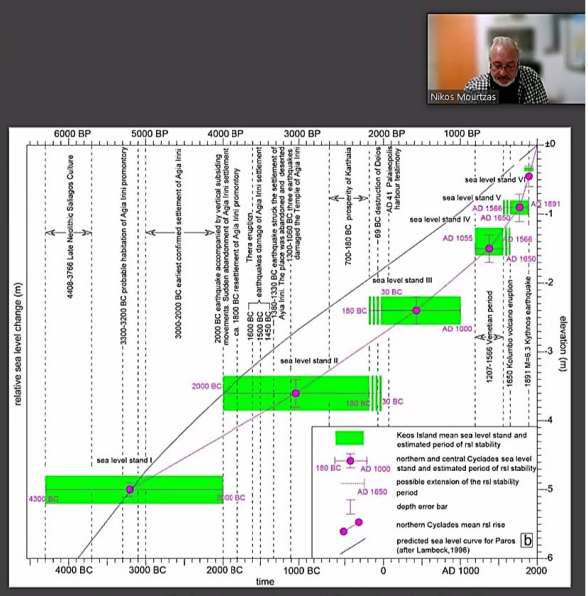
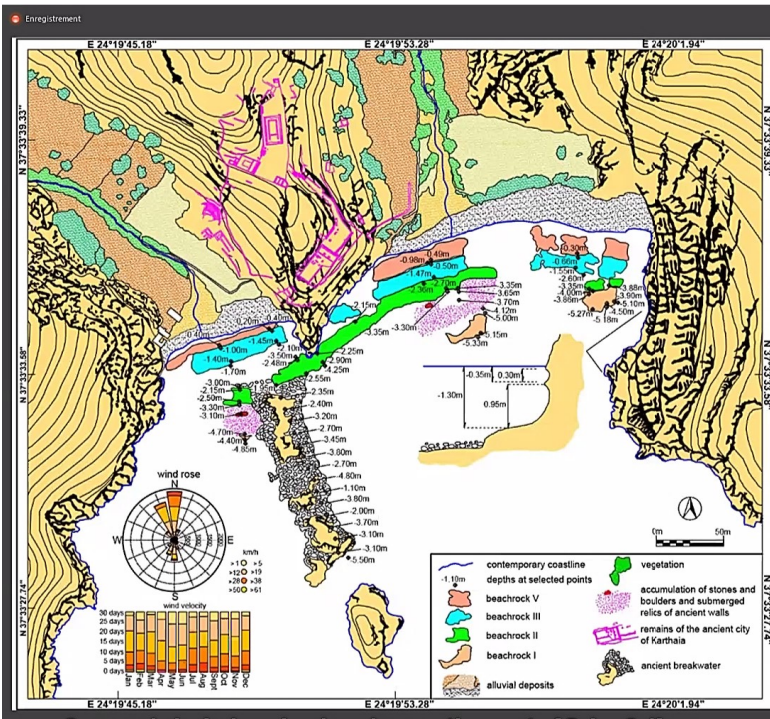
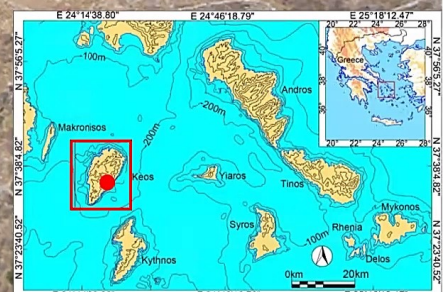
Plan and cross section of the Middle Bronze Age Temple (after Caskey, 1998)

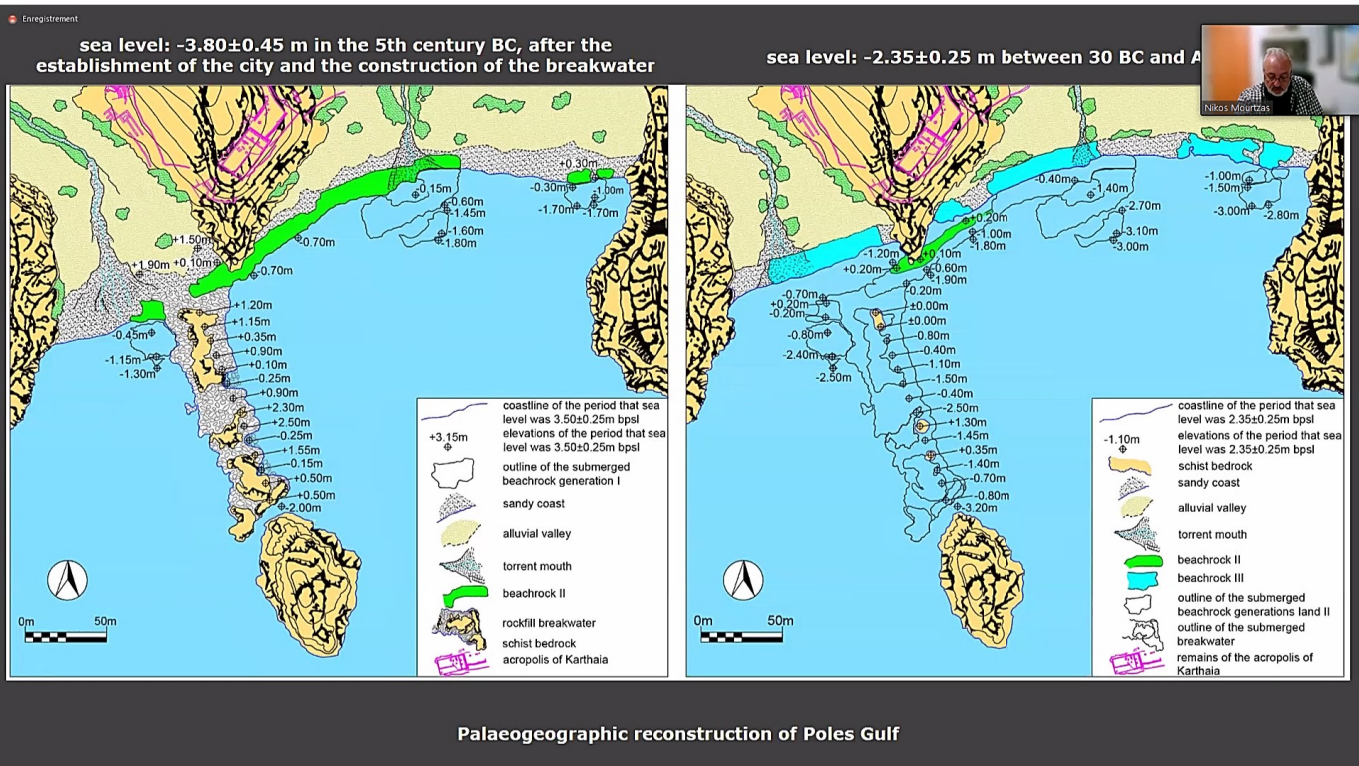
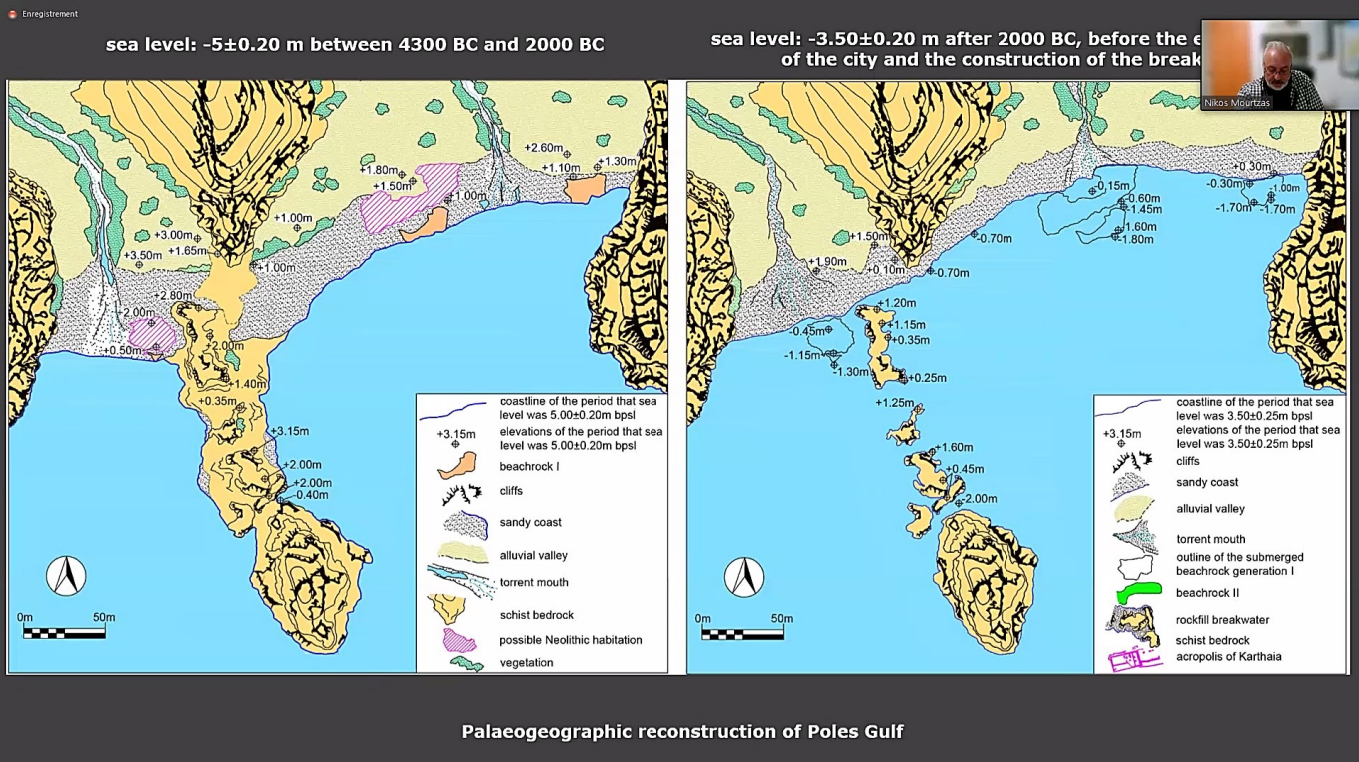


Plan and cross-section of the Spring Chamber (modified after Caskey, 1971)

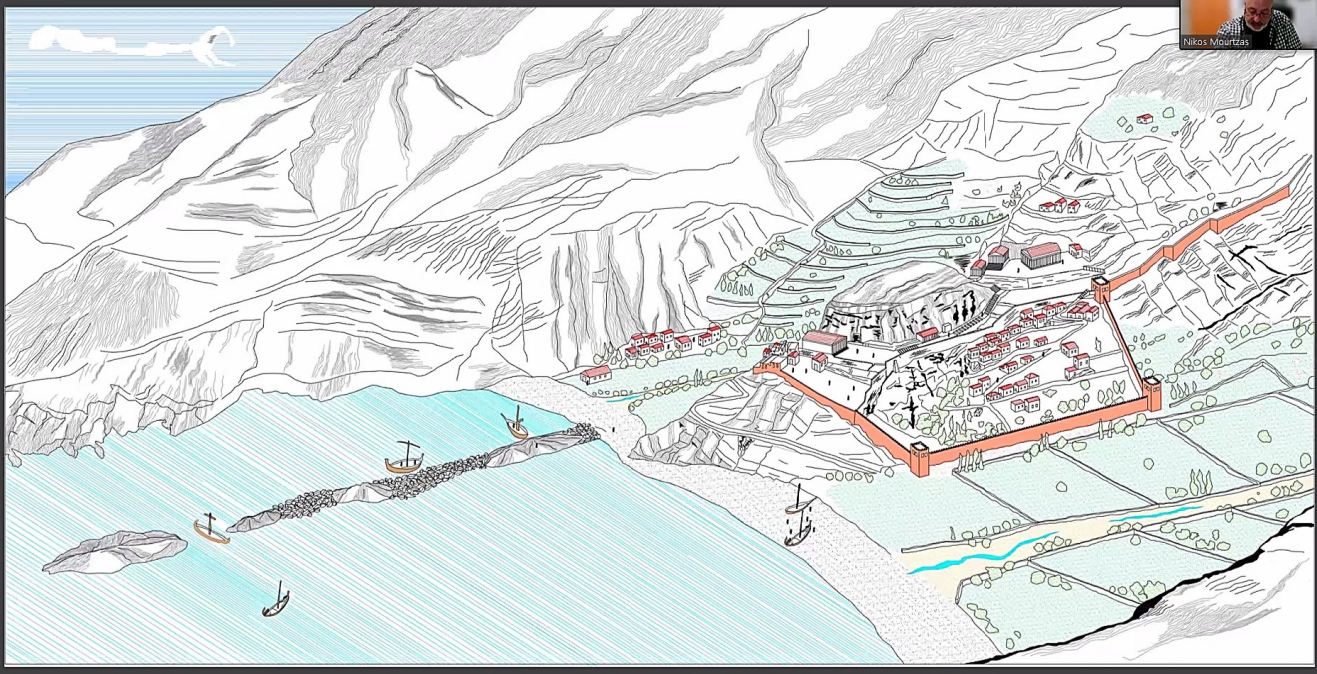








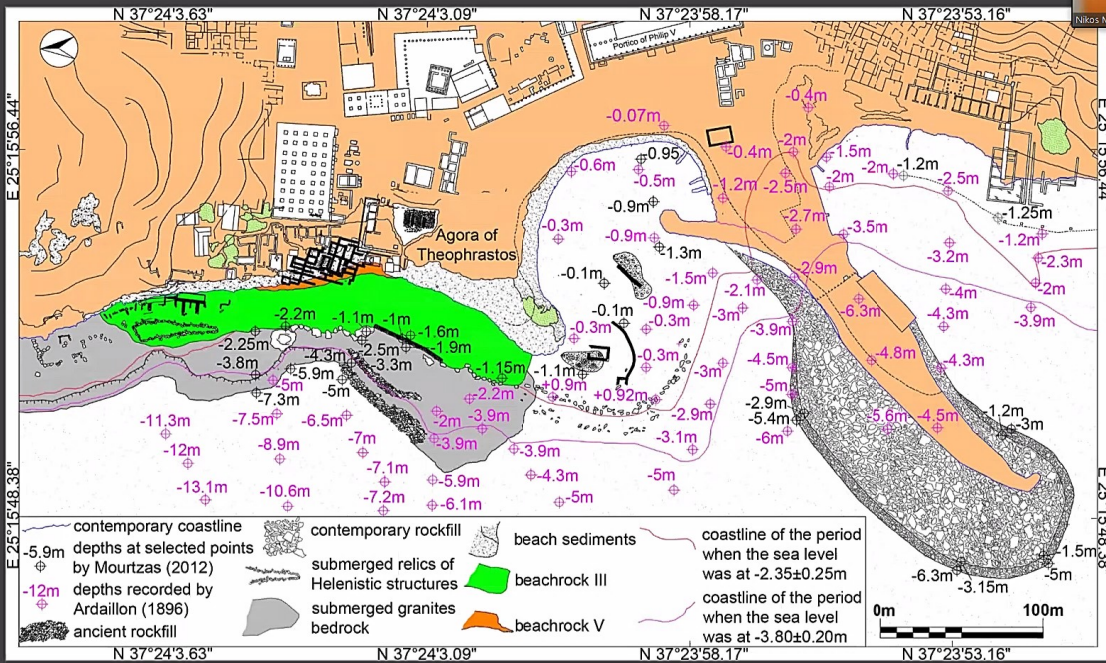
Schematic representation of ancient Karthaia and its harbour in the early 3rd century BC (modified after Papanikolaou)



Palaeogeographic reconstruction of the seafront of the ancient city of Delos



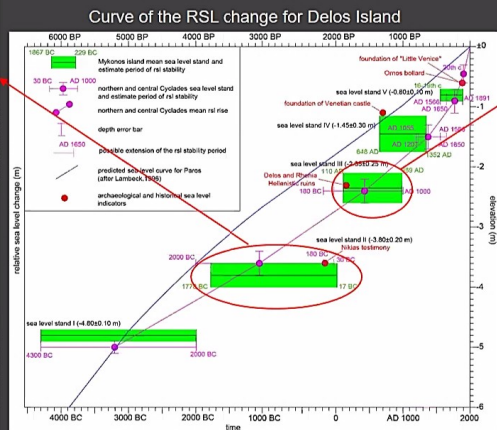
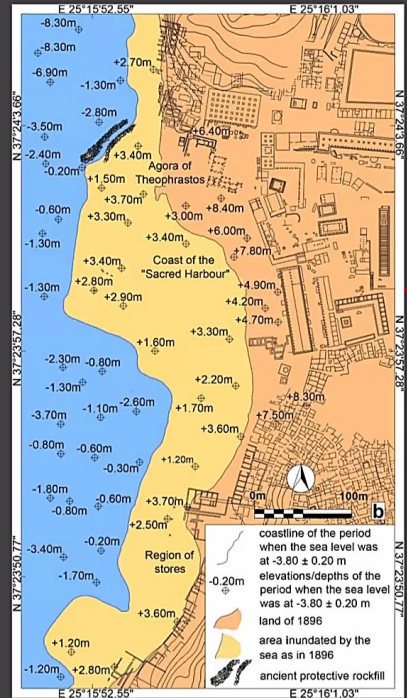
Location map of the various geomorphological and archaeological markers on the seafront of ancient Delos



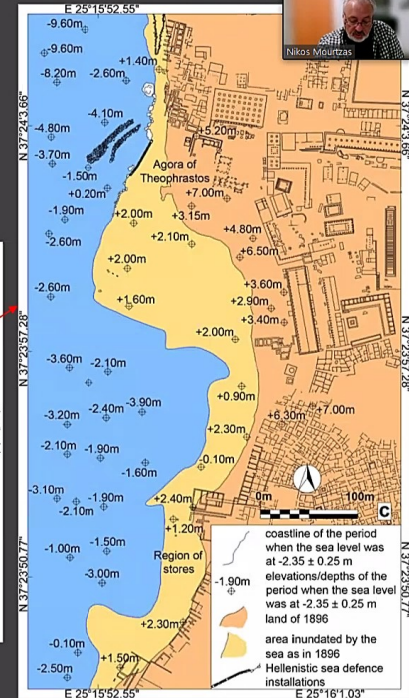
Palaeogeographic reconstruction of the seafront of ancient Delos



Sea level: -3.80 ± 0.20 m between 2000 BC and 30 BC

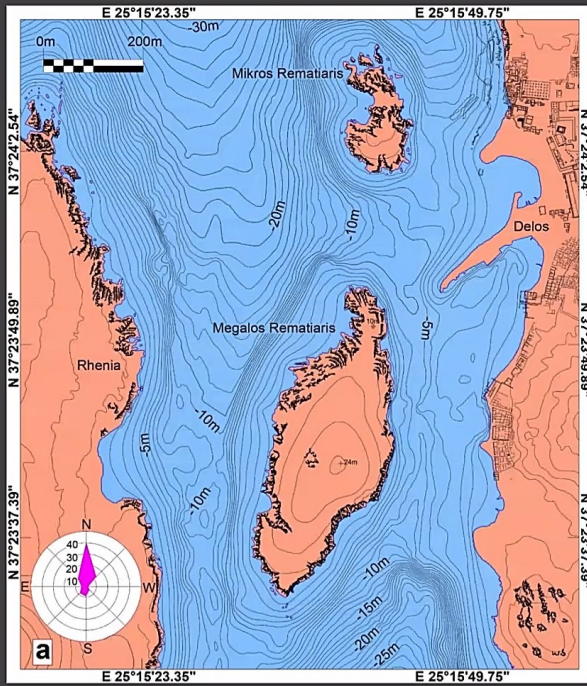


Sea level: -2.35 ± 0.25 m between 30 BC and AD 1896

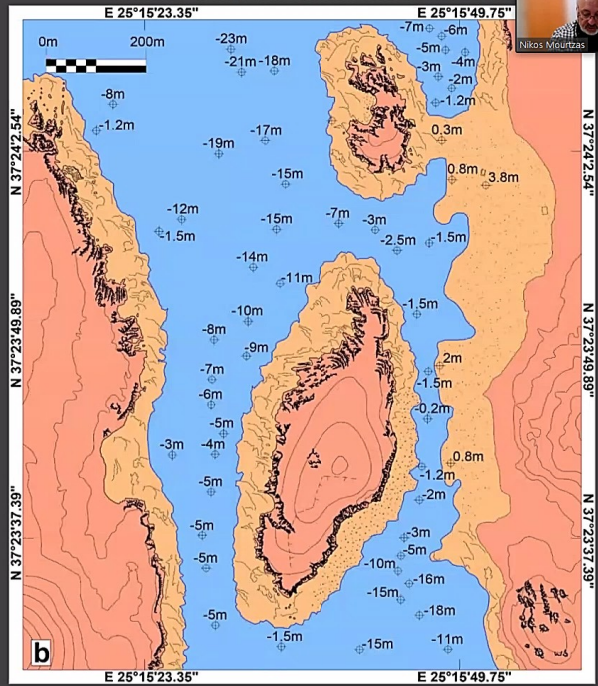


Palaeogeographic reconstruction of the strait of Delos

the strait of Delos as it now stand



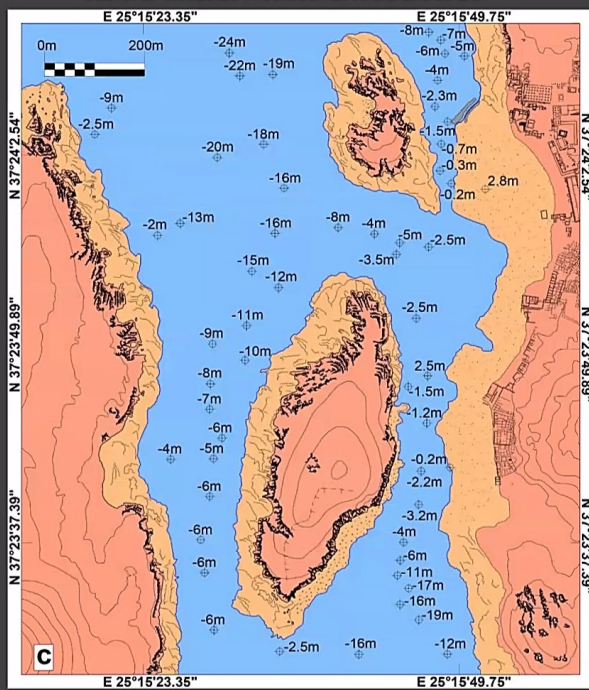
Sea level: -4.80 ± 0.10 m between 4300 BC and 2000 B



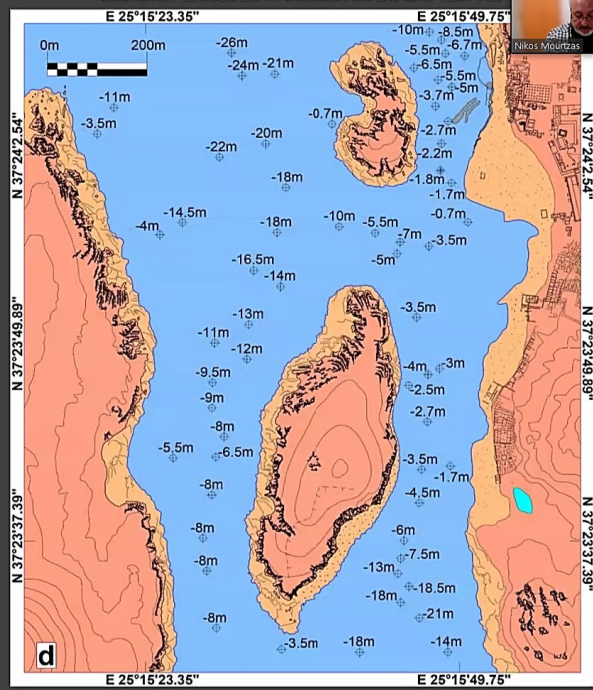
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Palaeogeographic reconstruction of the seafront of the strait of Delos

Sea level: -3.80 ± 0.20 m between 2000 BC and 30 BC



Sea level: -2.35 ± 0.25 m between 30 BC and 1207 AD



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