Geoarchaeological indicators of sea level change during the Roman period in Graias Gony submerged Roman harbour site between Ras Hawala and Ras Alam El-Rum areas, NW coast of Egypt Using the diagram PADM Model

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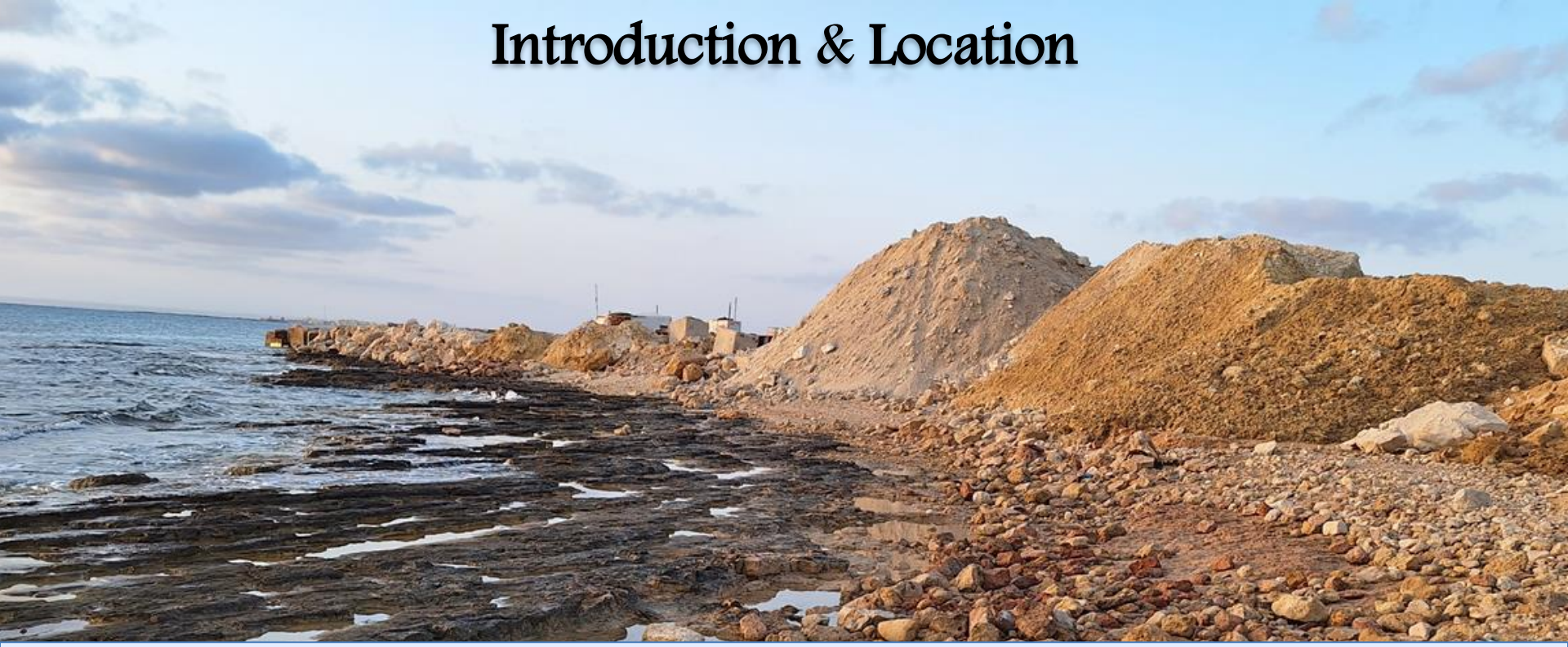
Introduction & Location



Graias Gony is submerged harbour in Ras Alam El-Rom area as a part of the NW coast of Egypt. Some geoarchaeological remains were discovered by Underwater Archaeology 20- 23rd October survey in the eastern side of Ras Alam El-Rum coastline on the NW coast of Egypt, East of Matruh city with extension about 16.9 km, SW Ras Alam El-Rom, in the same location of the above submerged harbours were described by another early writers. The authors discovered Roman Anchor in the western coast of Ras Alam El-Rum, which it cut from submerged platform by Paleo- tsunami waves in 365 BC.

The geomorphological characteristics were studied for all locations but the coastline were changed from the Roman period up to recent time by coastal erosion and other geomorphic processes in addition to the Holocene sea level change.

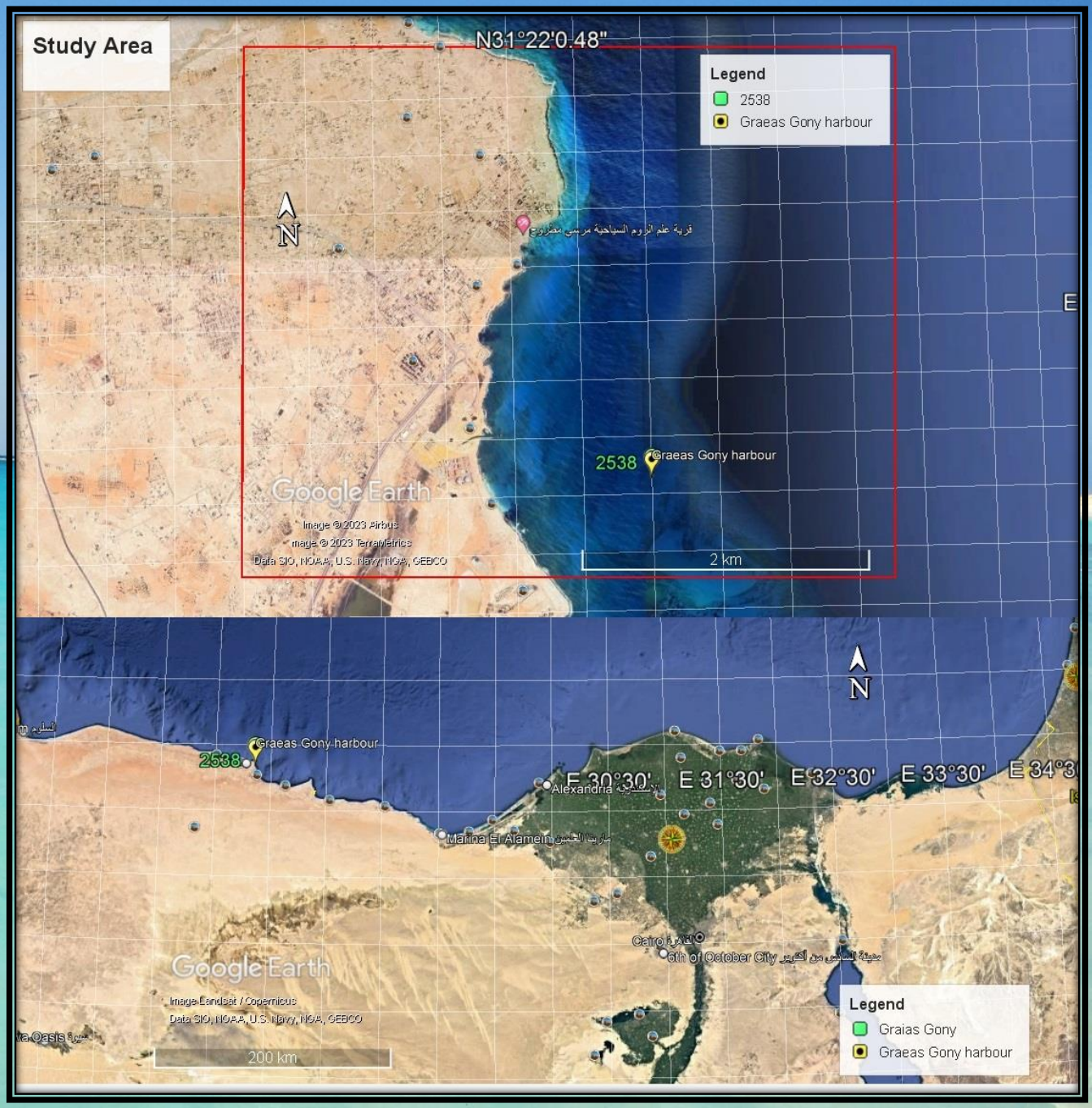
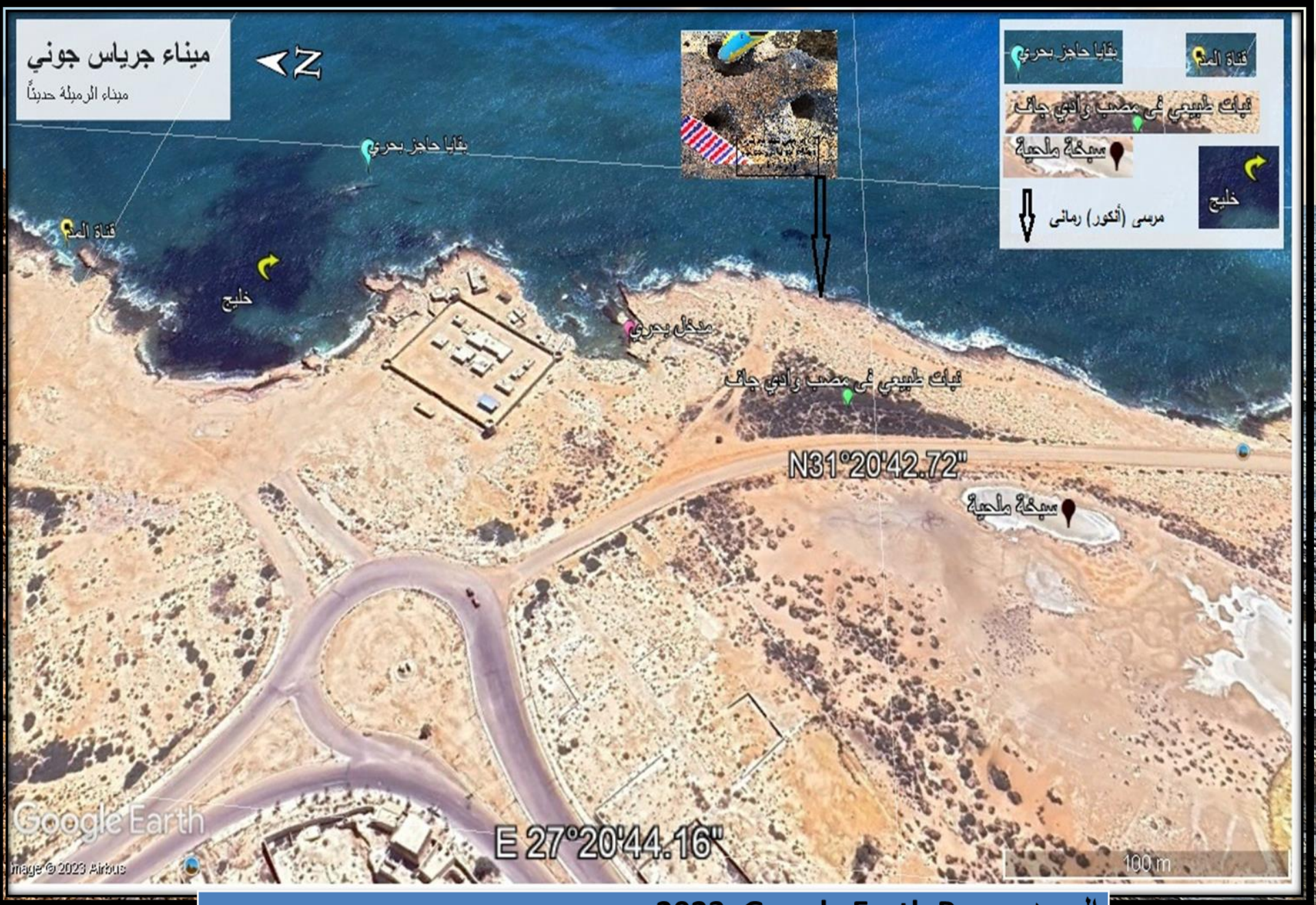


Fig (1), location of Graias Gony harbour in ancient Egypt , (Ball, 1942)

- http://www.ancientportsantiques.com/the-catalogue/egypt-libya/

It was mentioned by Claude Ptolmee, who named it the Geographer Ptolemios, in his book in the year 150 AD in a list of ports in the Mediterranean Sea (Abd El Maguid. 2001). This port is one of the largest ports located on NW coast of Egypt and was recently named Rumaila harbour in reference to the type of coastal rock deposits spread in it along with The sandy sediments diminished greatly, which prompted the Bedouins to give it this name. The researcher found clear evidence showing sea level changes in this harbour, the most important of which are Notches and submerged platforms.



المصدر: 2023, Google Earth Pro

The location of Roman Anchor and Headlands for Harbour

Objective

This study aims to define geomorphological characteristics and geo-archaeological evidence of the Graias Gony Submerged Harbour and study effect of Holocene sea level change on the study area . the western coastline consists of Pleistocene, Separated polygons of limestone sheets and fossil limestone, where there are coastal platforms, fluvial forms and solution holes . I defines remains of the ancient breakwaters of the harbour.

Fig (5) : Archeology Remains accumulated by waves on the beach

Geo-archaeological indicators

- the most important of which are Notches and submerged platforms. I studied the geomorphological characteristics for their location, noting that coastal erosion, other geomorphic processes, and the Holocene Sea level change have altered the coastline from the Greek and Roman periods to the present. Alternating Quaternary limestone, part of an eroded carbonate coastal ridge, occupies the study area. We observed geomorphic coastal landforms along the shore, such as multi-level marine notches, platforms, and caves. These features were created at the Holocene relative sea level. We also observed solution microlandforms such as holes, channels, pits, and residual pinnacles. Sea water sculpted these features on carbonate rocks.

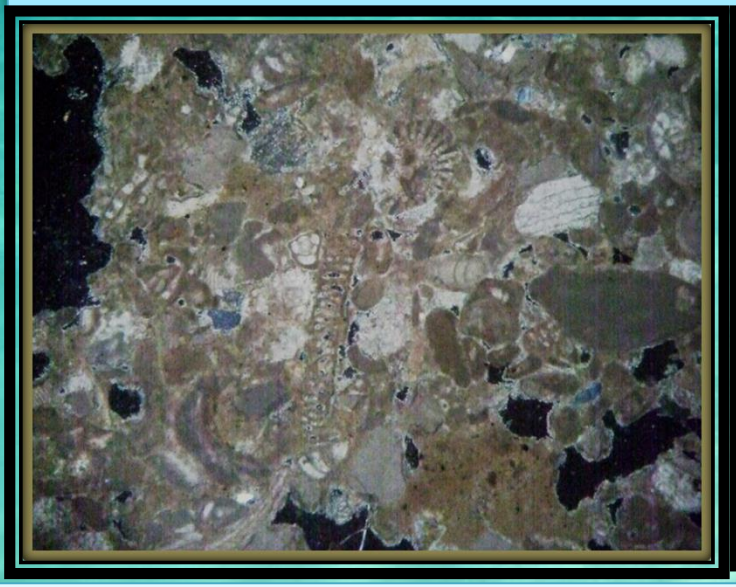
Methods

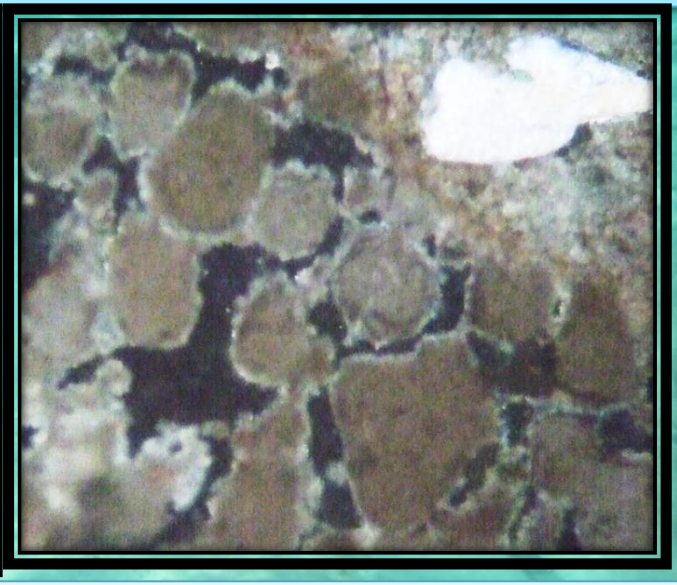
This study depends on detailed geo-archaelogical and geo-morphological surveying and mapping, coring of sediment samples, interpretation of multi-dates RS images, as well as GIS techniques

Roman Anchor, Headland and Platform in Ras Alam El Rom

Results

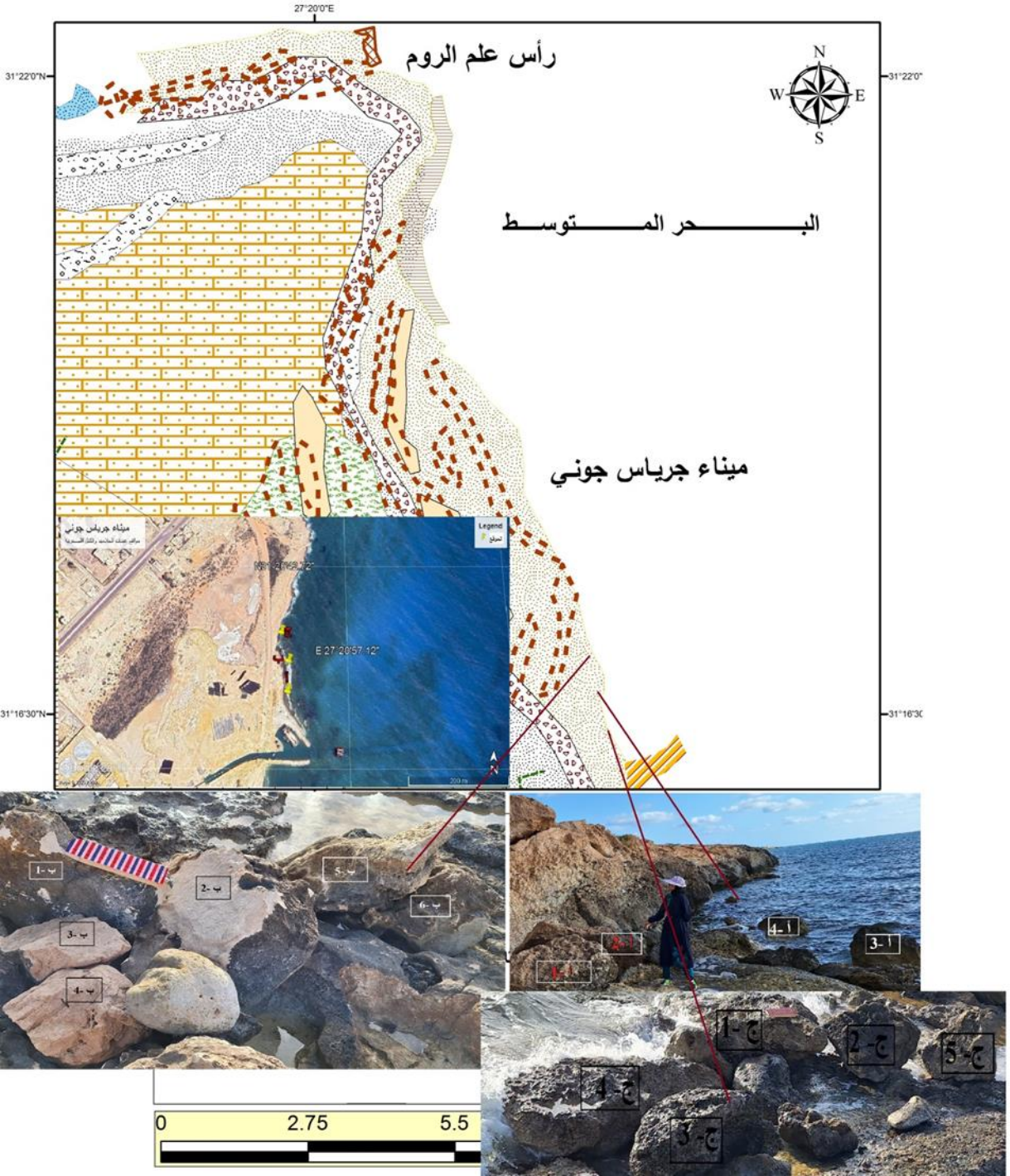
Some geo-morphological and geo-archaeological indicators were used to define the Holocene shoreline such as doing Analysis of samples to submerged plat form block the next figs and take photo to this profile and measure some platforms.



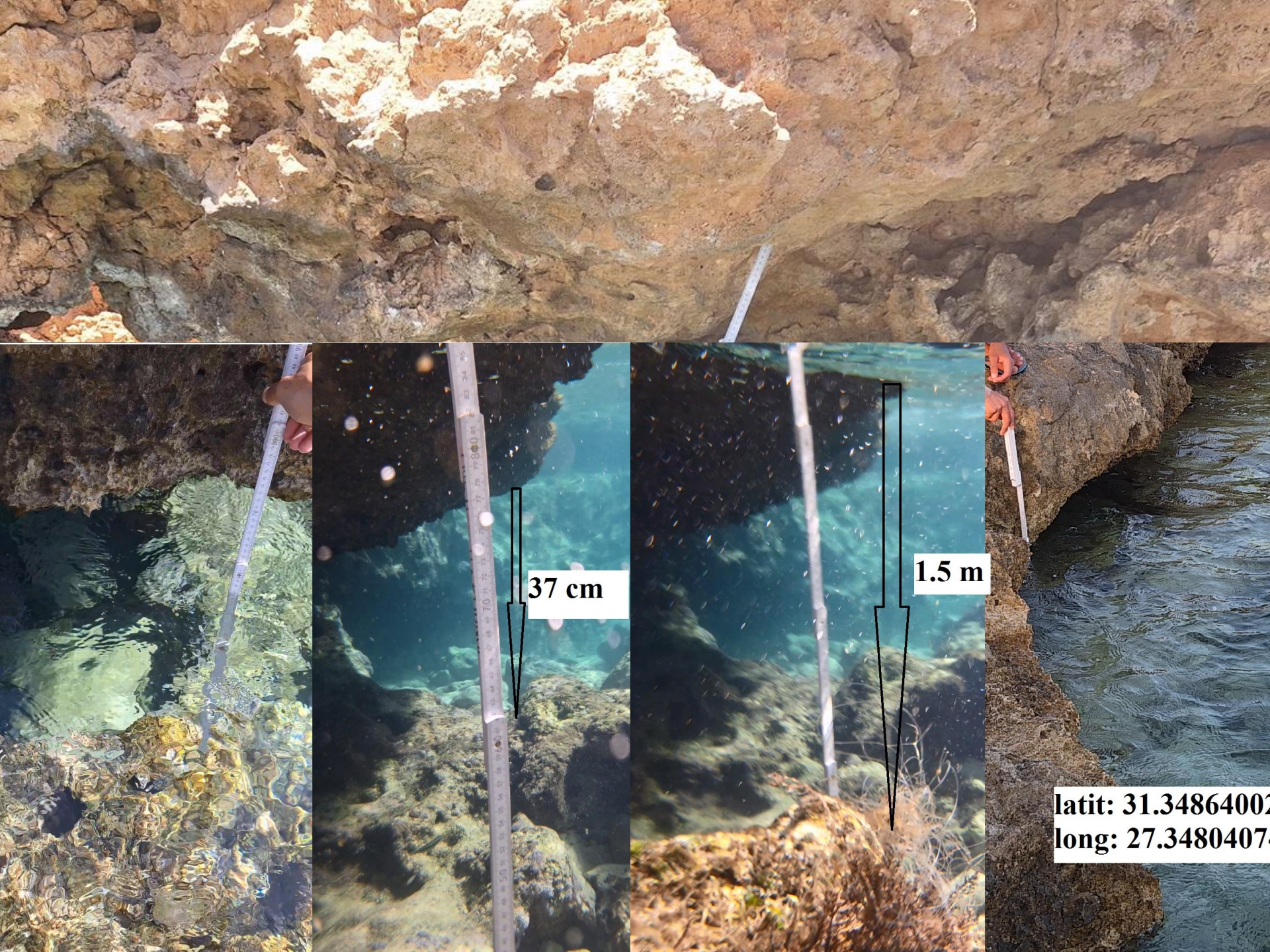


Thin section in submerged platform block

photomicrograph of the limestone showing the primary intergranular porosity(In). Note the thin film of isopachous cement coating the ooids (black arrow). Micritization of some ooid grain is also observed.



A map of the harbour of Grias Gony (Rumaila) apearing the locations of rock blocks uprooted by storm waves


37 cm
1.5 m
latit: 31.3486400
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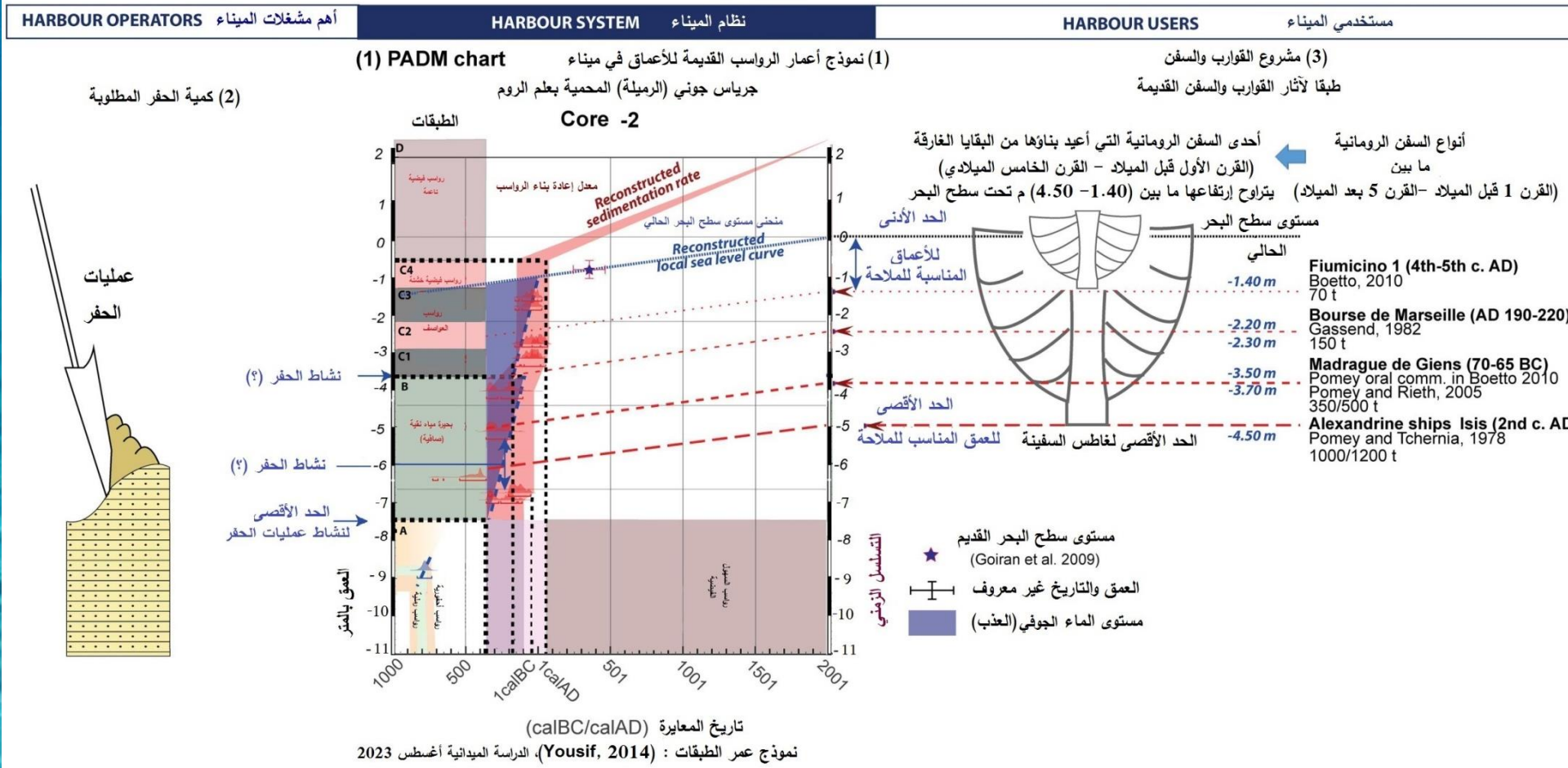


نموذج للحياة التشغيلية بحوض الميناء طبقا ونموذج PADM للتسلسل الرسوبي فى منطقة الجراولة التي تعد الظهير الخلفي لموقع ميناء جرياس جوني مع الأخذ فى الأعتبار فرضية مستوى التجريف (الحفر)القديم، ومستوى السفينة المحتملة، وربما حدثت أنشطة التجريف العميق فى الفترة ما بين القرن 3–4 ميلادياً

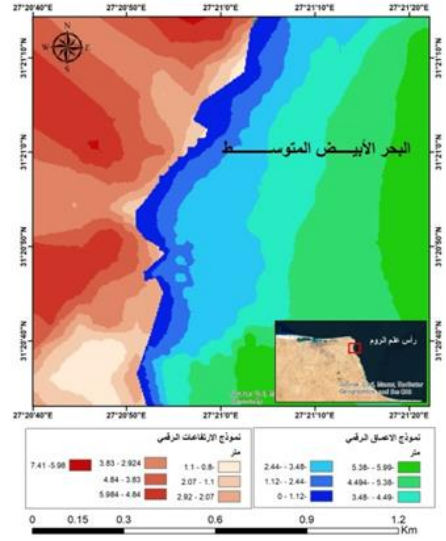
A model of the operational life of the Griyas Gony port basin according to the chronological age model (PADM) of the sedimentary sequence in the Garawla area, which is the back side of the port, taking into account the hypothesis of the old dredging level and the possible ship level.

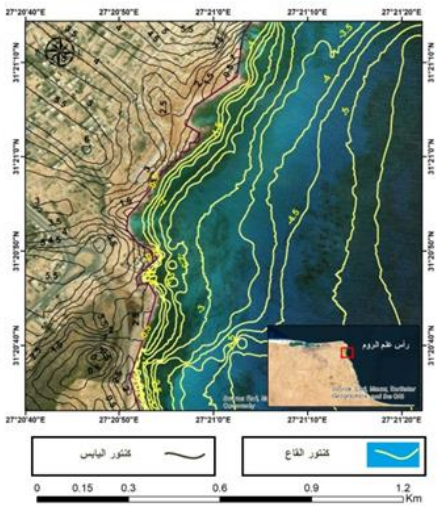
3. Conclusions

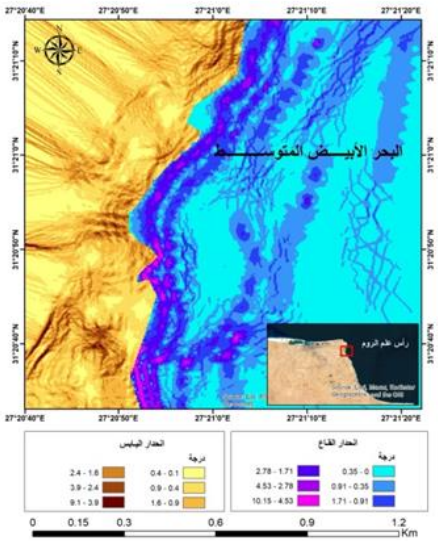
Some geo-morphological and geo-archaeological indicator have been measured in the ancient harbours site in the eastern side of Ras Alam El-Rum area. Some emerged notches and platforms ,

In addition to marine terraces and caves indicated to sea level change .

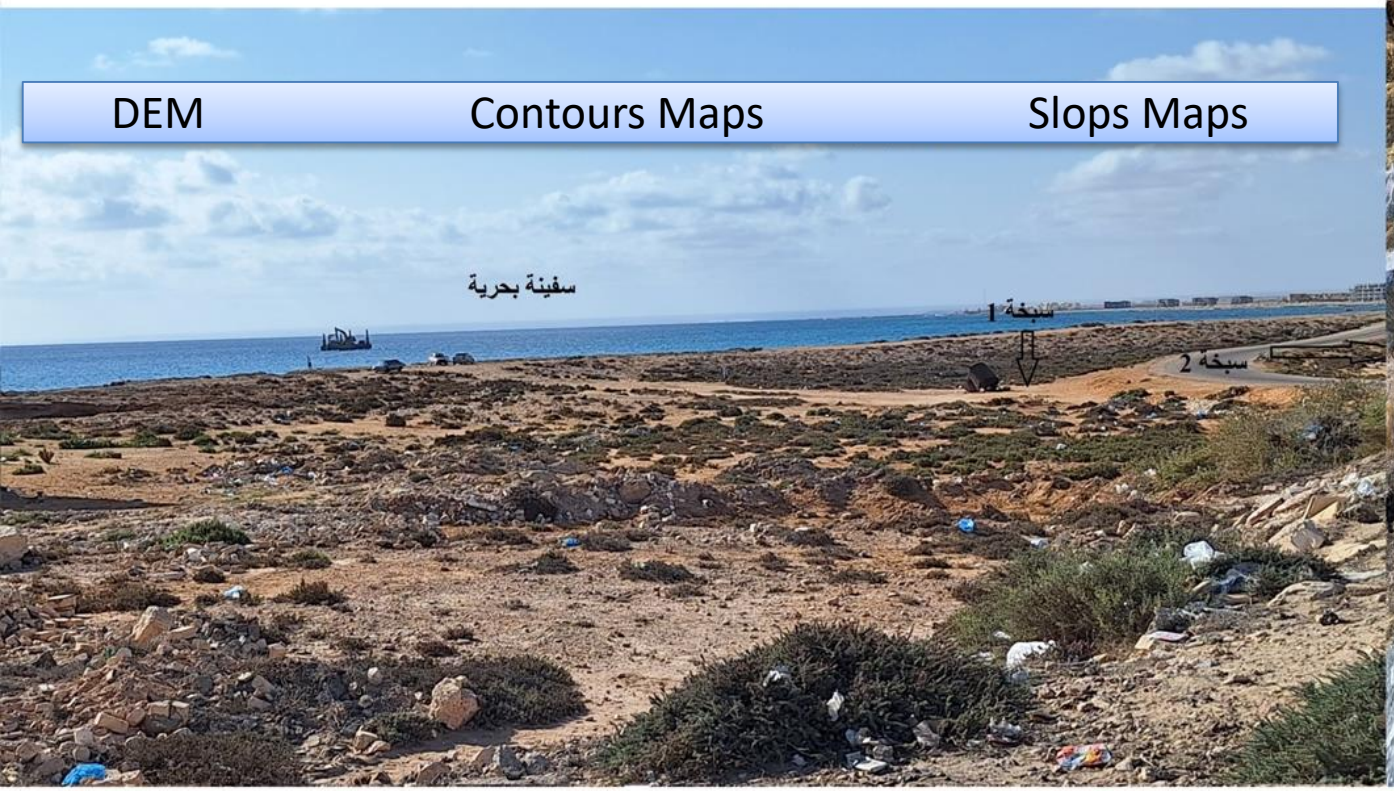
Some archaeology remains which belong to Roman perioud accumulated by waves on the beach indicated to the submerged Graias Gony harbour in those places and which it wanted on depth about 4 -5 m under water and it refers to sea level change .



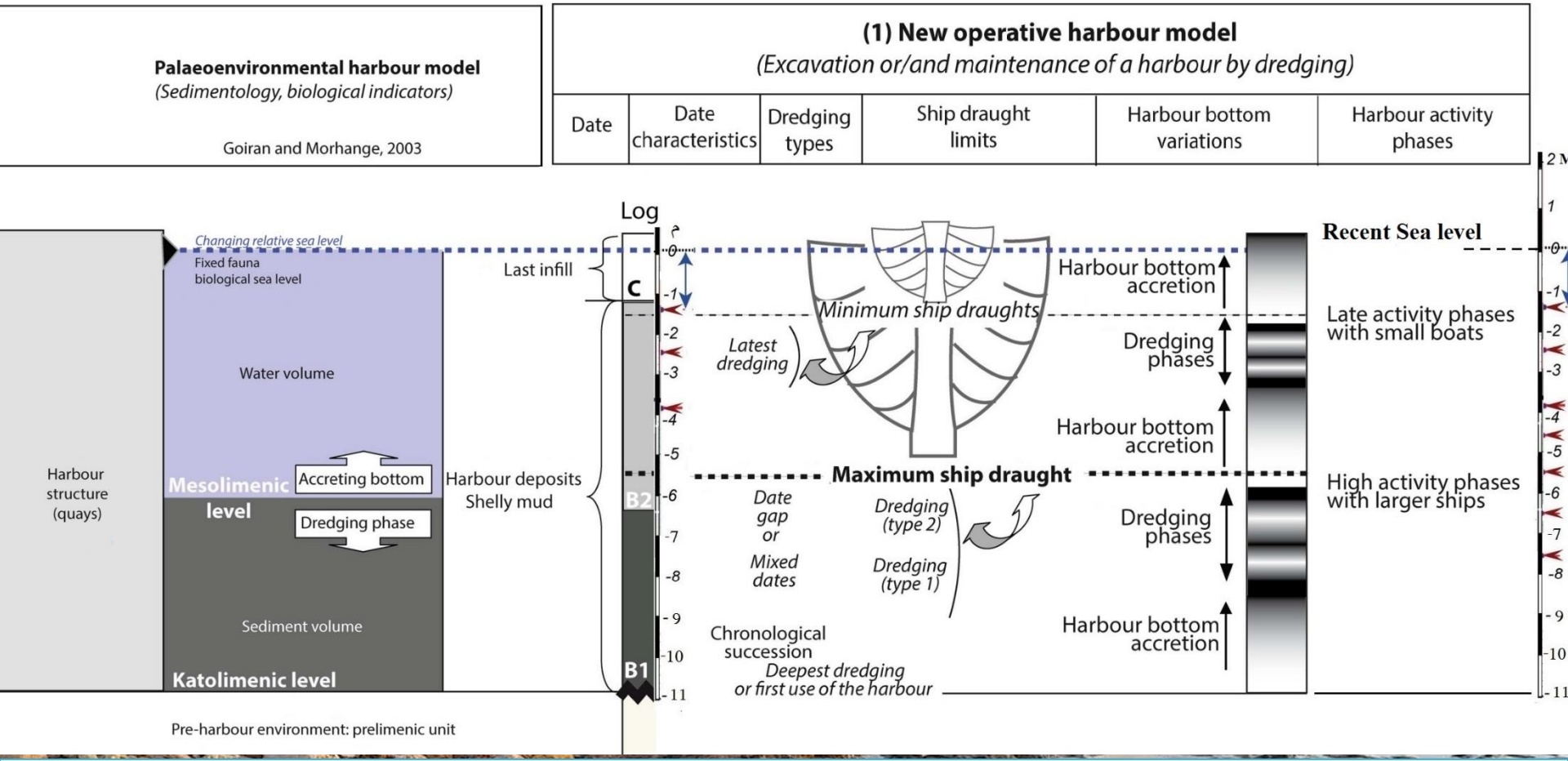




DEM Contours Maps Slops Maps



according to the results of the geomorphological assessment process, and according to the comparison model resulting from the chronological age chart of the depths, which makes this site eligible for human intervention to establish a port, and its back area necessary to serve the port, which leads to prosperity and activity in the navigation movement to become A strong navigation point once again linking Egypt to the countries of the Mediterranean basin.



Model of an operating harbour based on the PADM analyses of the harbour of Grias Gony . The left side of the figure shows the harbour from a palaeoenvironmental perspective. The right side shows the harbour sedimentation in a new interdisciplinary perspective, including data from recent ship and boat.

However, the correlation of different core sequences is needed for a reconstruction of the accessibility of the harbour and a general understanding of its potential through time. The PADM makes diachronic perspectives of this model possible.

- **Ball, J.(1942), Egypt in the Classical Geographers, Ministry of Finance of Egypt, Government Press, Bulaq, Cairo.**
- **Fourtau, R., (1914), La côte de la Marmariqued'après les anciens géographesgrecs, Bulletin de l'Institutd'Egypte (8): 100-126.**
- **Salomon. F, Keay. S , Carayon. N, e Goiran. J. P, 2016, The Development and Characteristics of Ancient Harbours—Applyingthe PADM Chart to the Case Studies of Ostia and Portus, PLOS ONE | DOI:10.1371/journal.pone.0162587, p. 1-23.**