

**The Roman rock-cut fish tanks of Crete (Greece):
impressive monuments of construction technique and accurate
indicators of relative sea level change.**

Dr Nikos Mourtzas - Dr Eleni Kolaiti

International Workshop

**The Roman fish tanks of the Mediterranean: constraints and interpretations
for the definition of sea level changes during the last 2000 years.**

20-22 September 2022



**Città di Santa
Marinella**





Journal of Archaeological Science 39 (2012) 884–895



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Journal of Archaeological Science

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Archaeological indicators for sea level change and coastal neotectonic deformation: the submerged Roman fish tanks of the gulf of Matala, Crete, Greece

N.D. Mourtzas*

16-18 Kefallinias Str., GR-15231 Chalandri, Athens, Greece

Journal of Archaeological Science 39 (2012) 2392–2408



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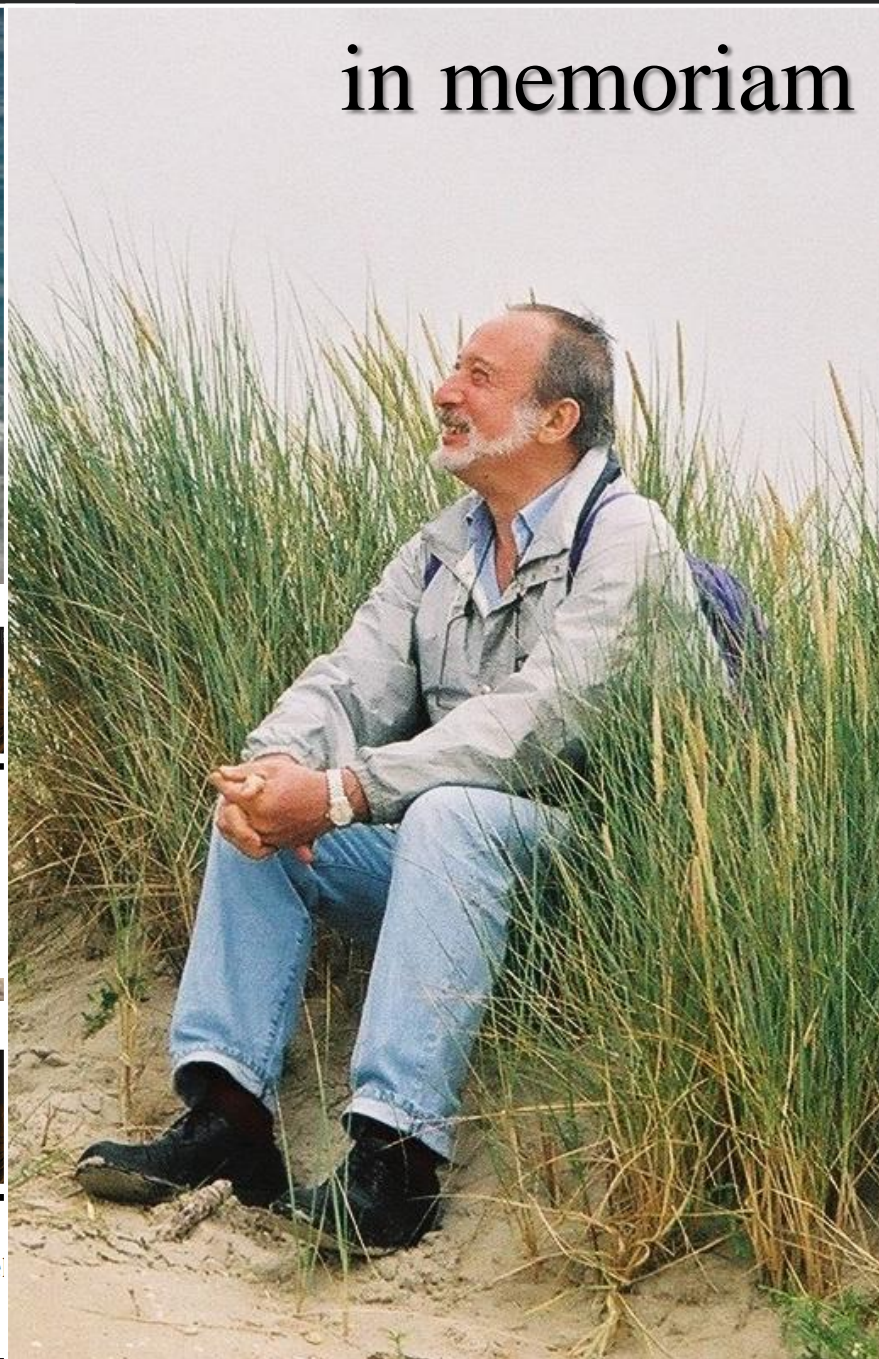
journal homepage: <http://www.elsevier.com/locate/jas>

Fish tanks of eastern Crete (Greece) as indicators of the Roman sea level

N.D. Mourtzas*

16-18 Kefallinias str., GR-15231 Chalandri, Athens, Greece

in memoriam



11-606

d by a remarkable study of the Roman fish tanks at N. Mourtzas attempts a critical review of previous e and provides a geological interpretation that lts (a single tectonic block at least 150 km long e Roman times) the complicated and often unclear as and models.

terpretations deduced from archaeological data, el. Its content is clearly intelligible from the abstract

that contains also, as Methods of investigation, some pterpretations. Such criticism, that duplicates in some ted mainly at the concerned sites. The stations used

probably too long to be really useful and would be ifles.

y Wegmann (2008), the datings of around. 42 or 53 ge. They might correspond to minimum ages mples that may not be sufficiently representative of

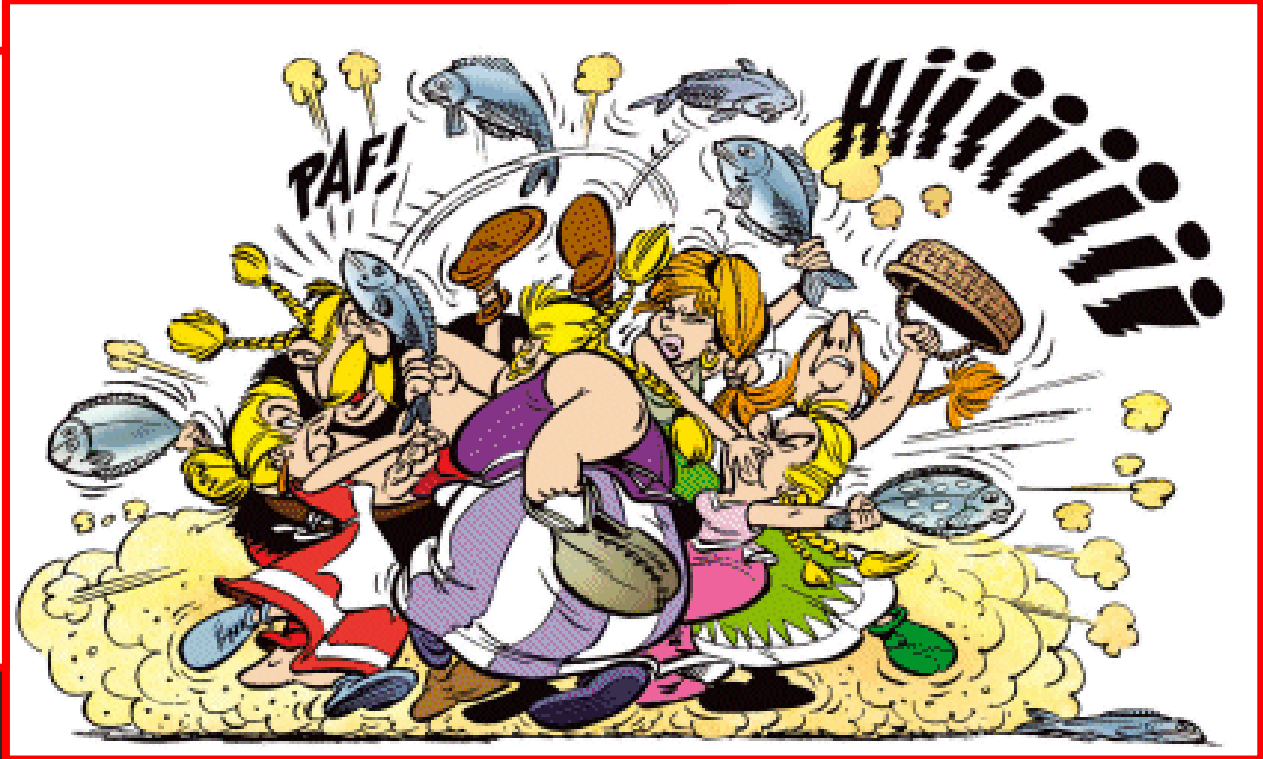
information provided is generally clearly written and basin seems however unconvincing. If the sea water inflow into the basin could be ensured only etrate into the basins. The identification by Davaras eliable sea-level indicators seem to be missing from

that sea level at Roman times in the central t should not be uncritically accepted. This assertion 10) it is suspected to be based on a revision of ertain assumptions of the Lambeck isostatic model; elpidou et al., 2012) found that the revision made by ality and that the sea-level position deduced from roximately 0.5 m below present sea level. For ding delta environment, sea-level indicators dated to -level rise of 80±10 cm since this time (Goiran et al.,

igh resolution version is downloaded) is clear and oulas, Tsoutsouras, Strongylo, Koutsounari) seems

apering published after moderate revision

P.A. Pirazzoli
Emeritus research director at the CNRS





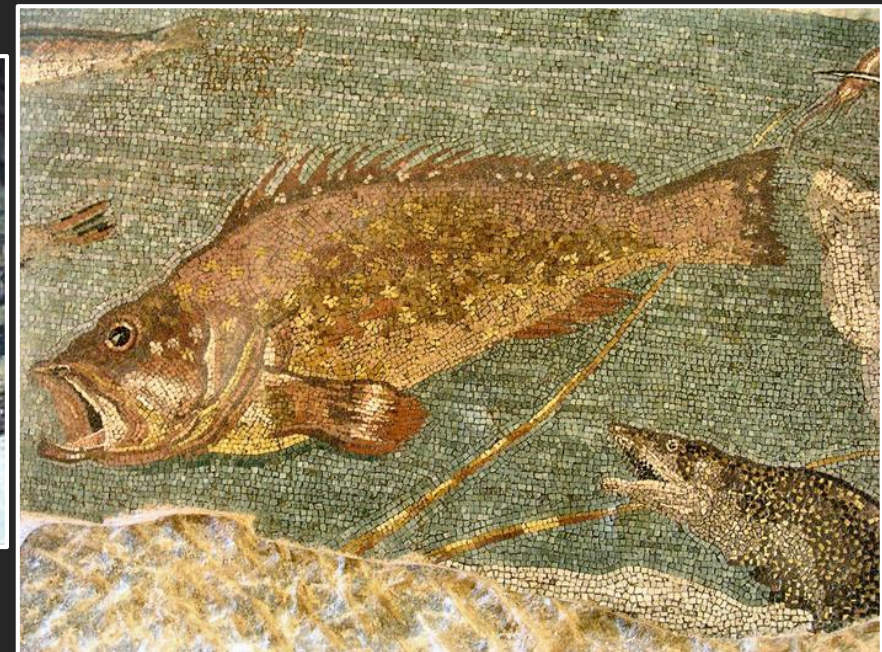
Palazzo Massimo Museo, Rome



Mosaic from Villa Dionysus in Knossos, Crete Island



Mosaics from Kos Island



Mosaic from the Roman town Emporiae

**Lampoussa (ancient Lapithos),
Turkish-occupied northern Cyprus**



Fisine (Slovenia)

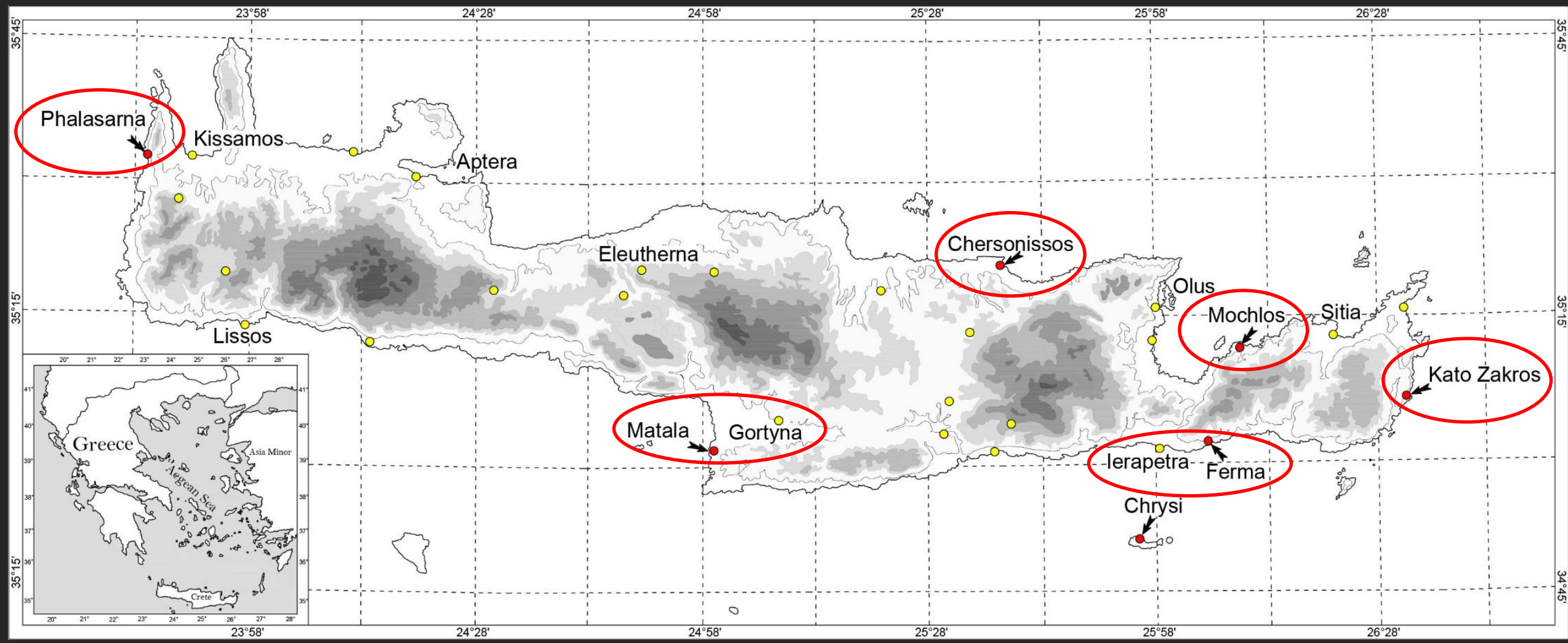


Sidi Daoud, Tunisia

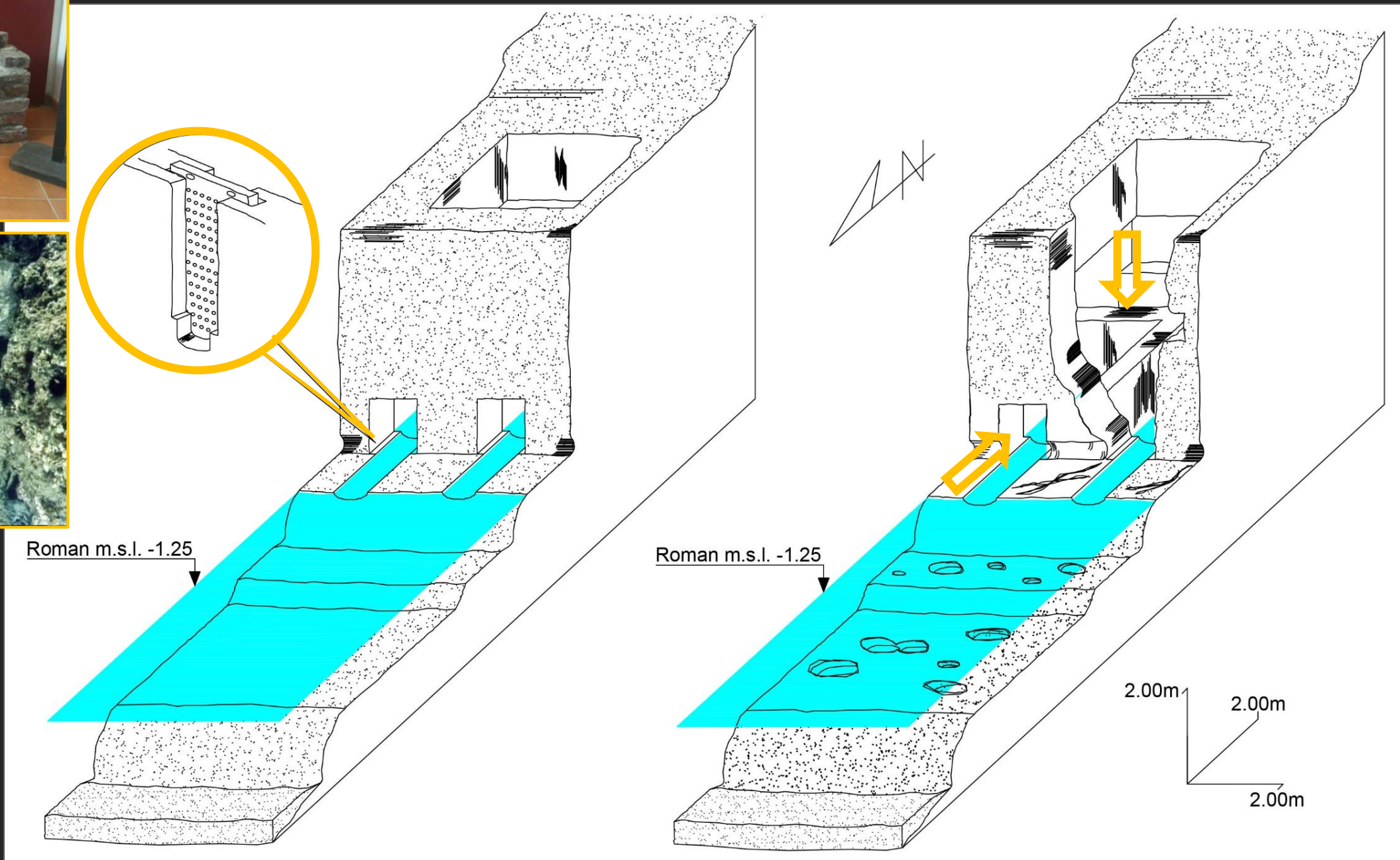


Apollonia (Libya)

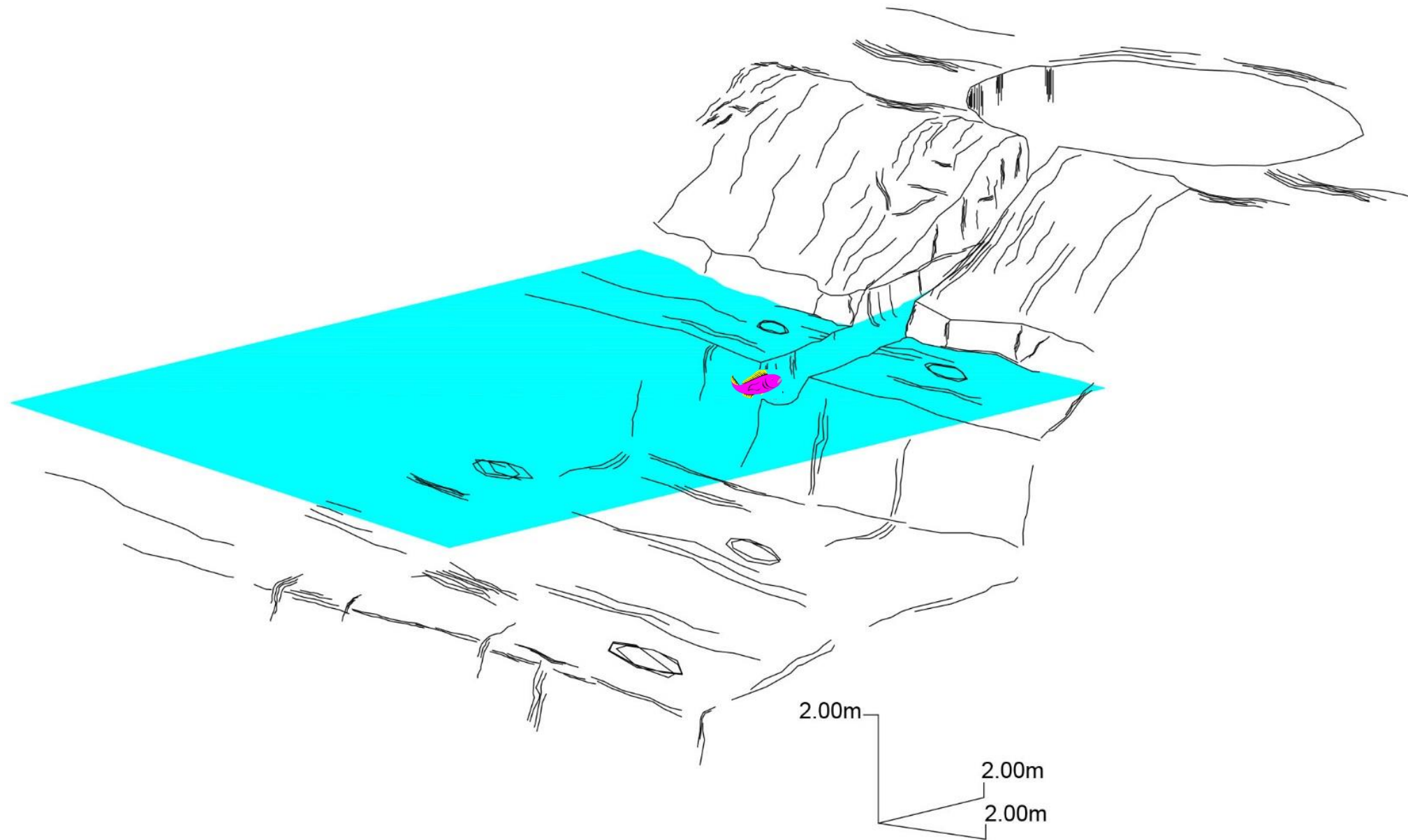


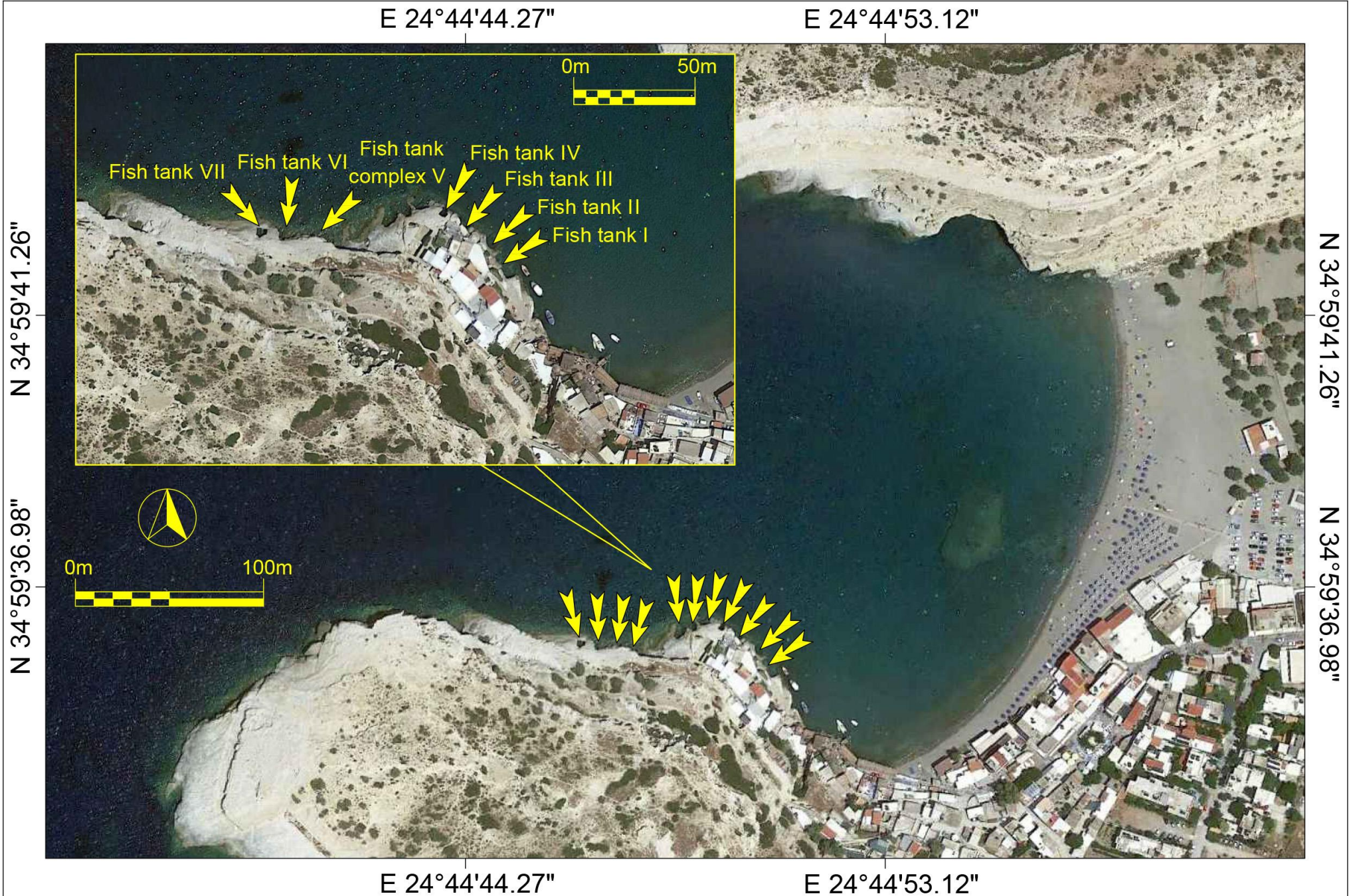


3D representation of a typical Roman fish tank in Matala, Crete



3D representation of a Roman fish trap on the coast of Matala, Crete







NOW NEVER GO!

MILKIN' CREEK

SCALA

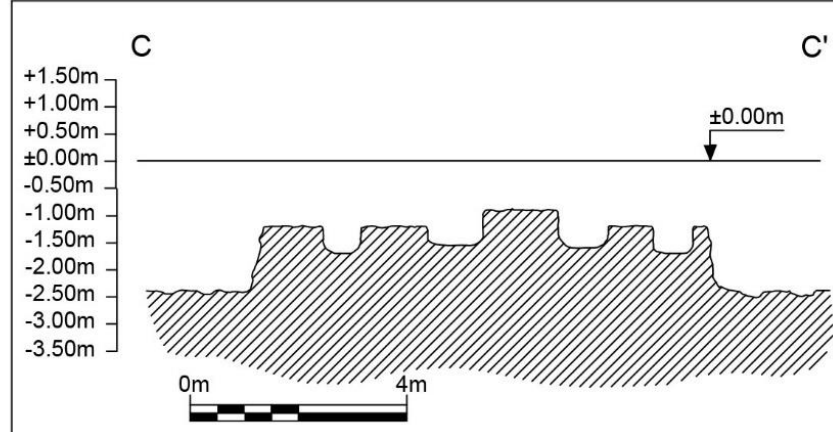
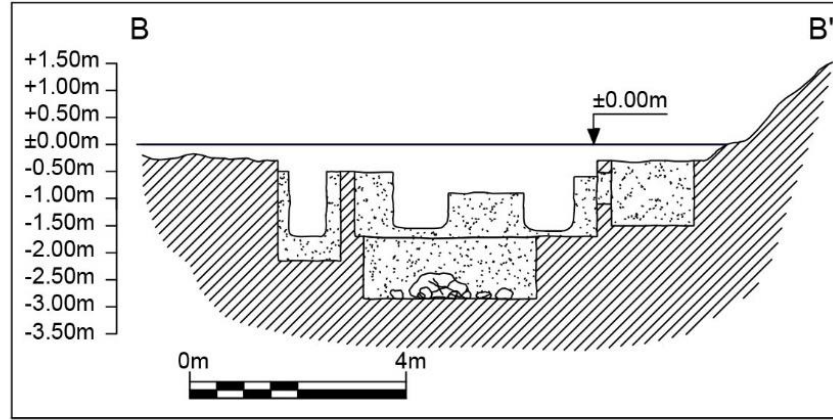
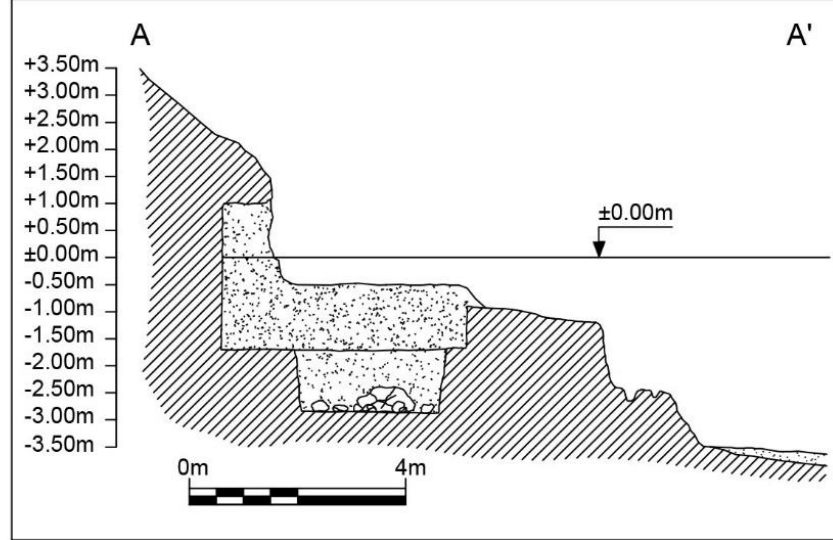
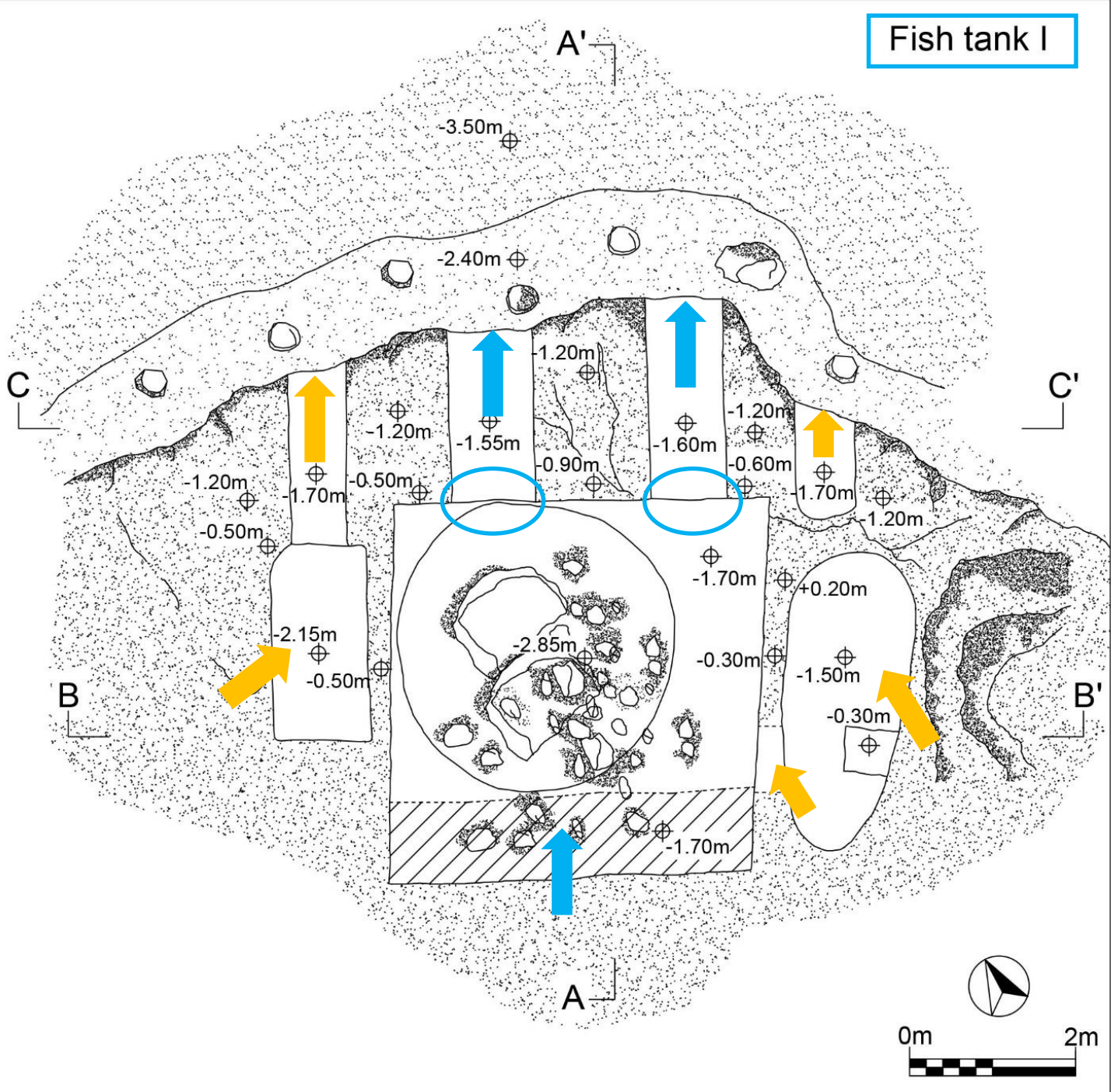
150 YEARS OF FIX
162 YEARS OF GREECE

FIX
HELLAS

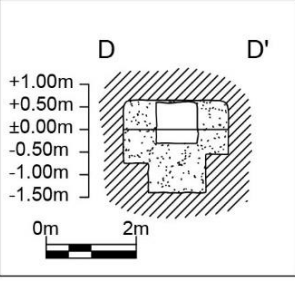
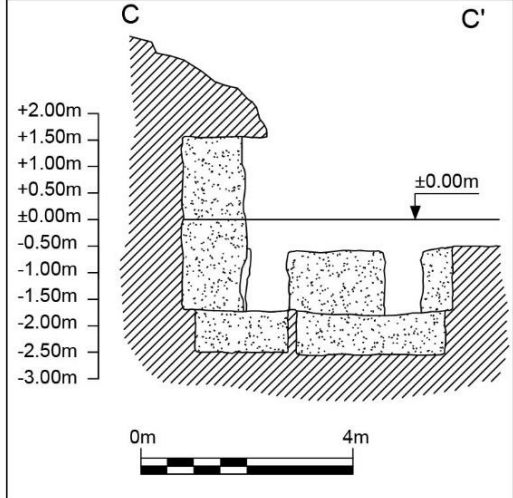
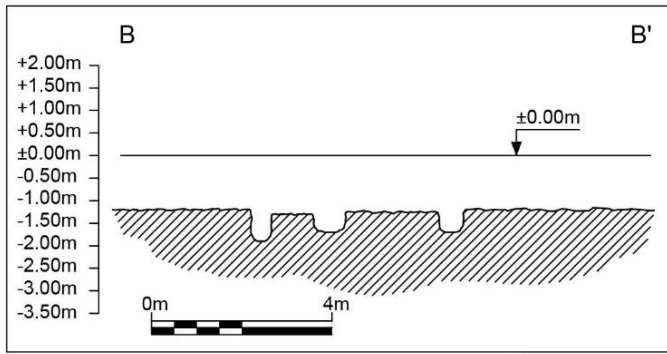
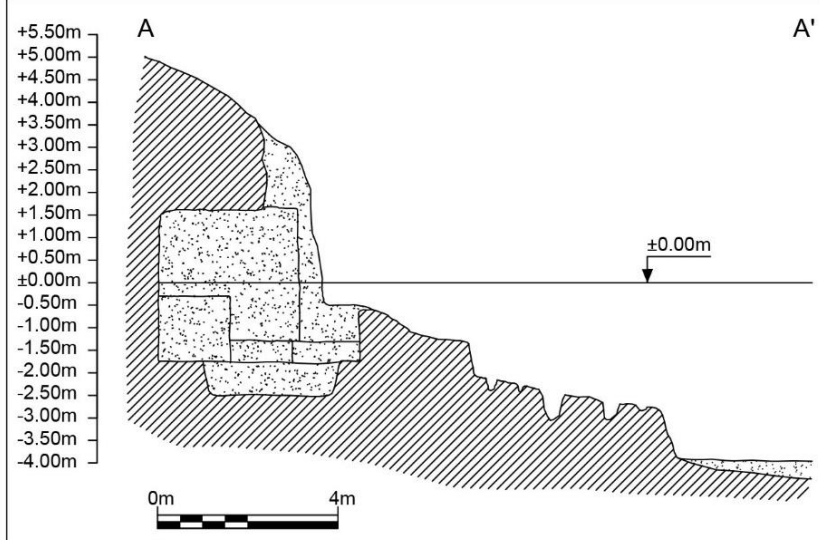
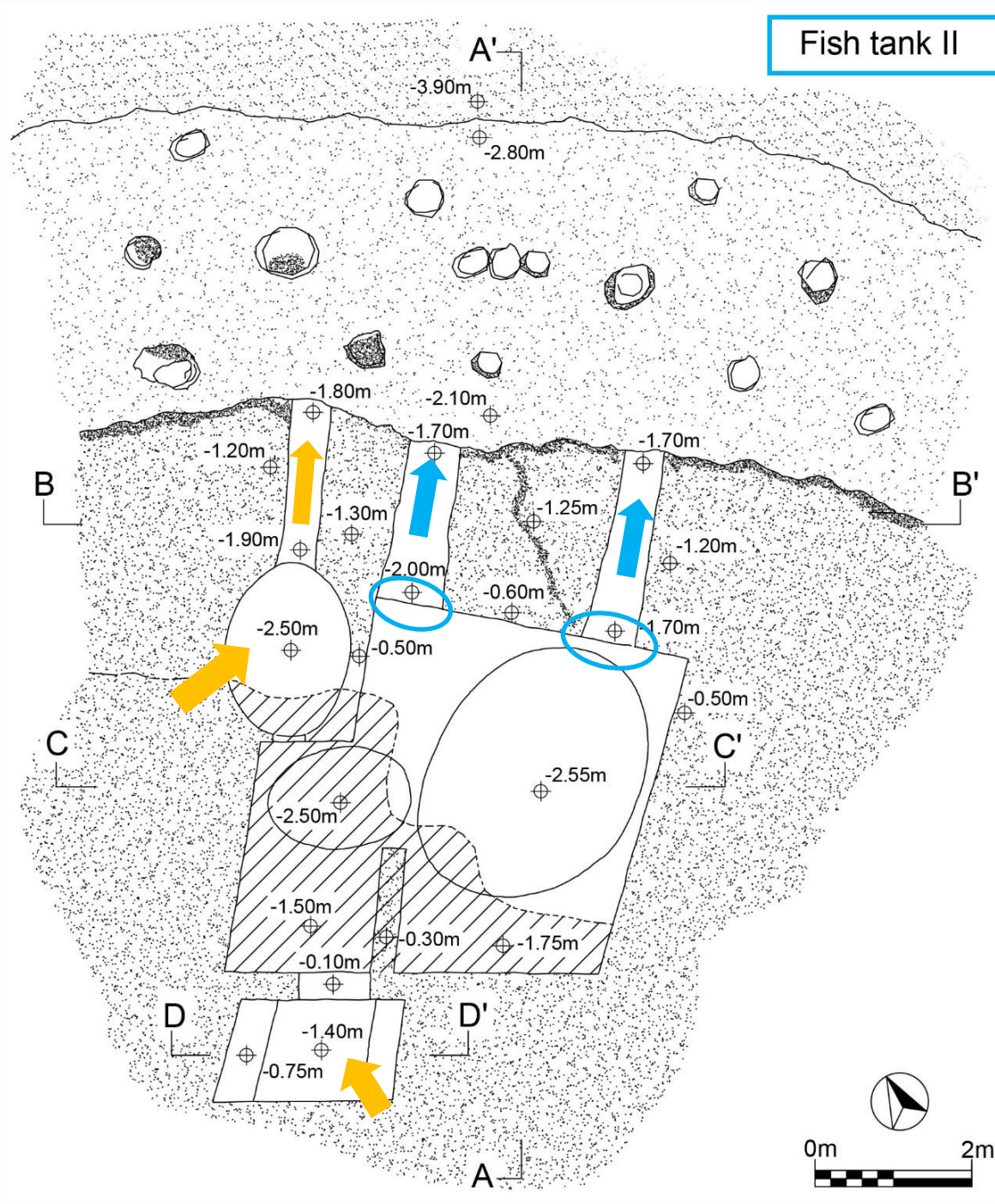
The Greek word for Beer!

SCALA
BEER

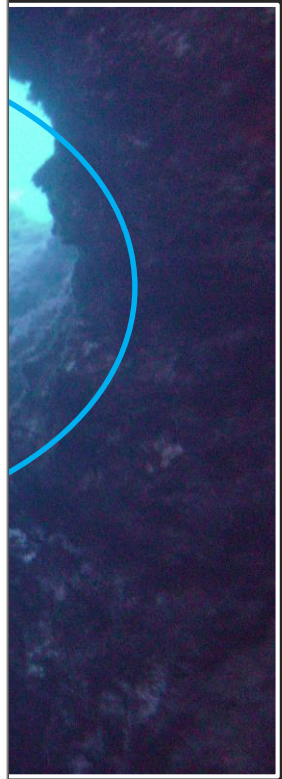
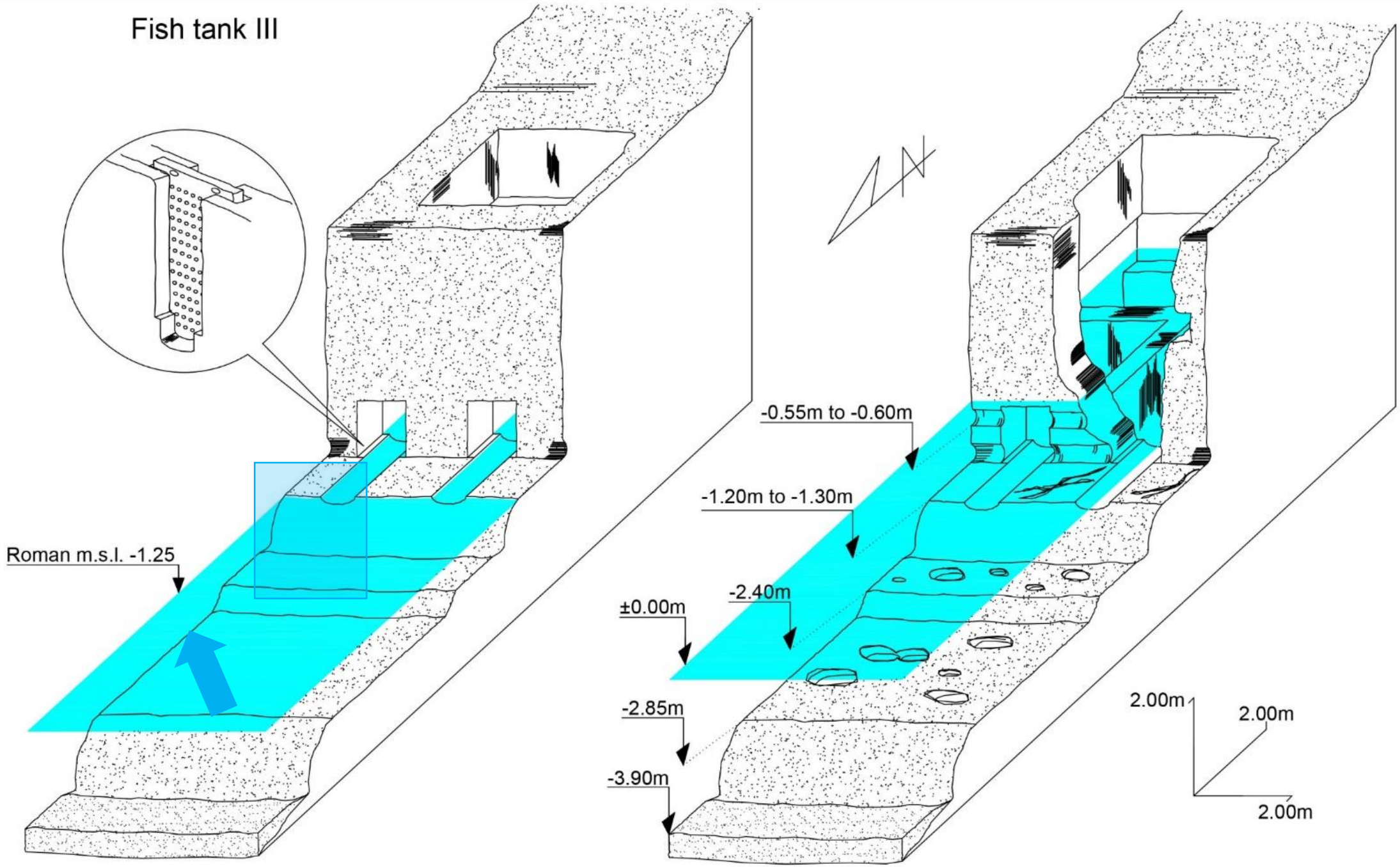
Fish tank I



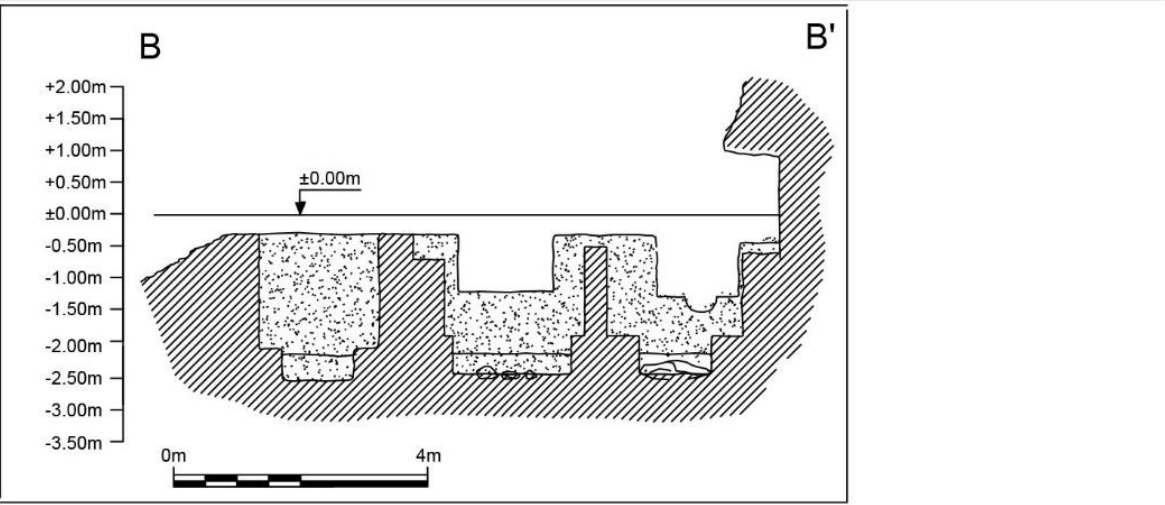
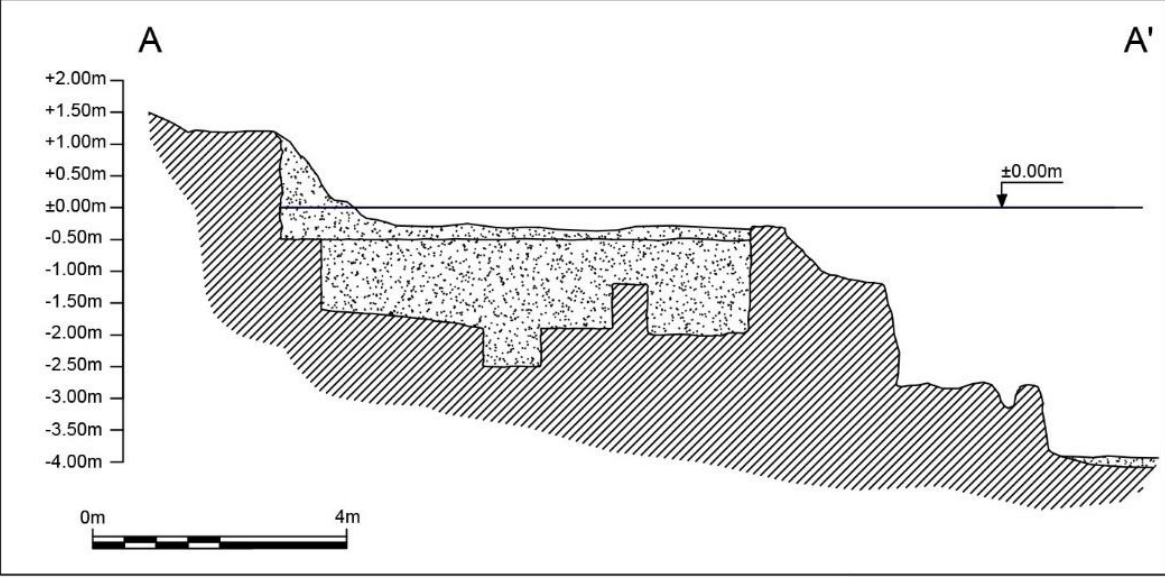
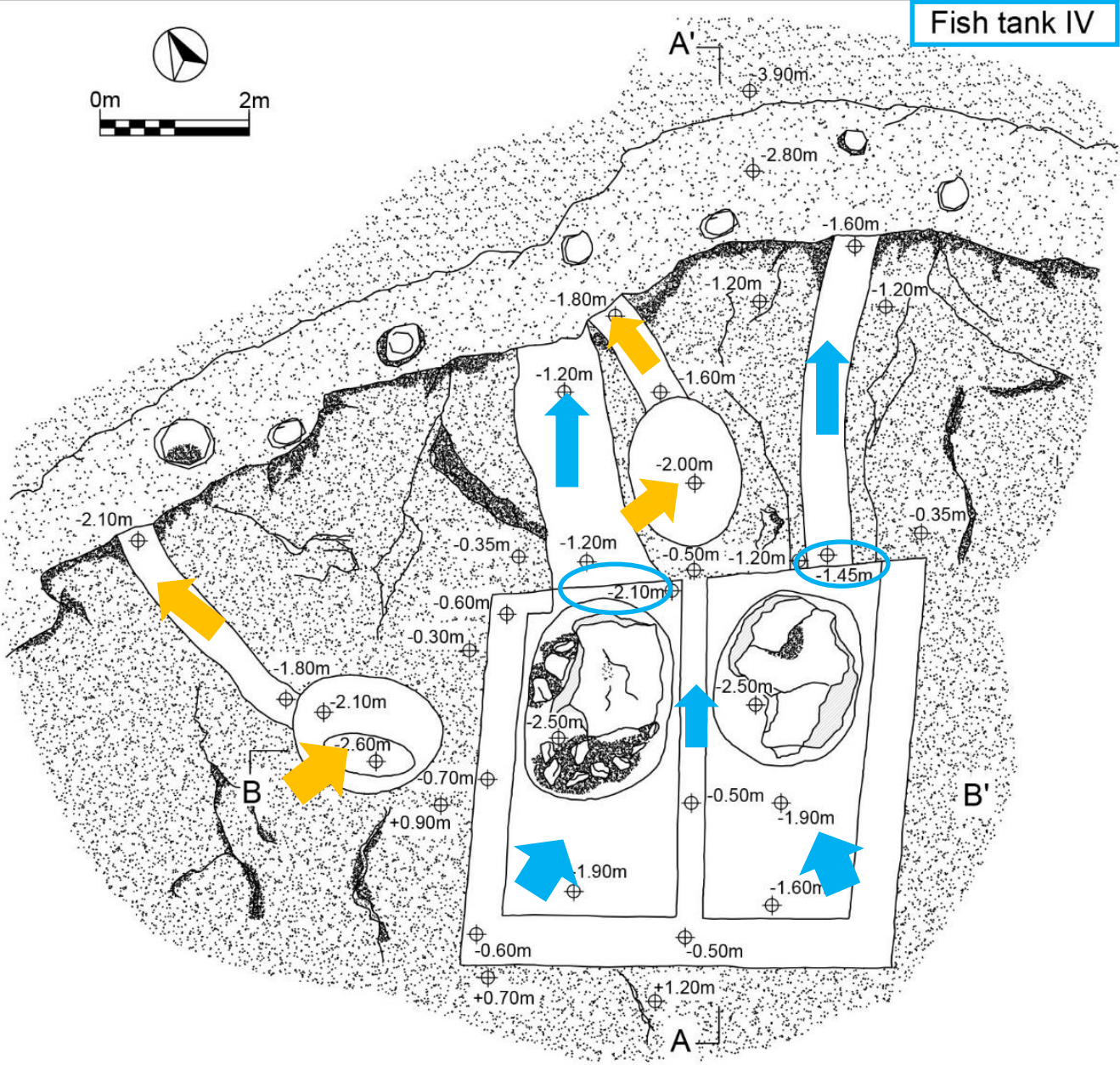
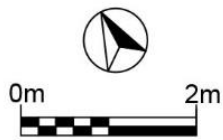
Fish tank II



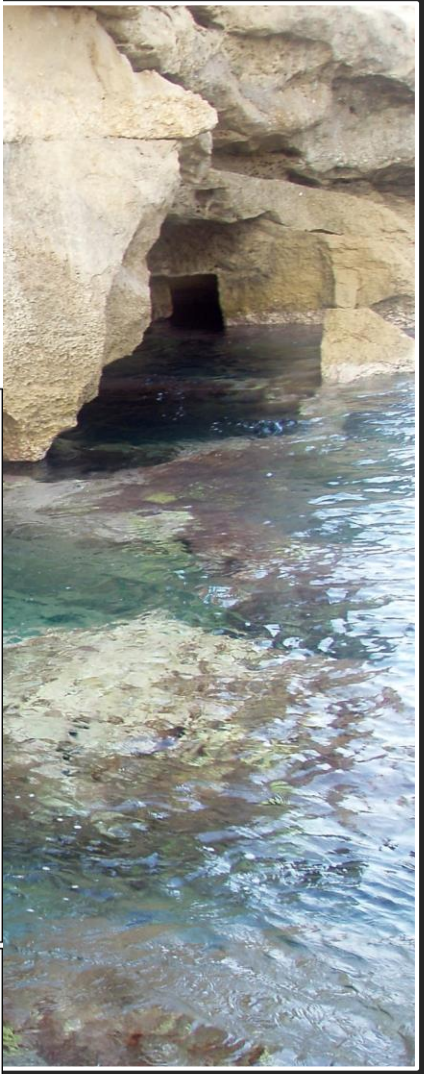
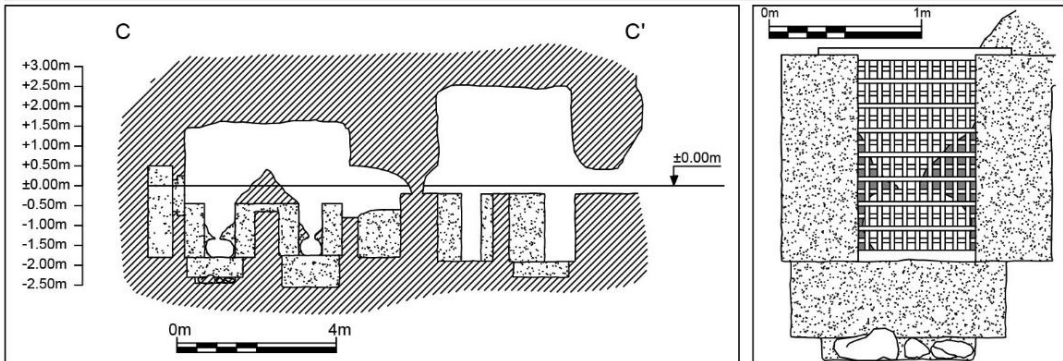
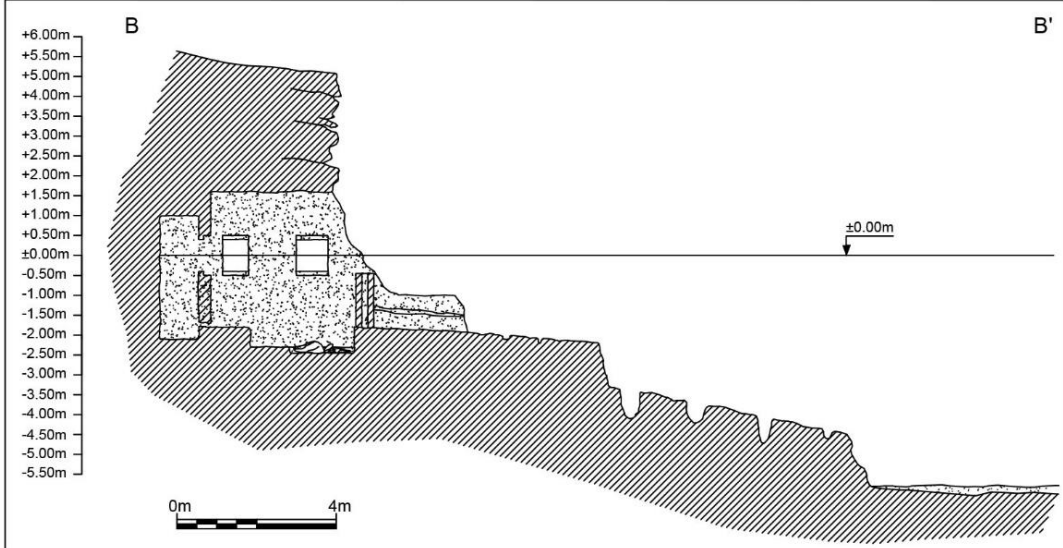
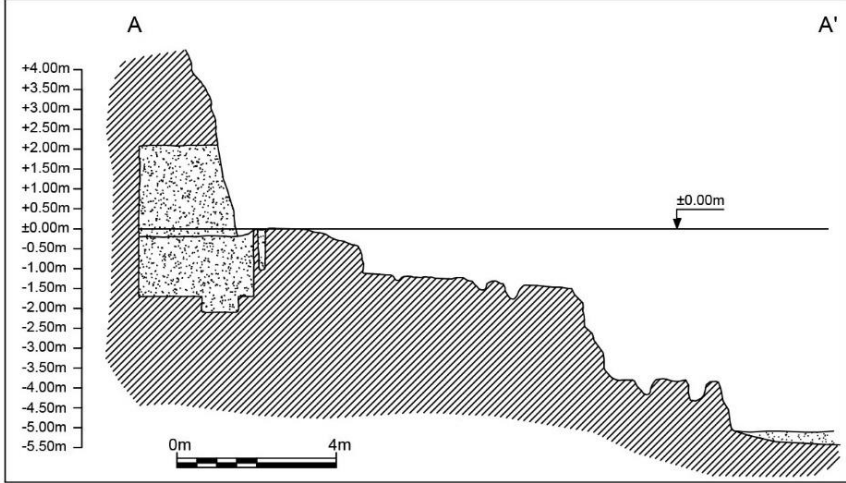
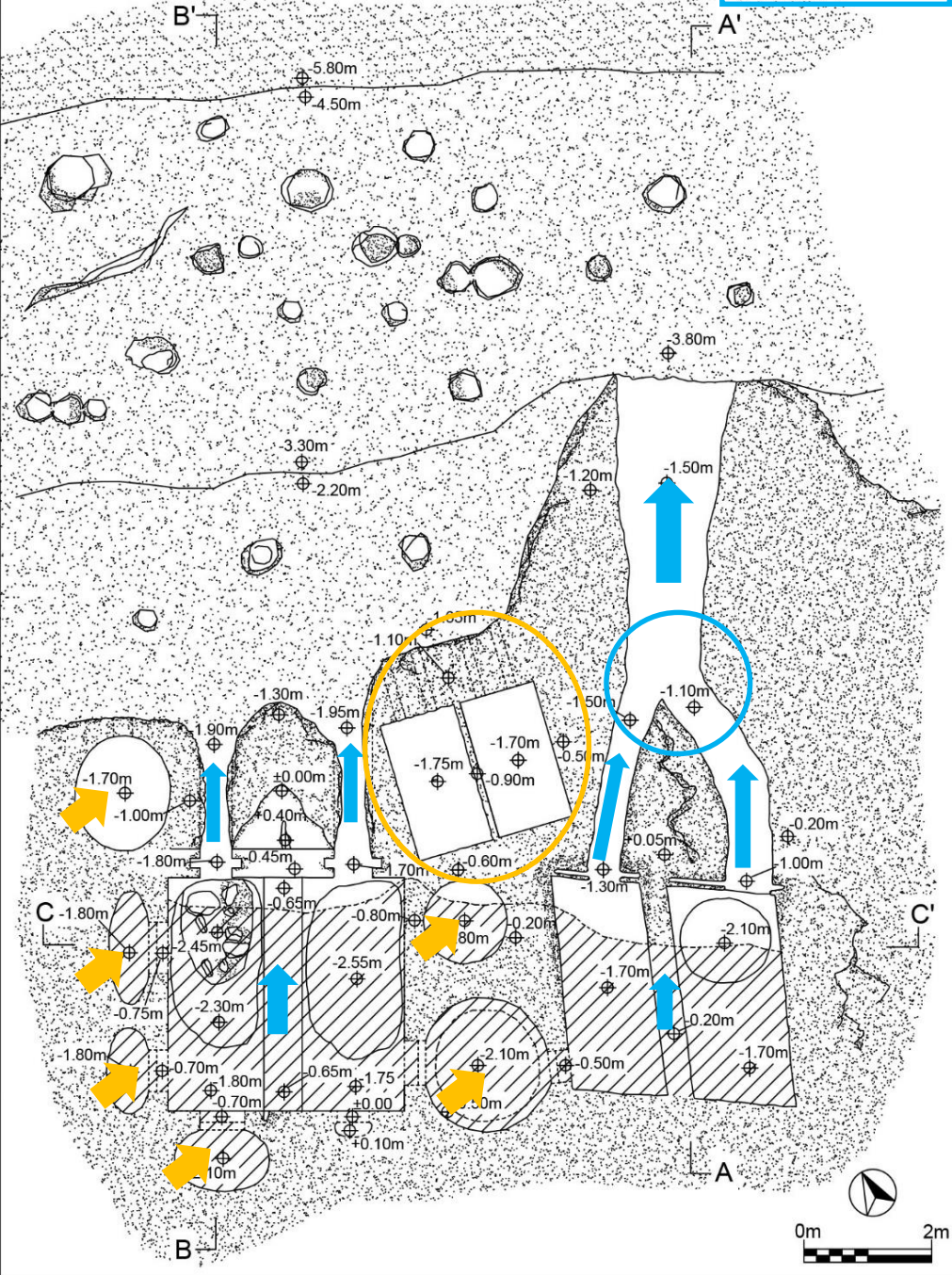
Fish tank III



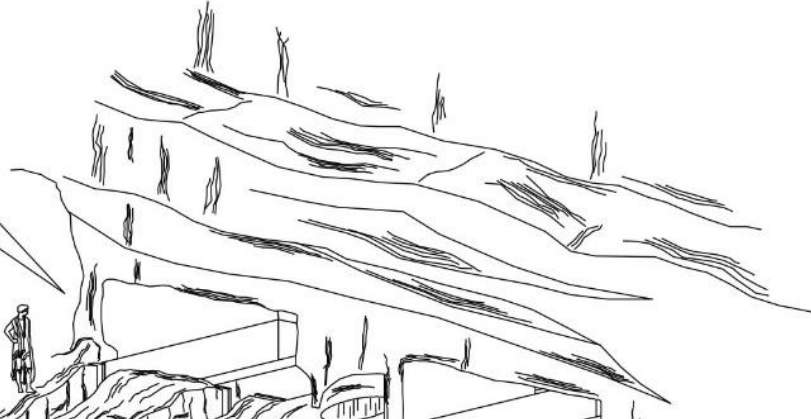
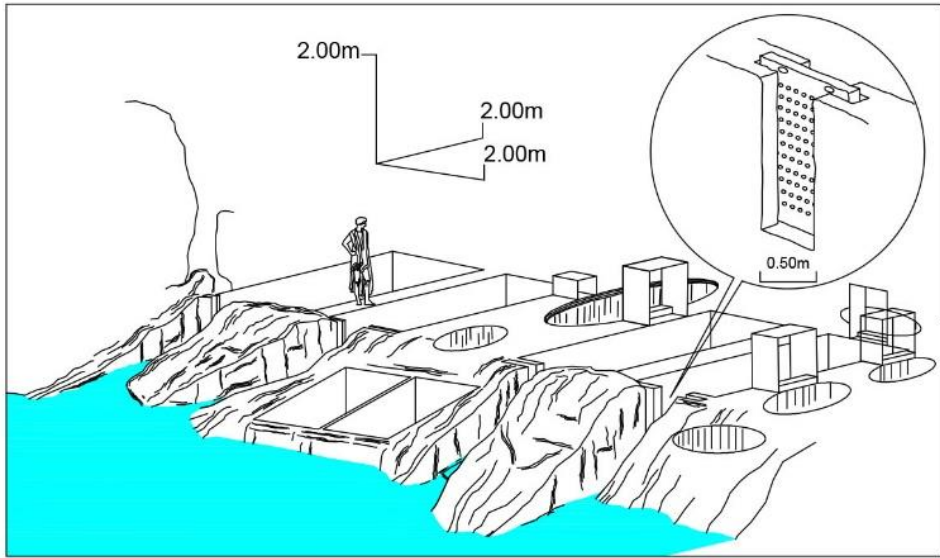
Fish tank IV



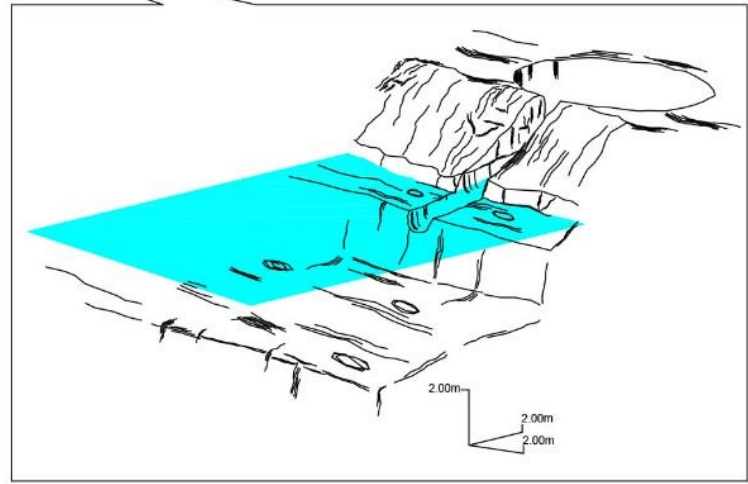
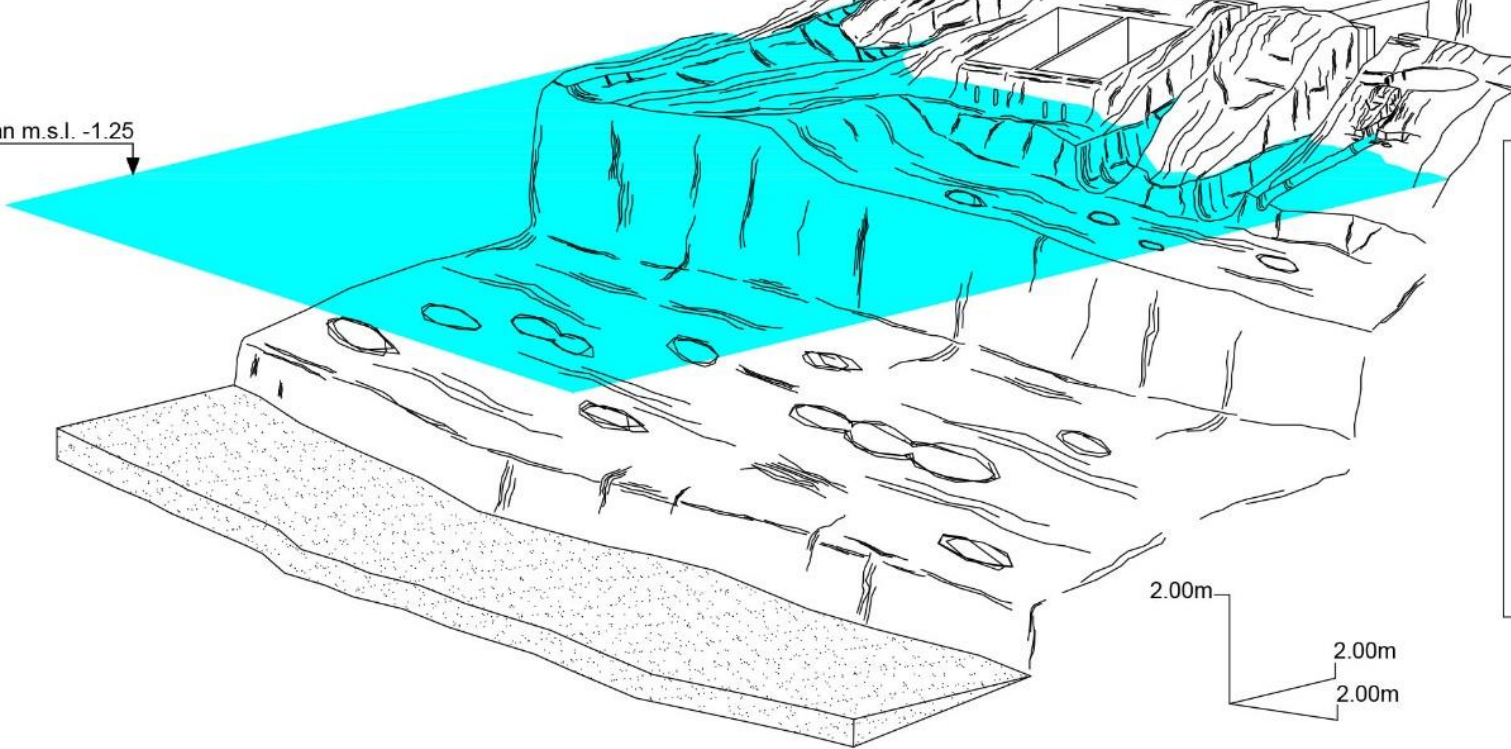
Fish tanks V & VI



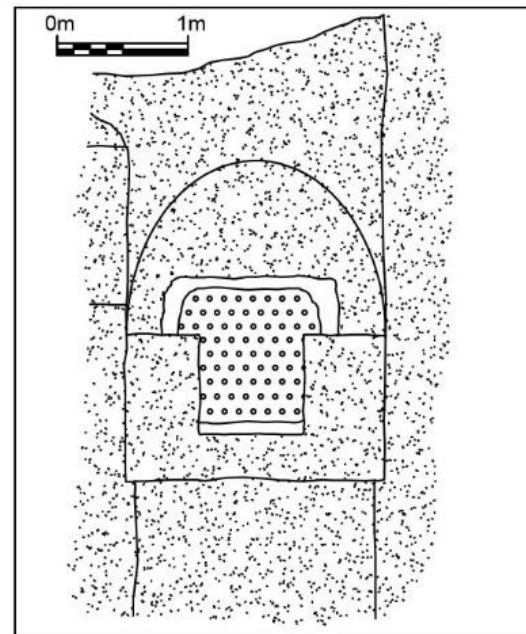
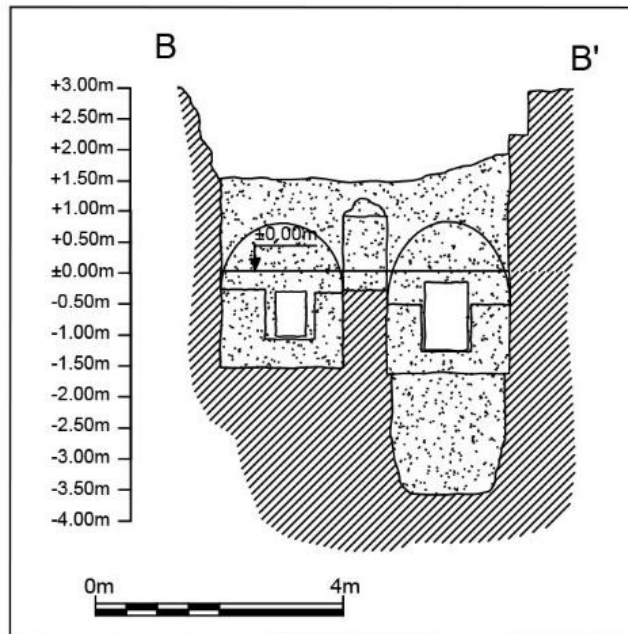
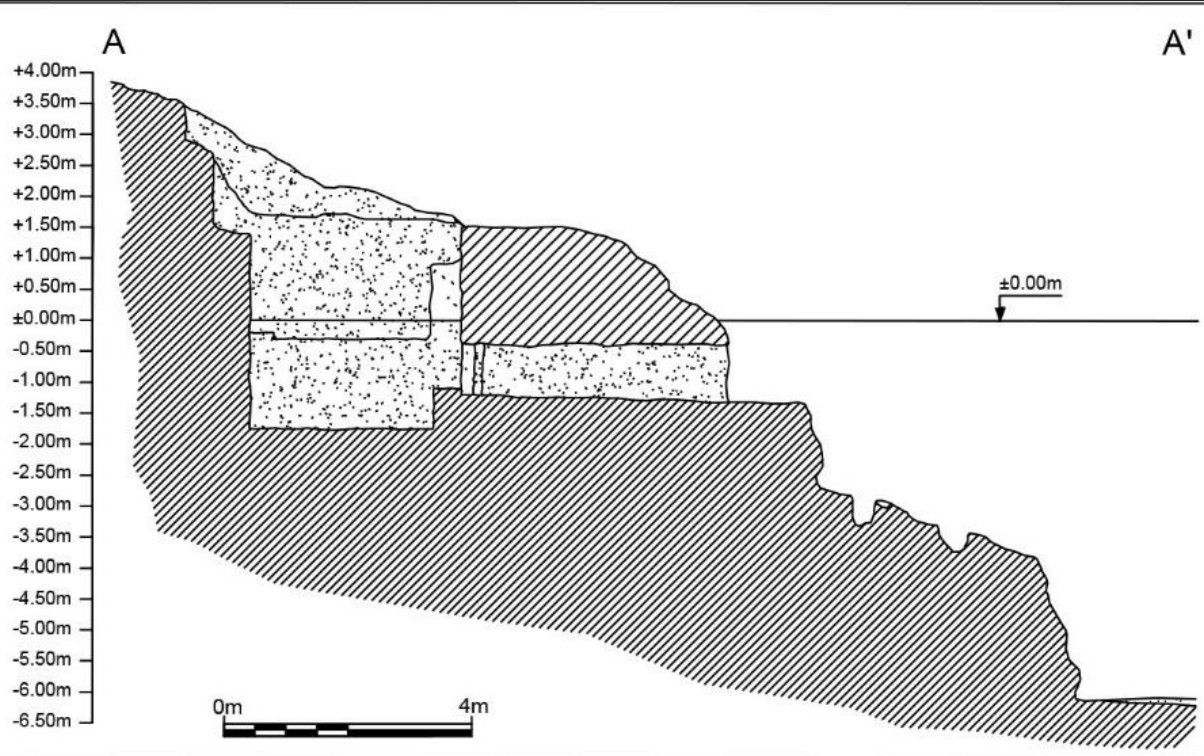
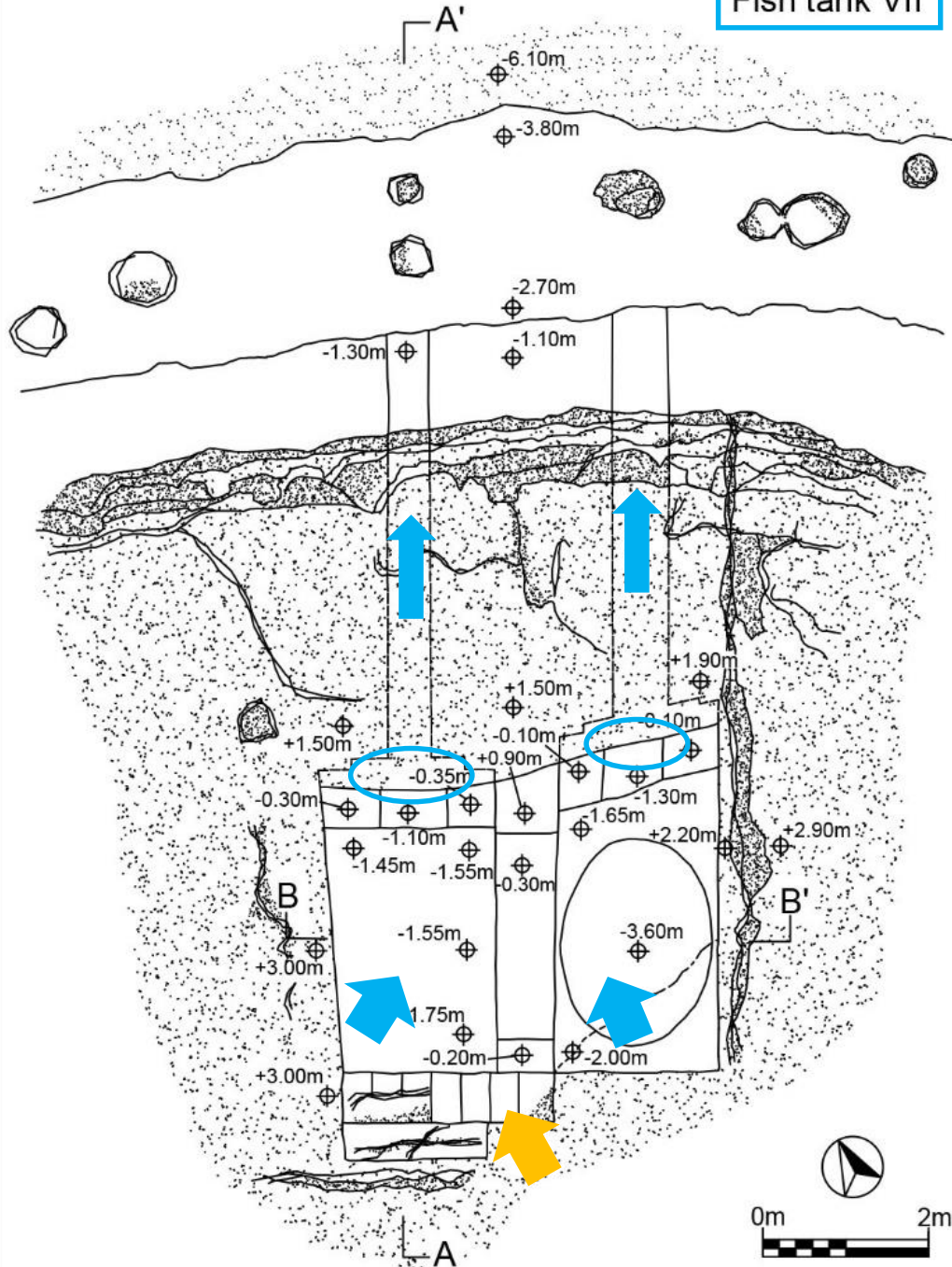
Fish tanks V & VI



Roman m.s.l. -1.25



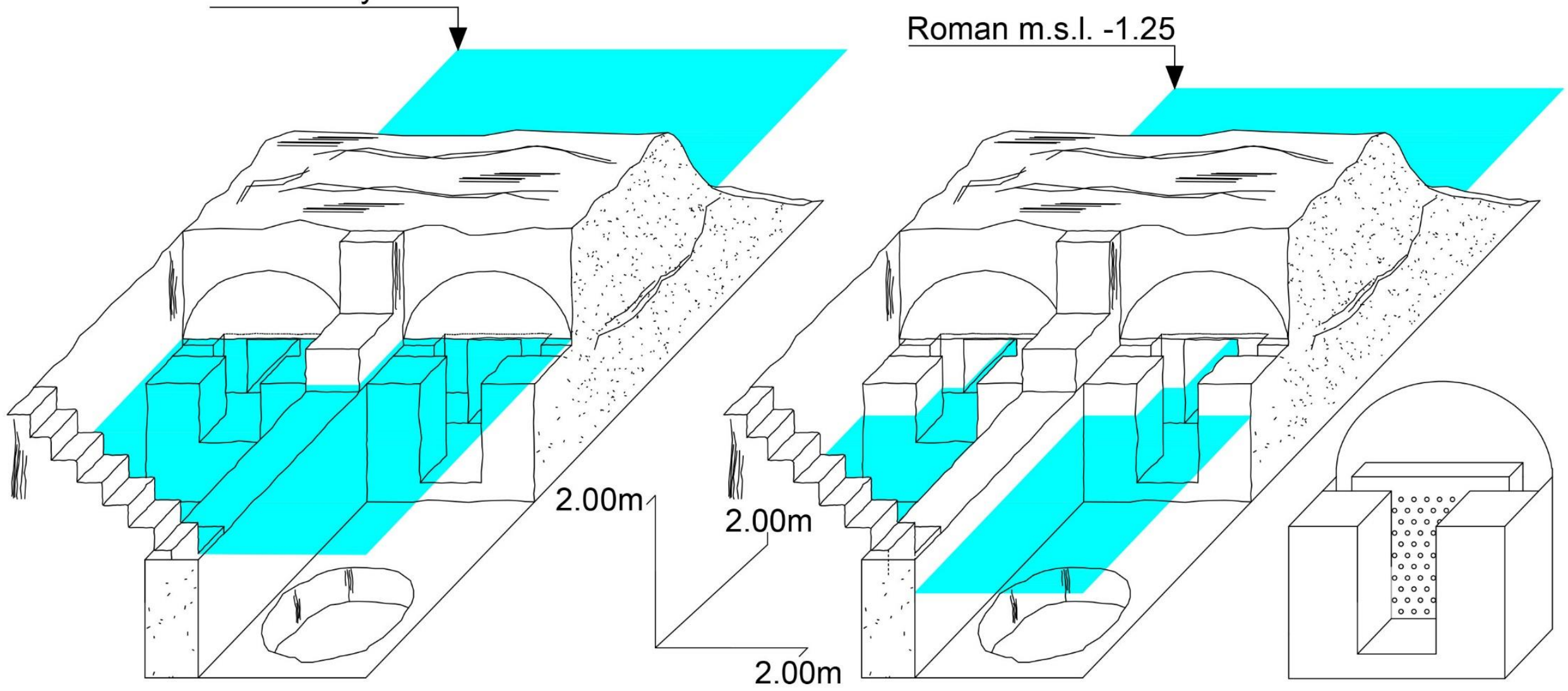
Fish tank VII



Fish tank VII

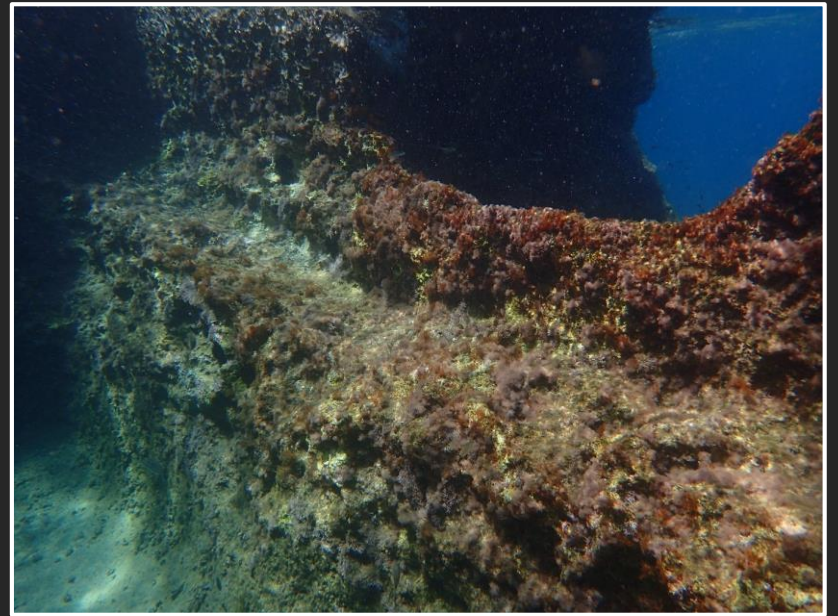
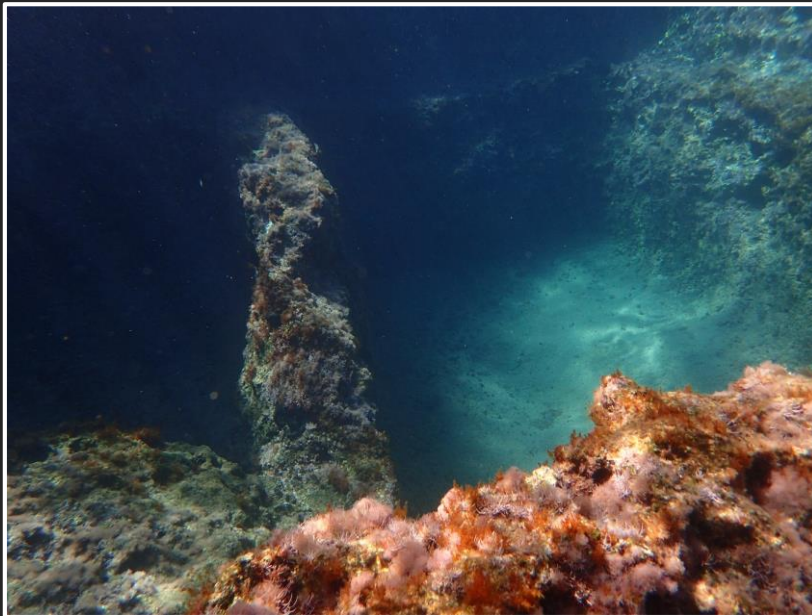
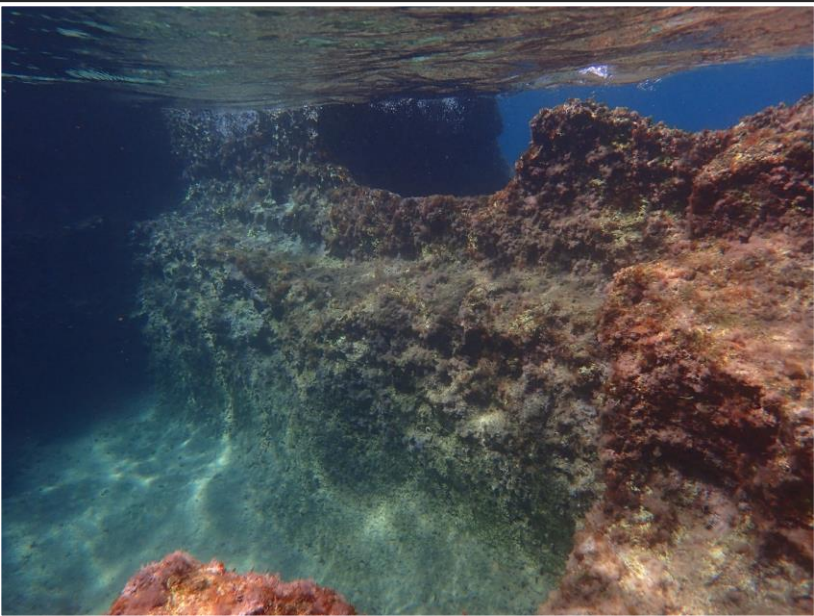
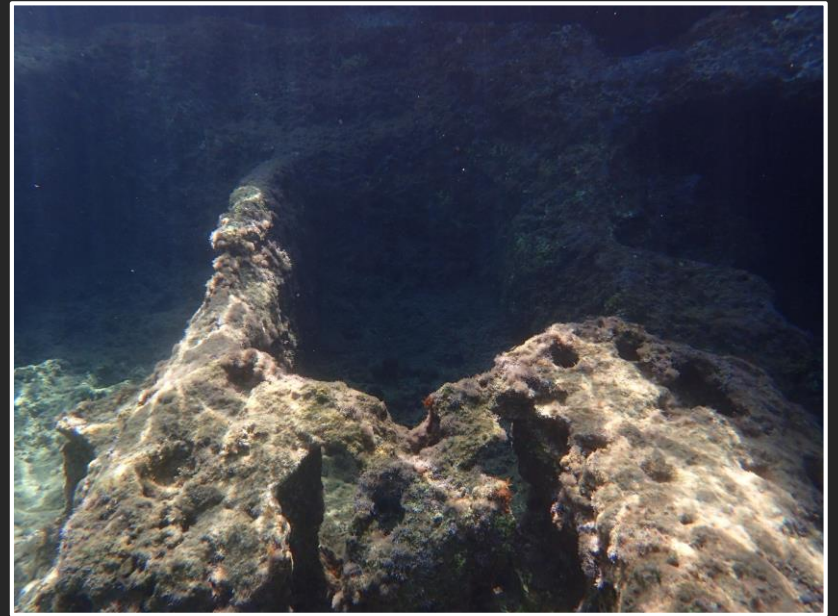
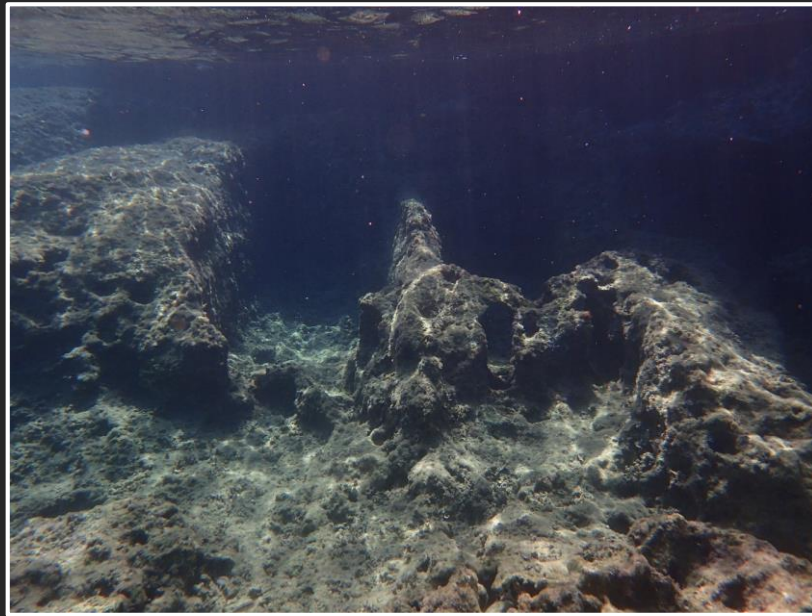
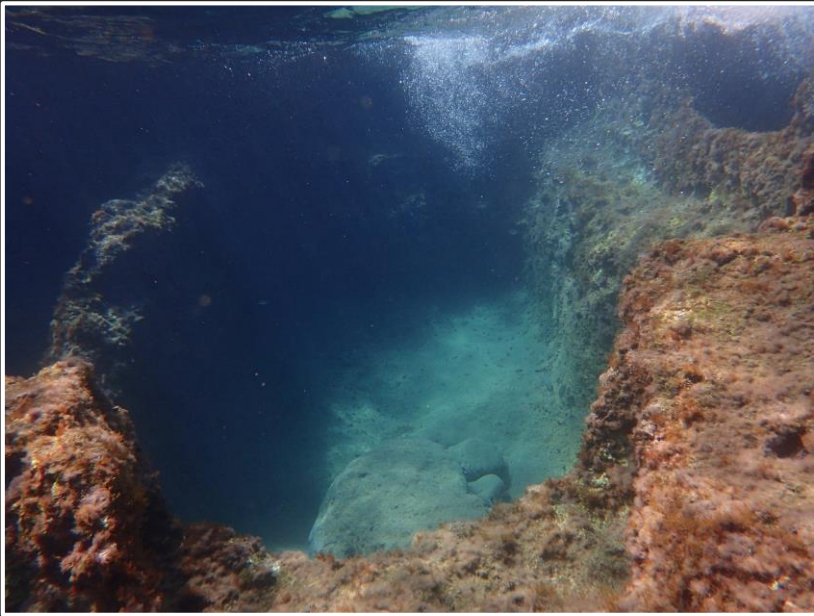
Present day m.s.l.

Roman m.s.l. -1.25

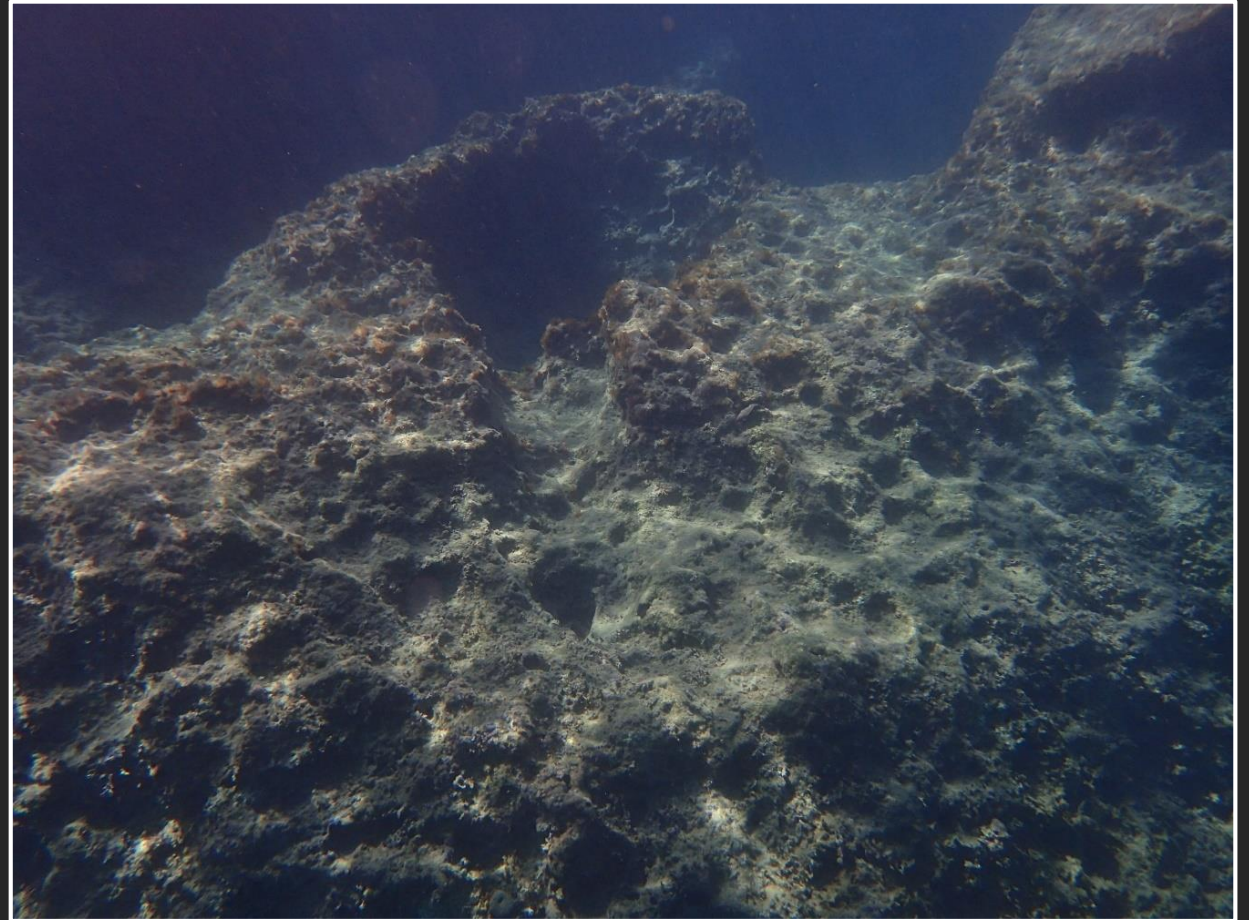
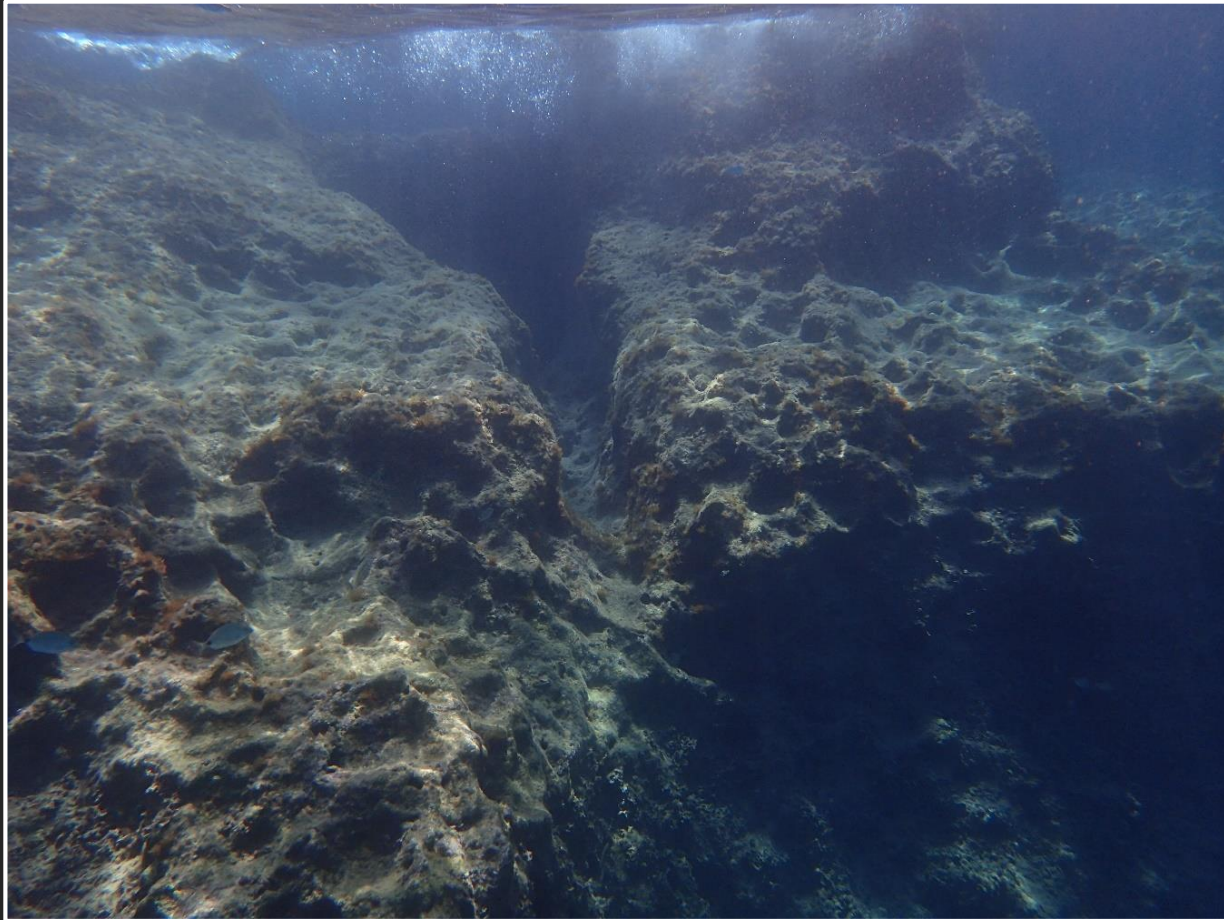




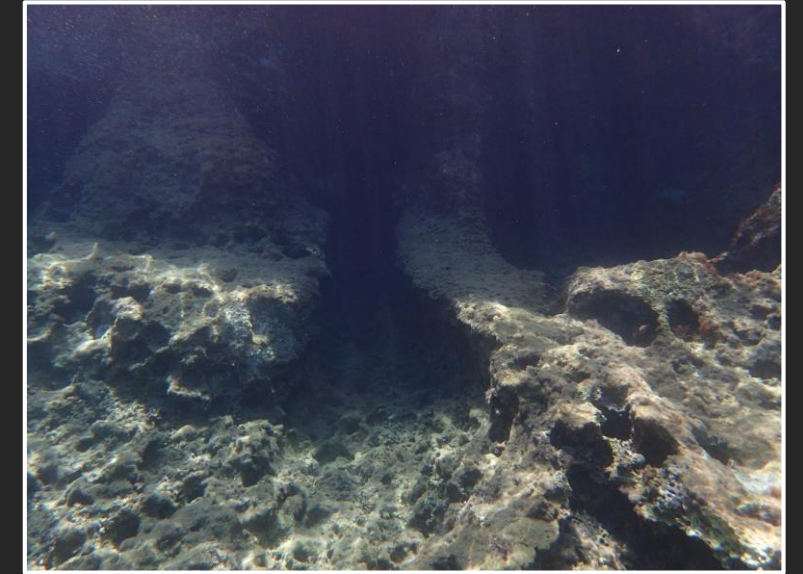
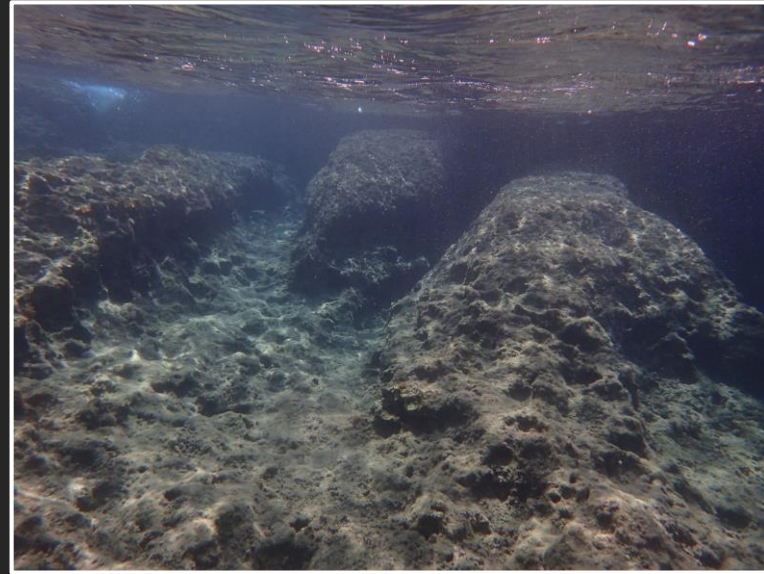
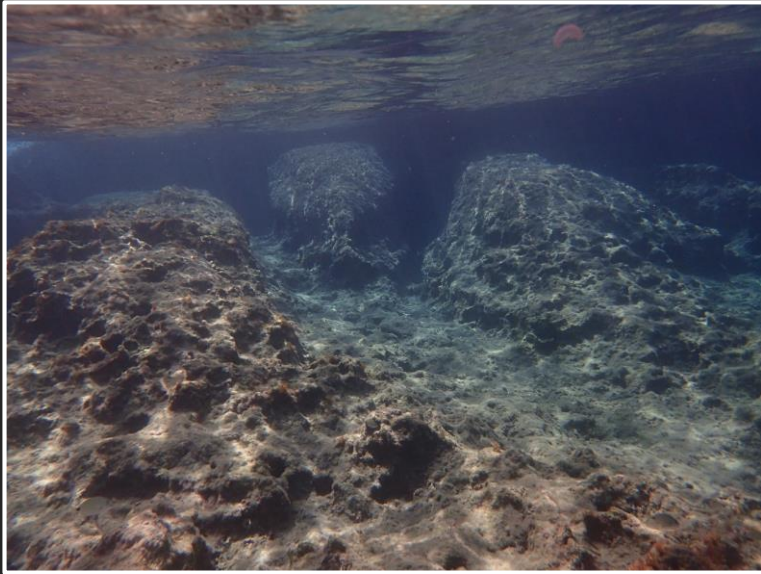
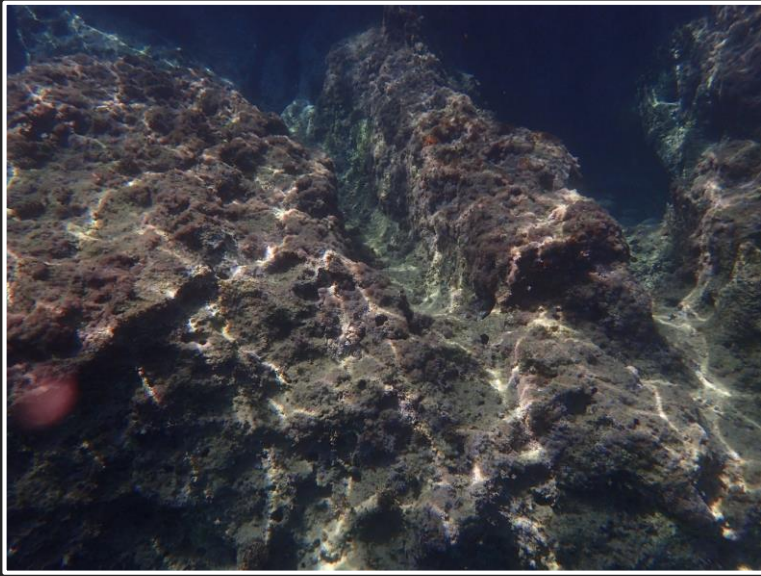
carved roofs



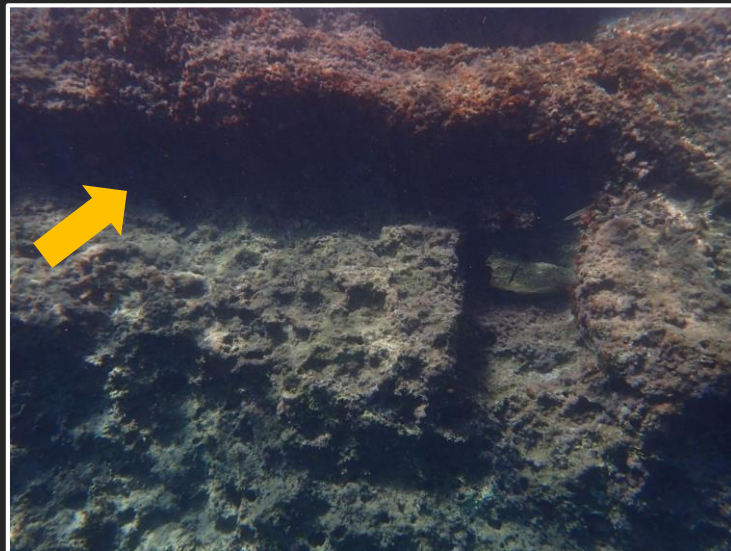
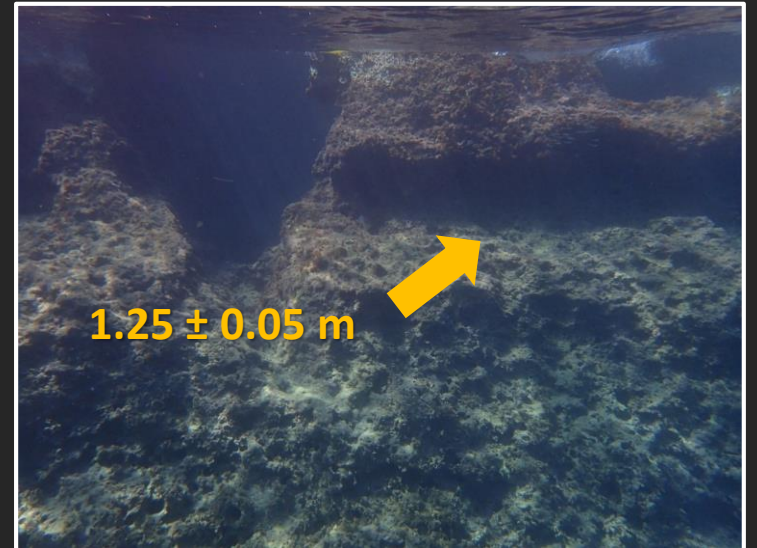
partition walls and sidewalks



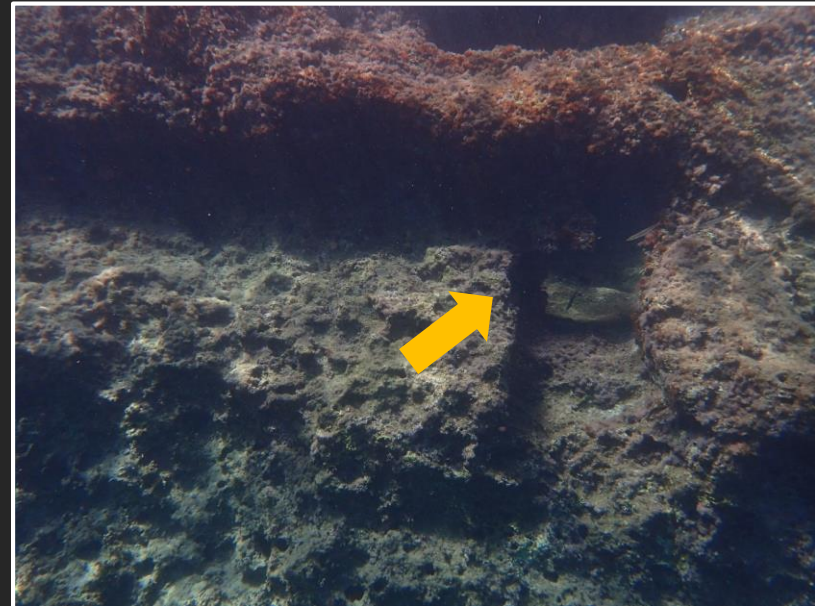
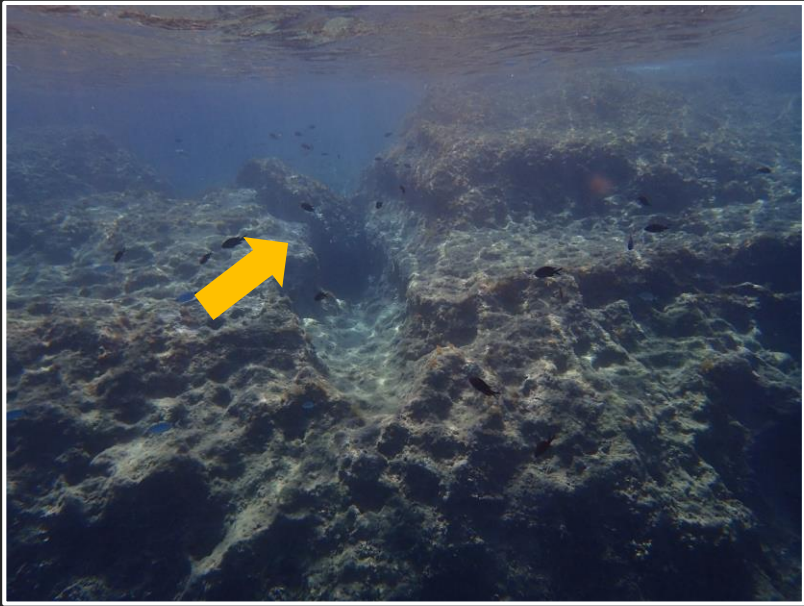
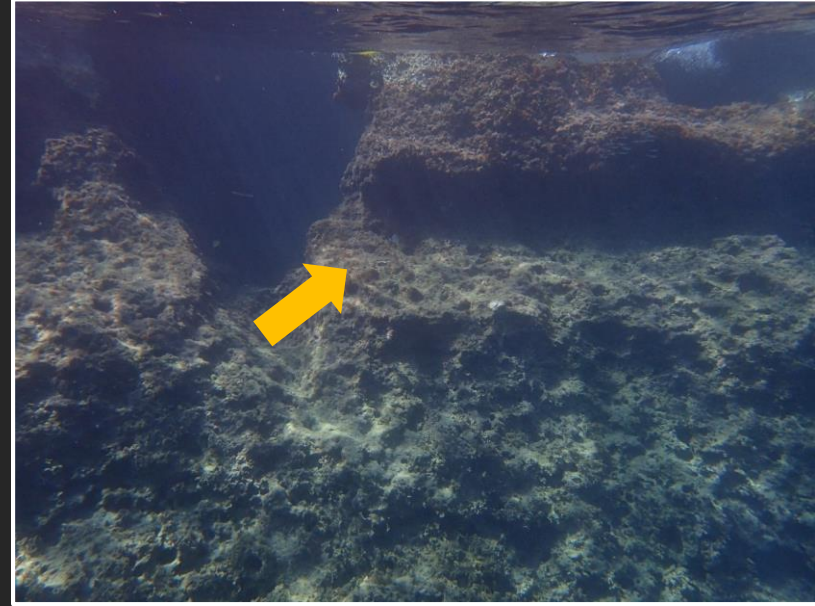
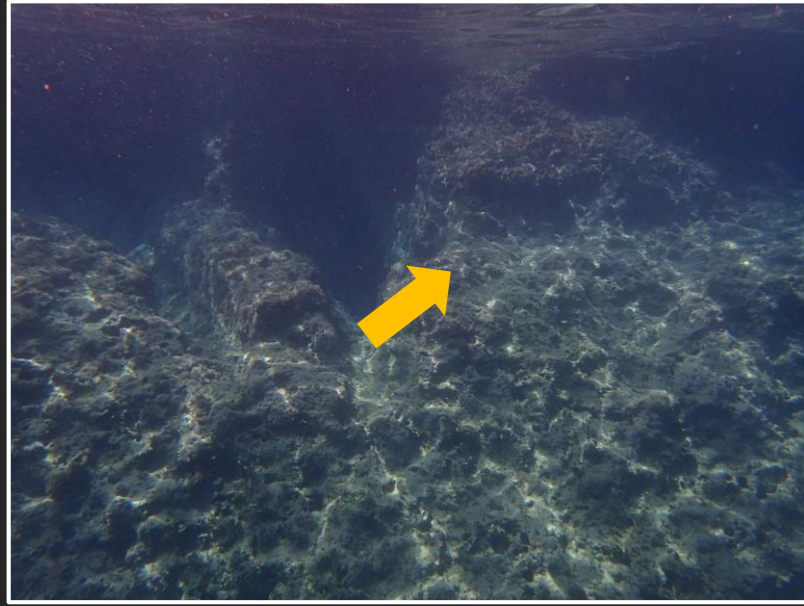
fish traps



entrances and channels

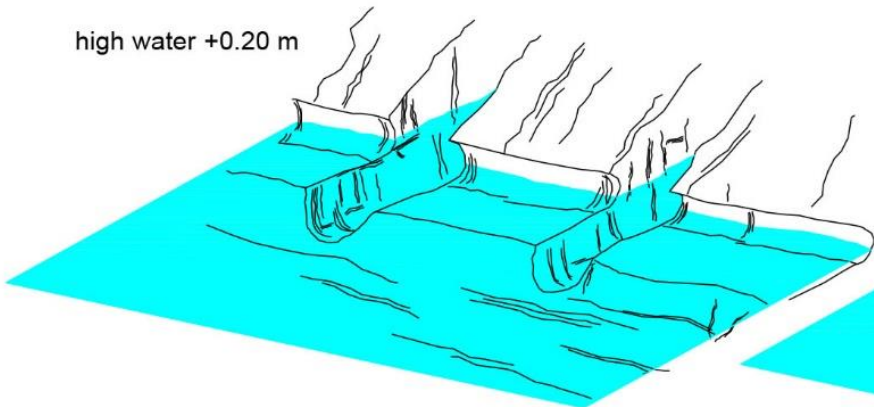


relationship between marine notch and entrances

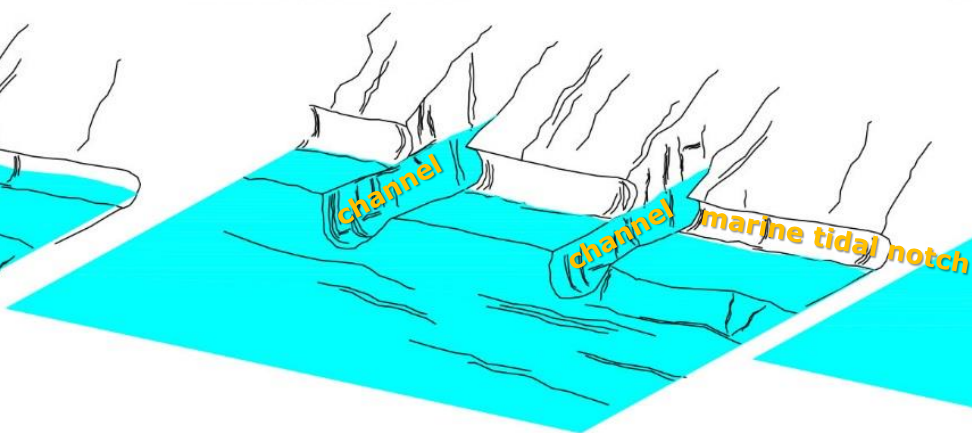


relationship between marine notch and channels

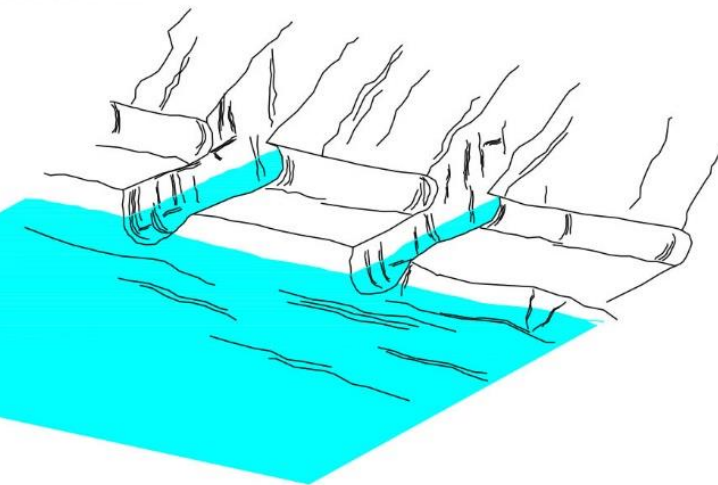
high water +0.20 m



mean sea level ± 0.00 m



low water -0.20 m





Salt pans, fish processing tanks and quarries at Cape Nissi



Fish tank of Ferma,
Ierapetra (SE Crete)



E 25°50'19.50"

E 25°50'24.98"

E 25°50'30.72"

E 25°50'36.39"



N 35°00'41.00"

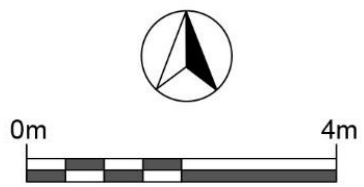
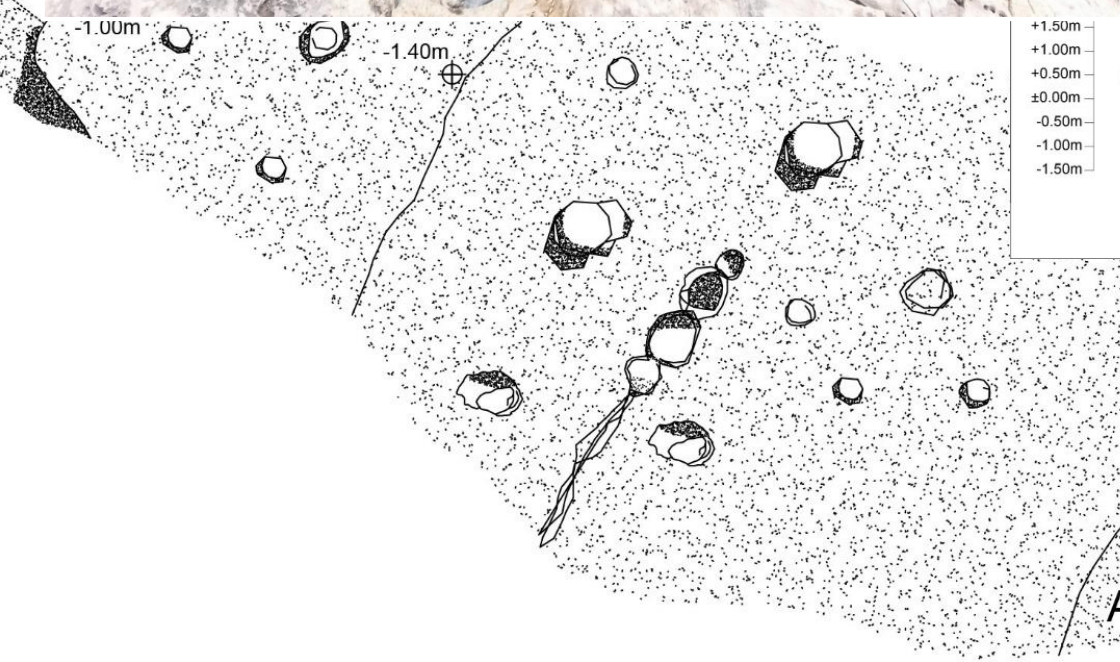
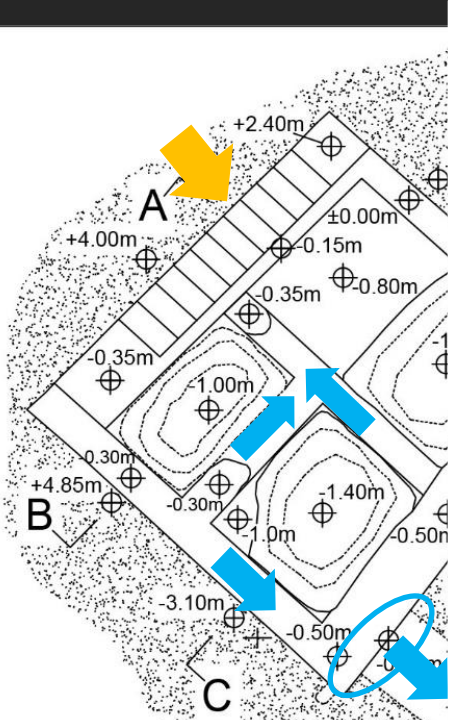
N 35°00'41.00"

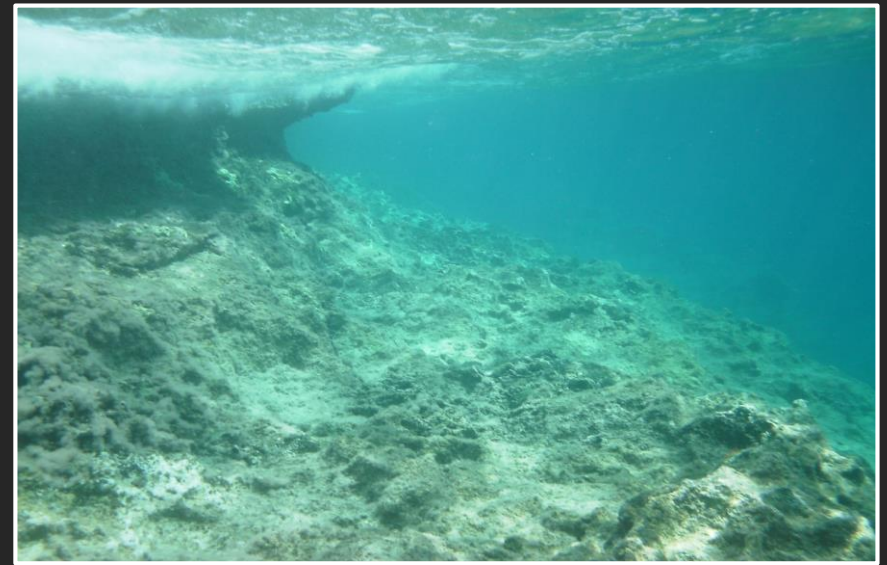
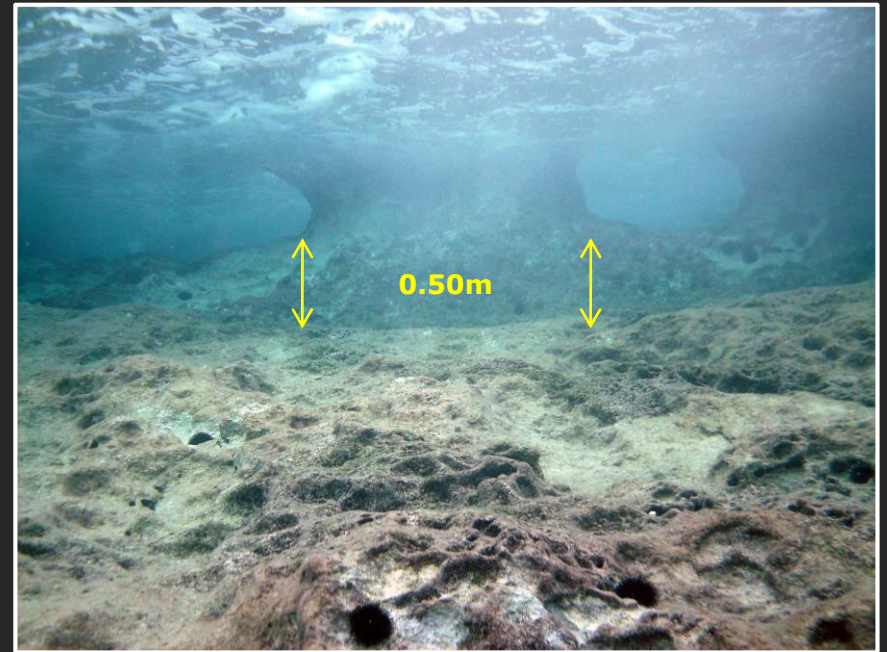
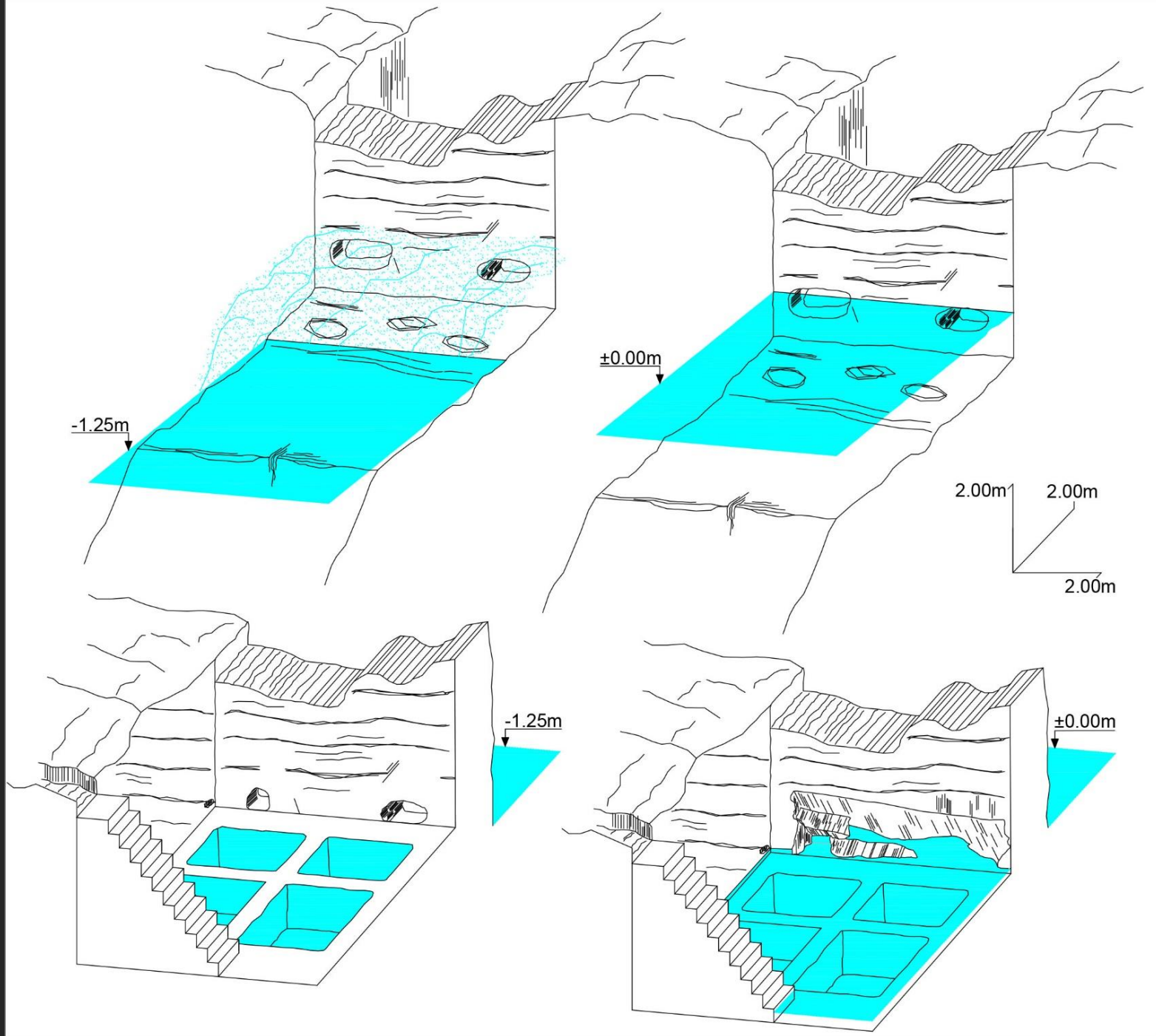
E 25°50'19.50"

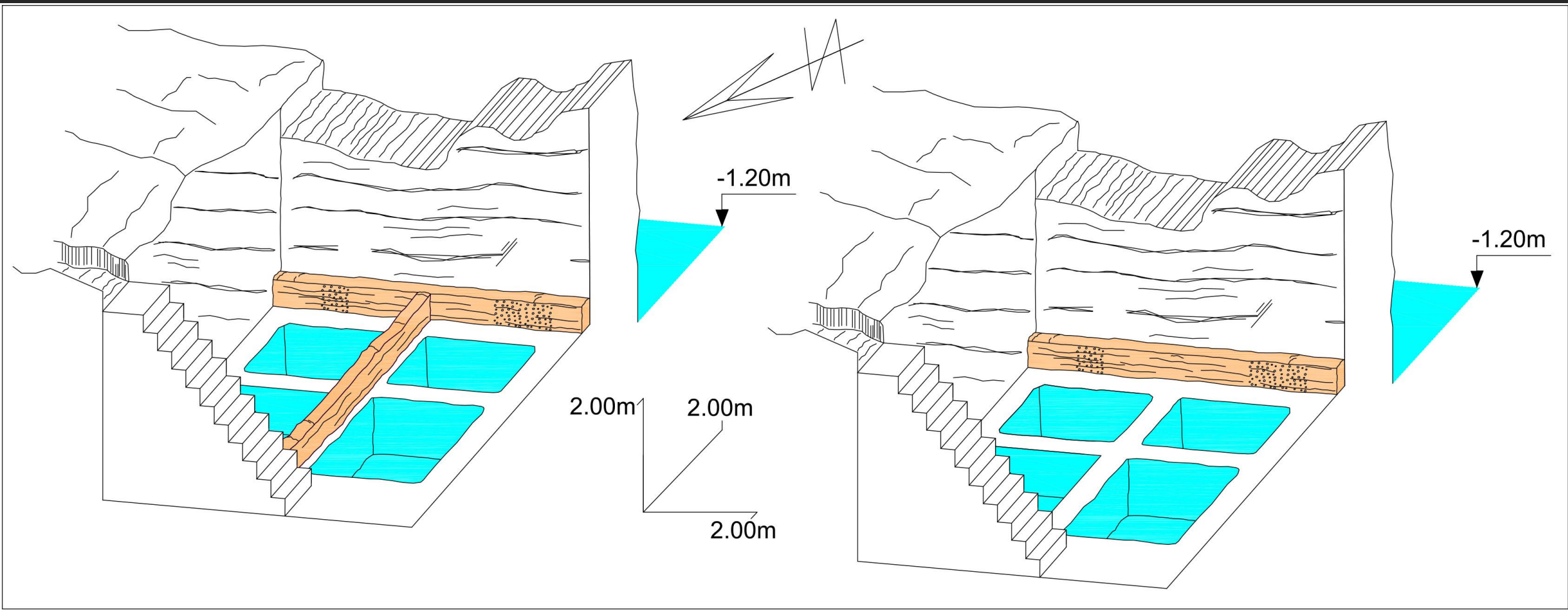
E 25°50'24.98"

E 25°50'30.72"

E 25°50'36.39"







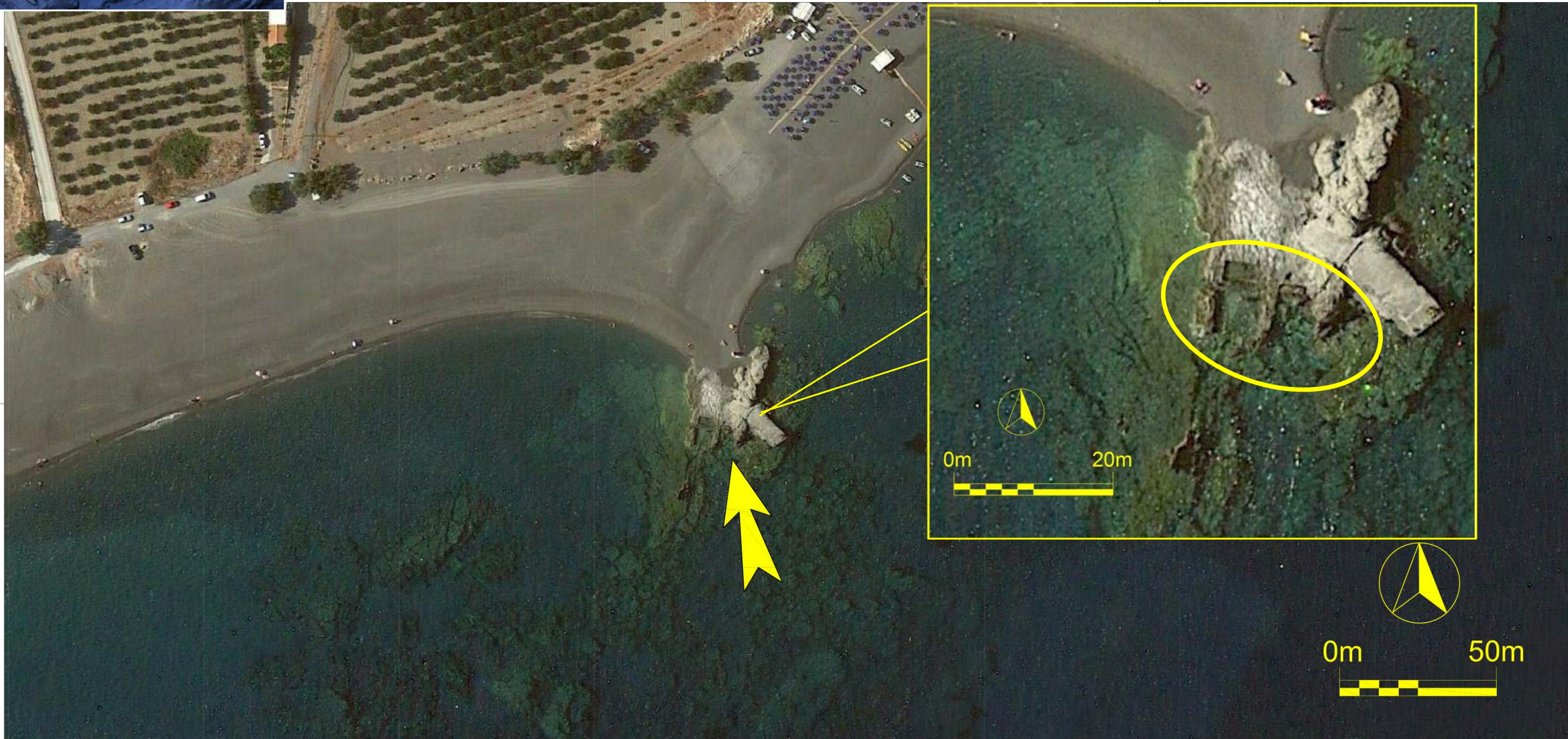
Salt pan and fish tank of Koutsounari, Ierapetra (SE Crete)



N 35°00'31.55"

E 25°50'03.04"

E 25°50'08.75"



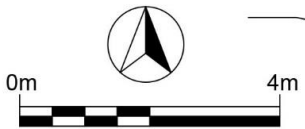
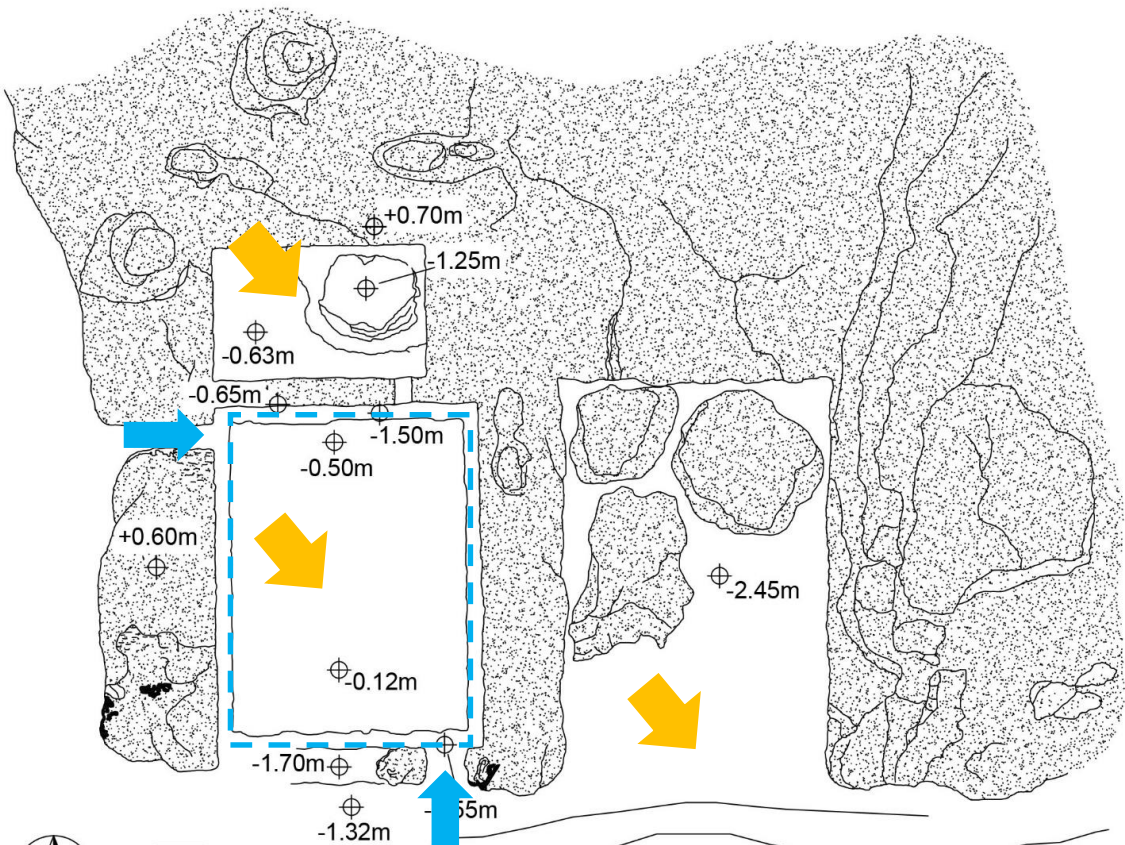
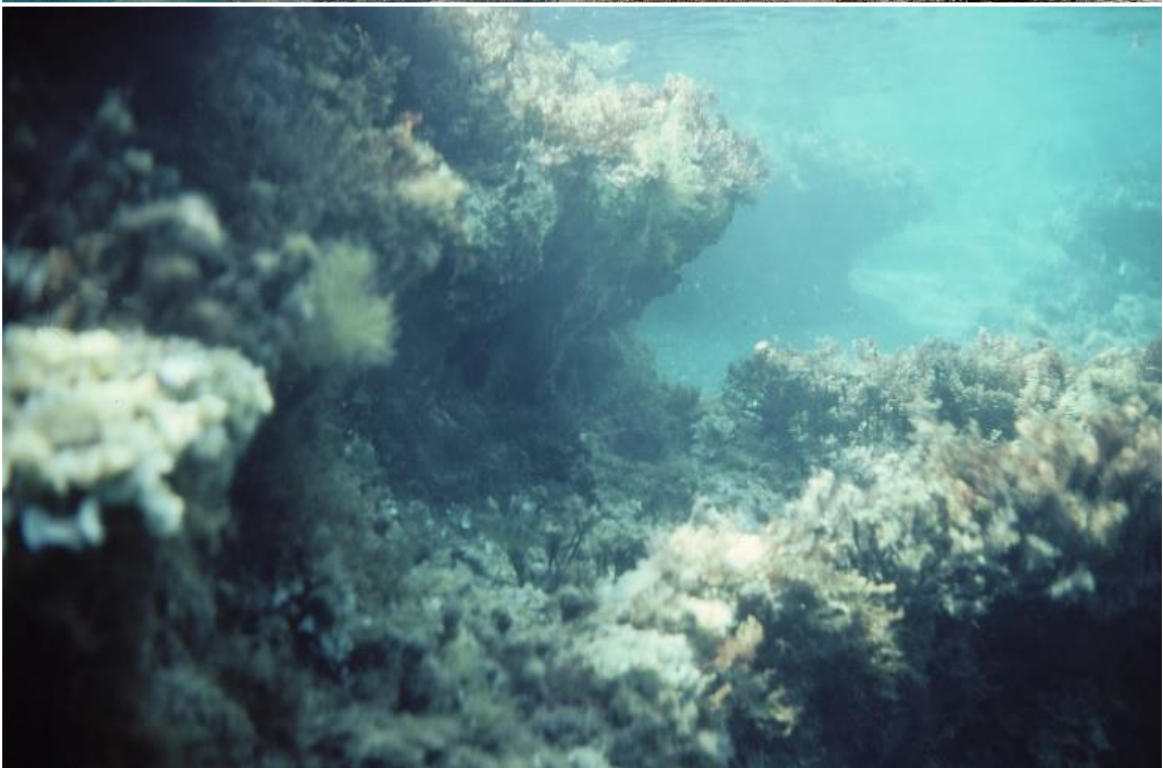
N 35°00'31.55"

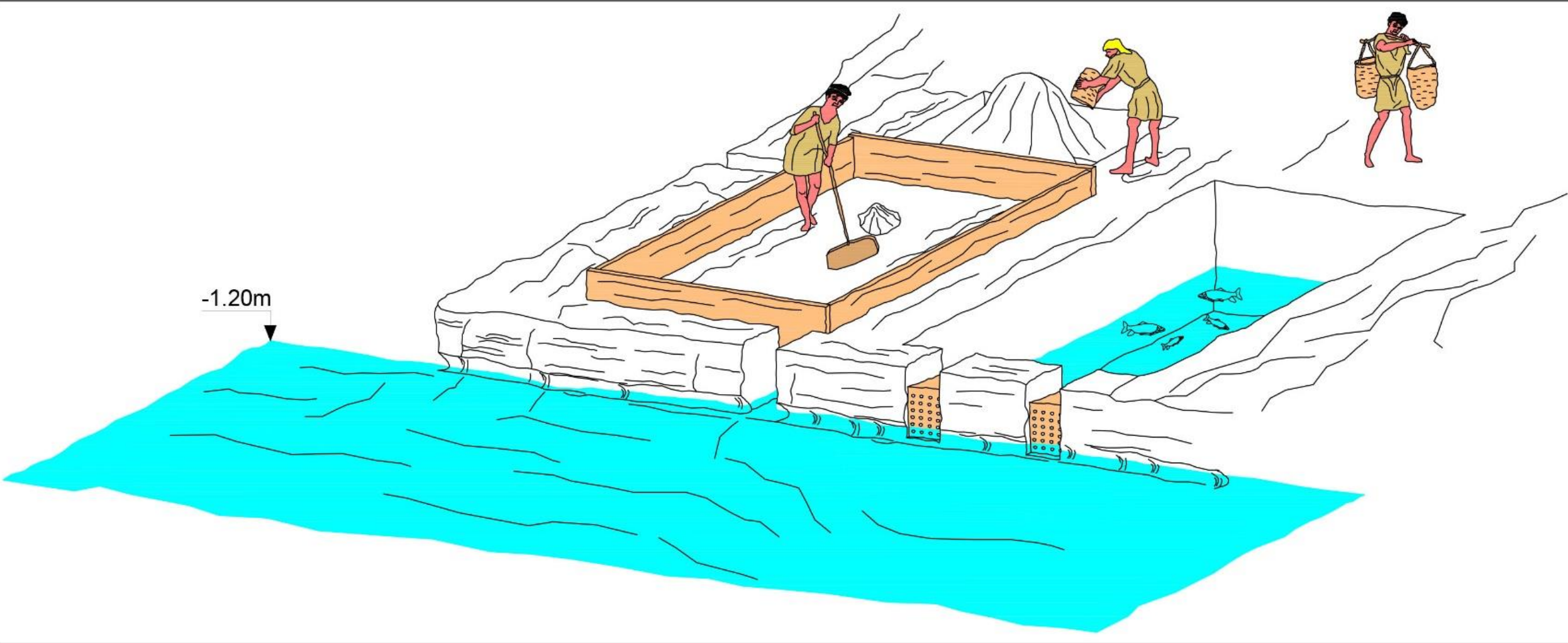
N 35°00'31.55"

E 25°49'57.40"

E 25°50'03.04"

E 25°50'08.75"





-1.20m

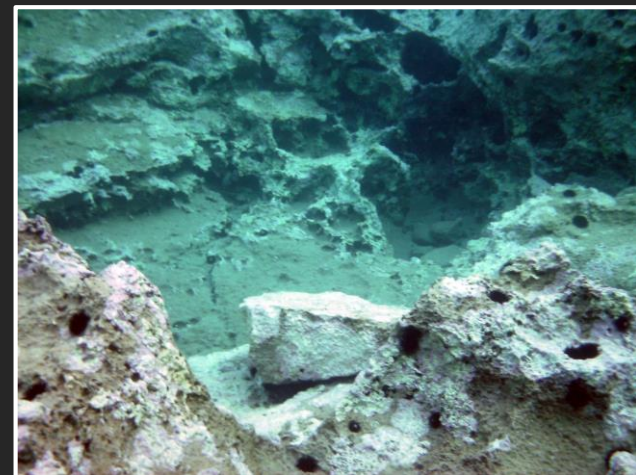
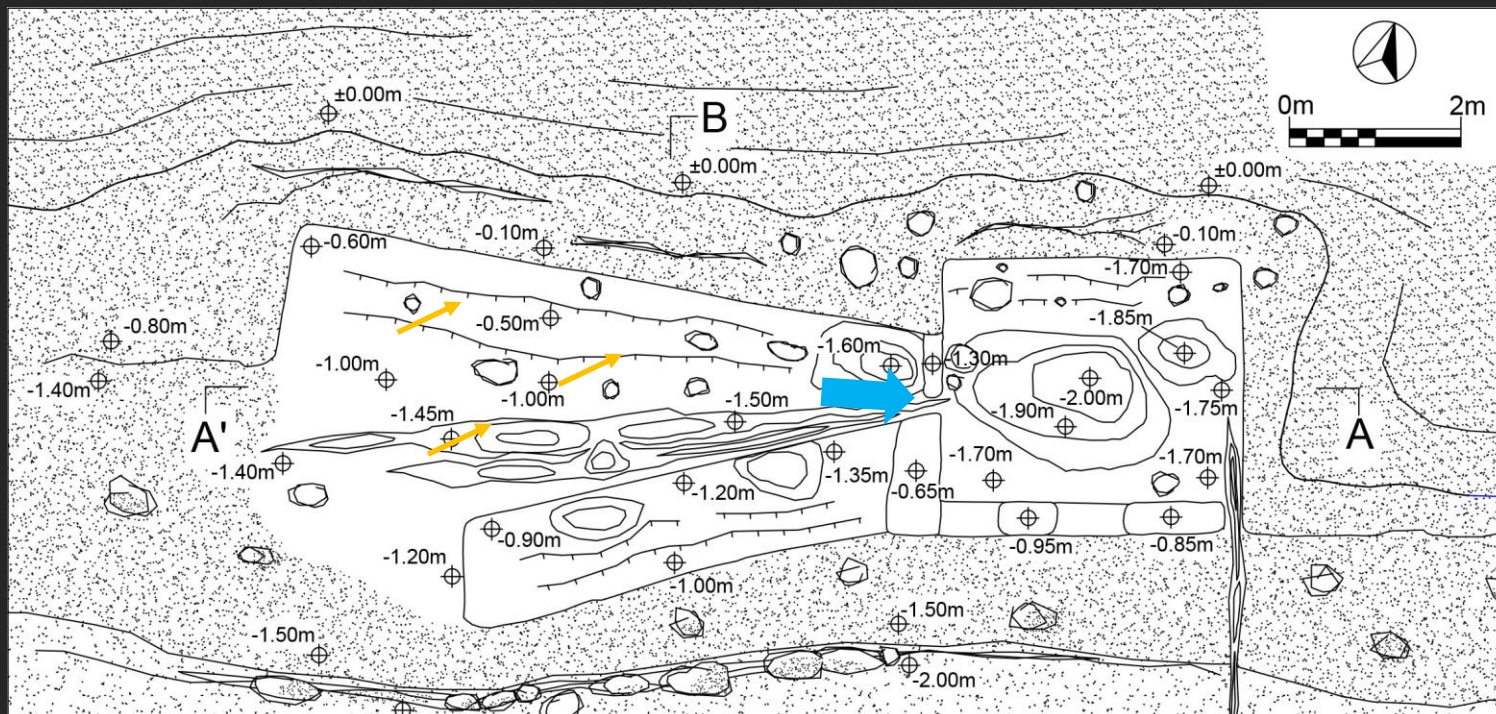


**Fish trap of Kato Zakros
(E Crete)**



35° 5'50.18"N

n





**Fish tank of Mochlos
(NE Crete)**

E 25°54'15.59"

E 25°54'32.51"

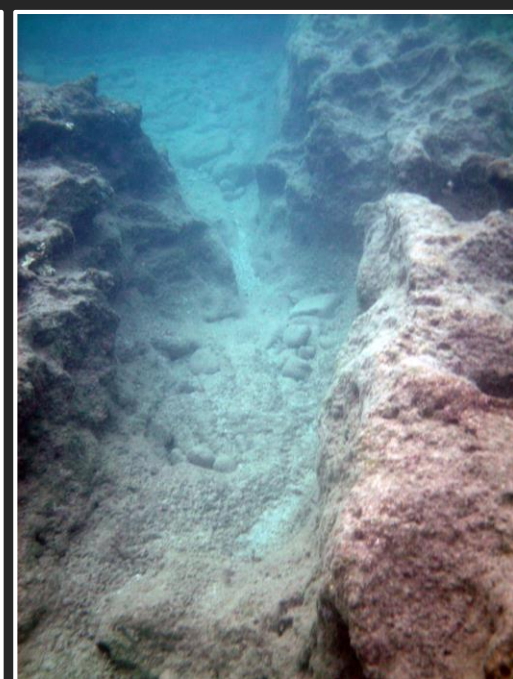
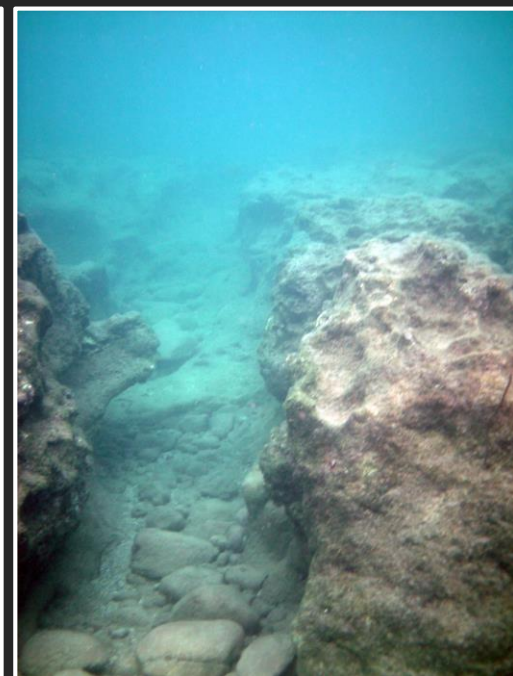
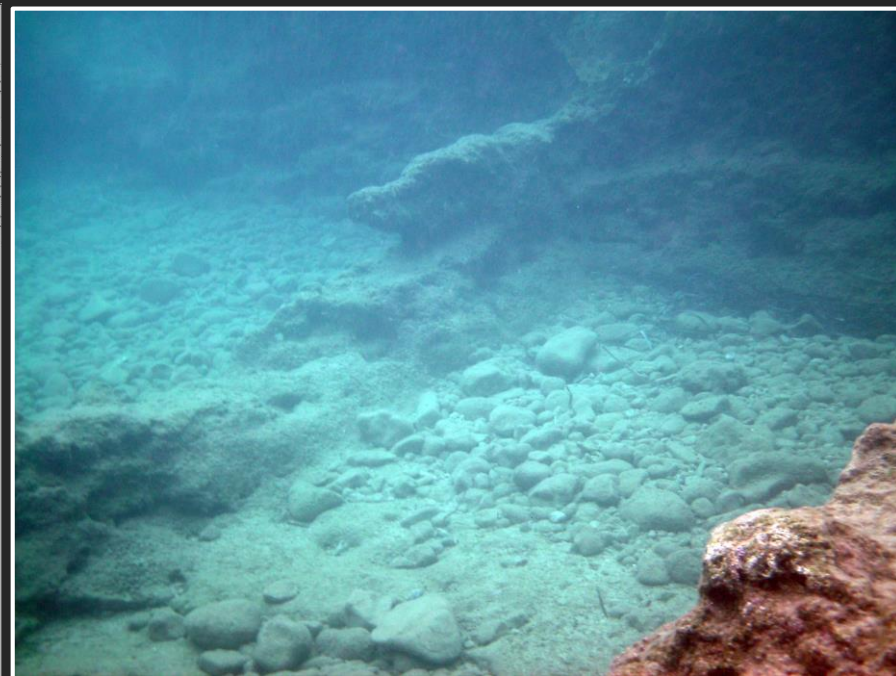
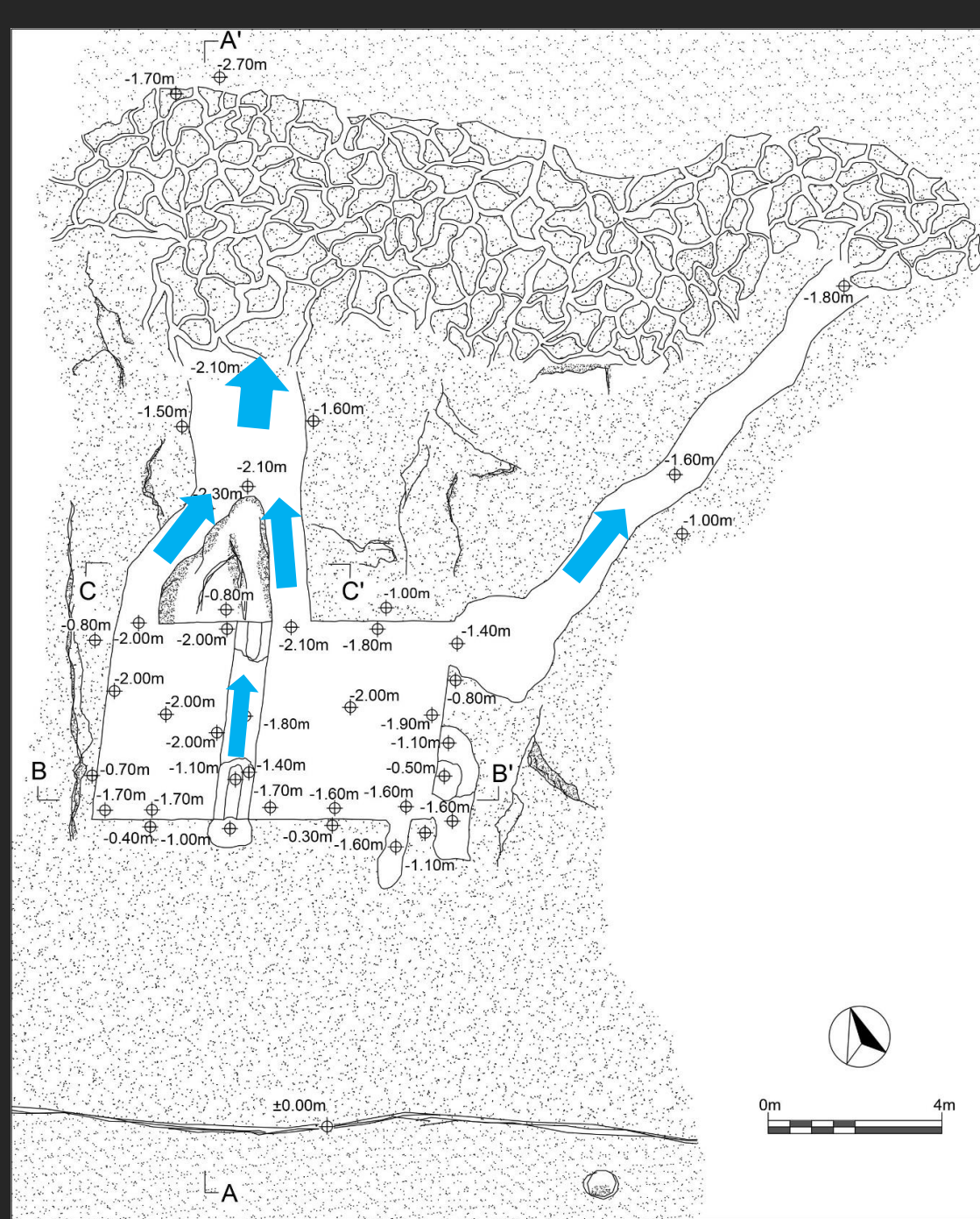


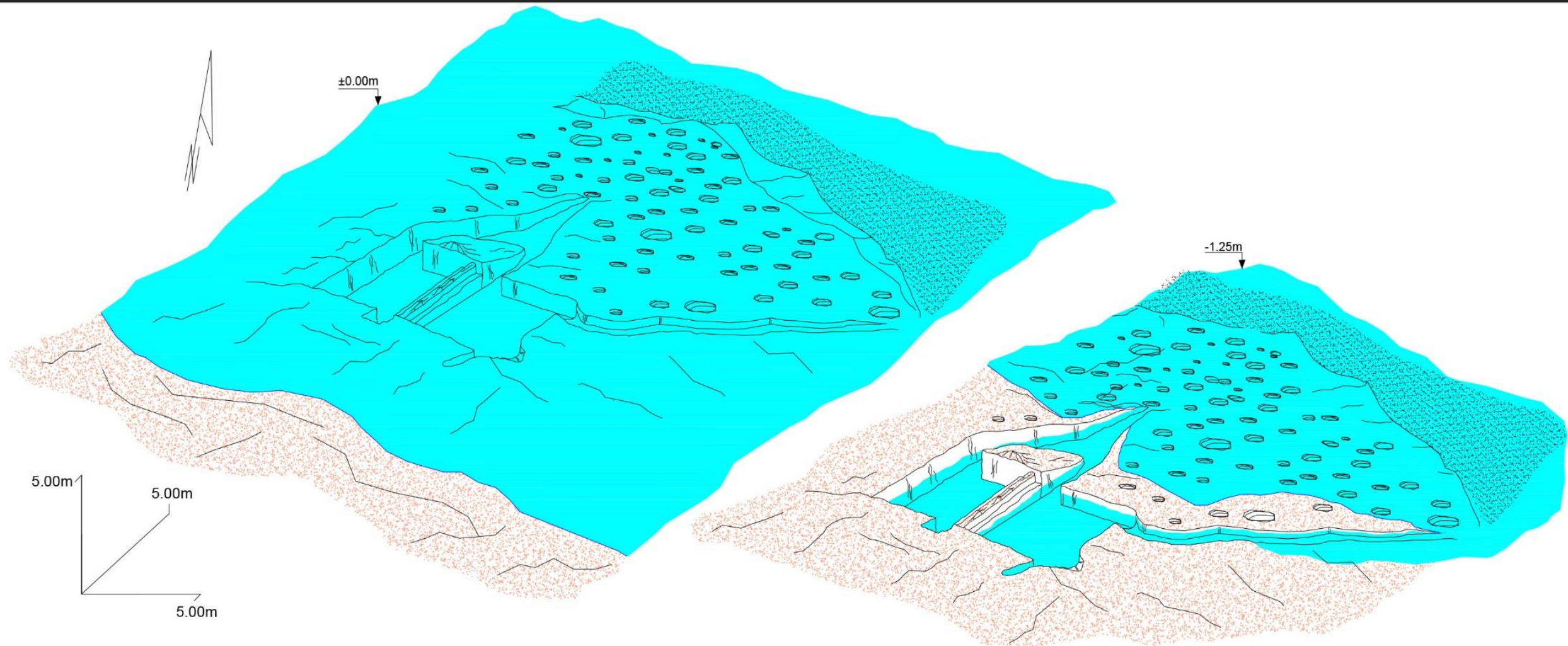
35°11'8.46"N

9"

E 25°54'32.51"







E 25°23'27.06"

E 25°23'49.25"

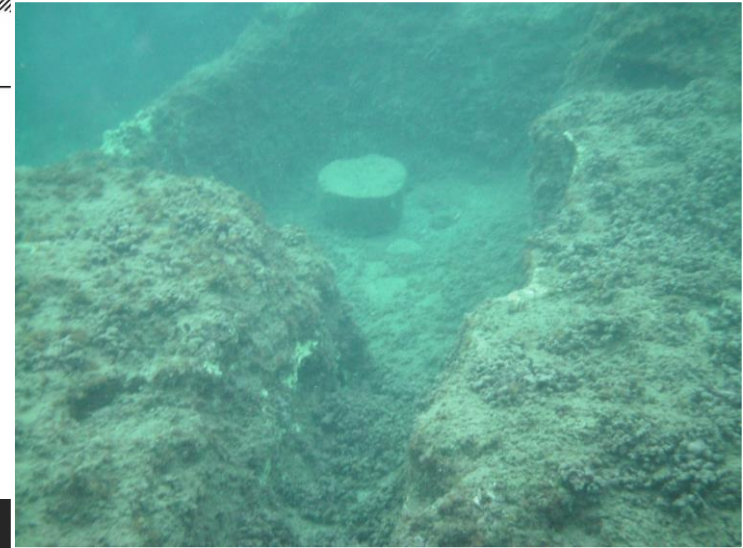
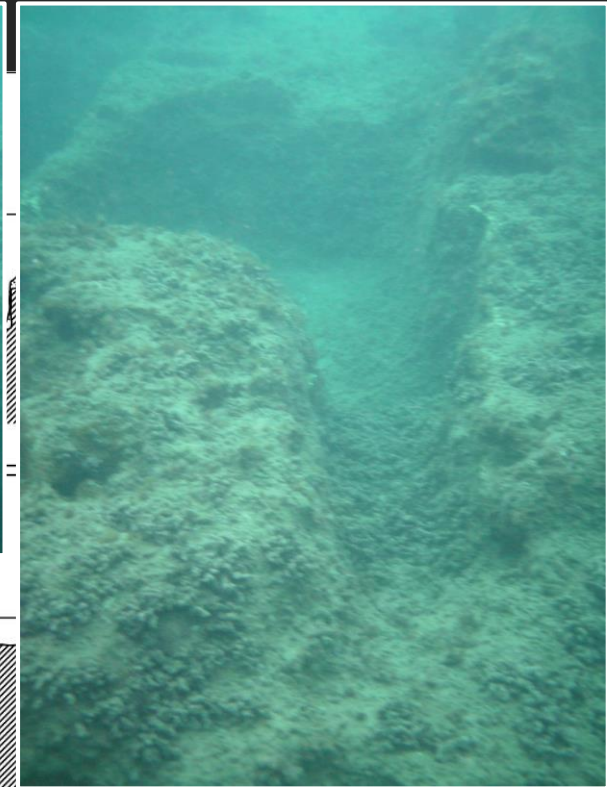
35°19'20.80"N

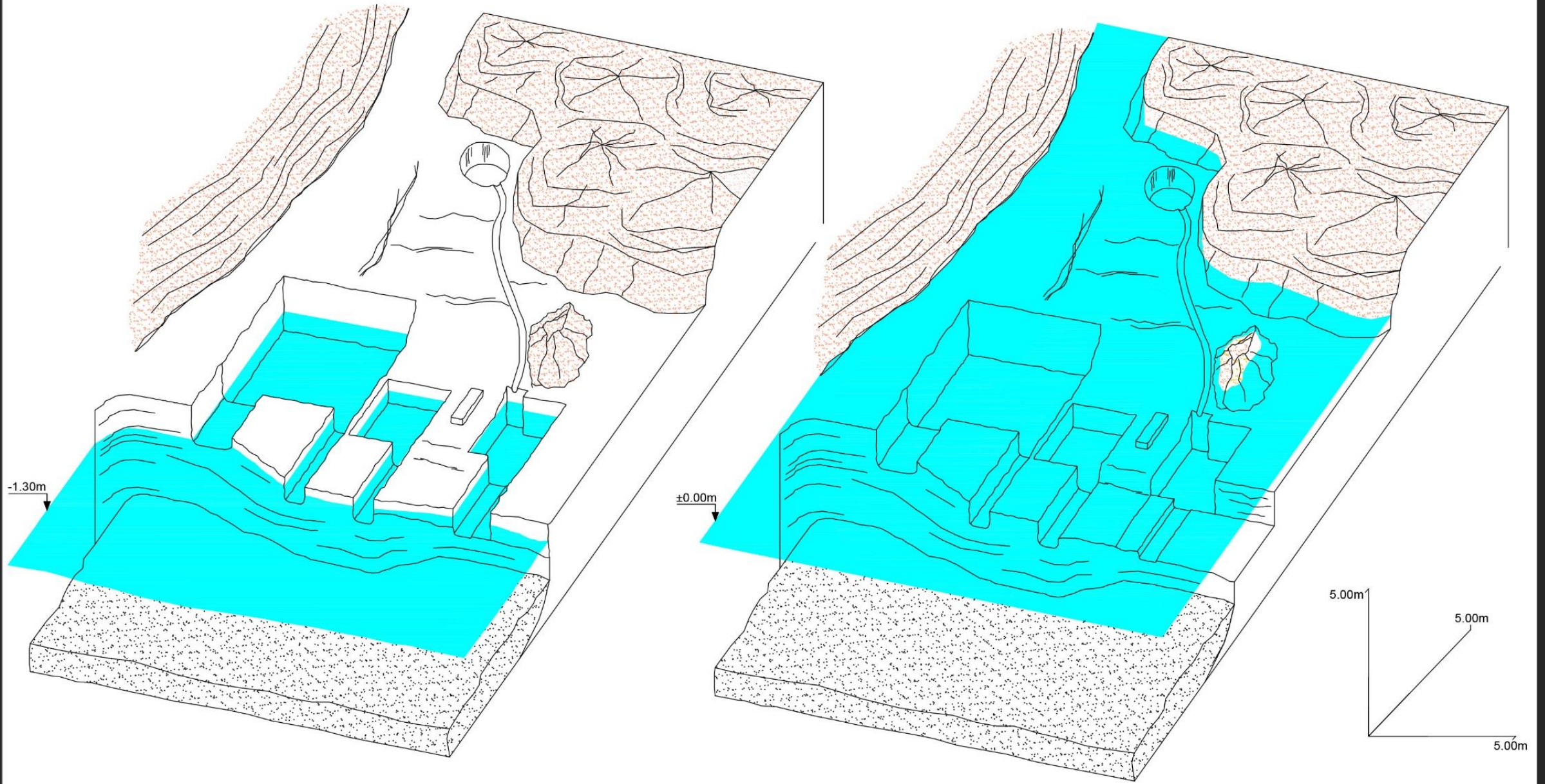


E 25°23'27.06"

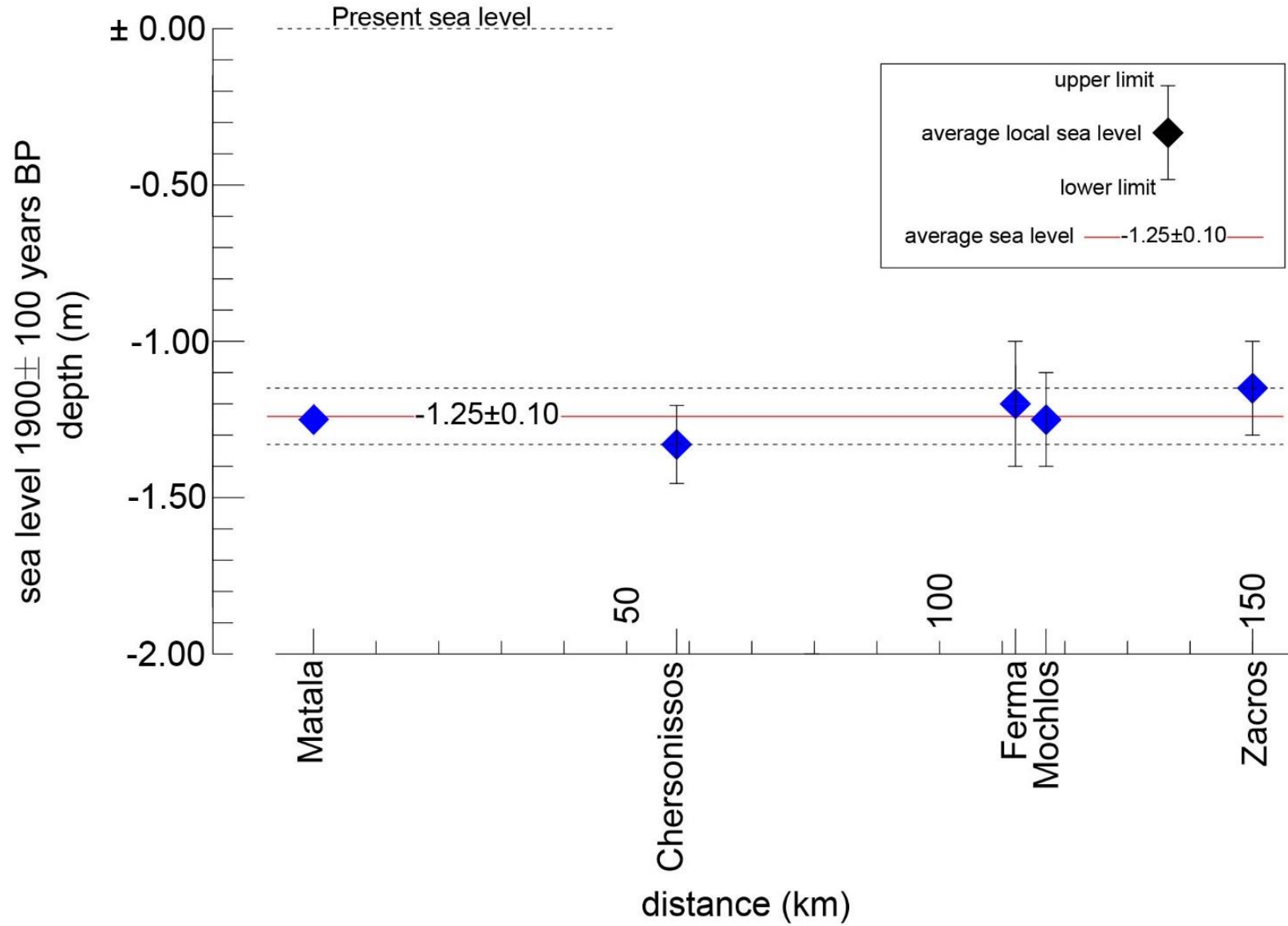
E 25°23'49.25"

35°19'20.80"N



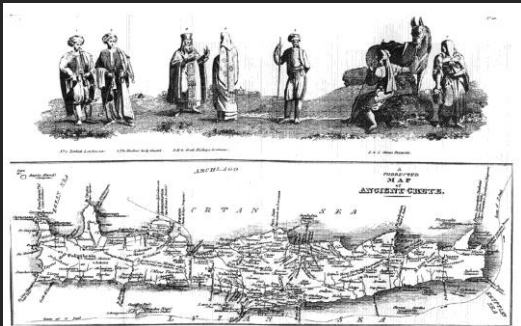


Roman sea level stand in Crete



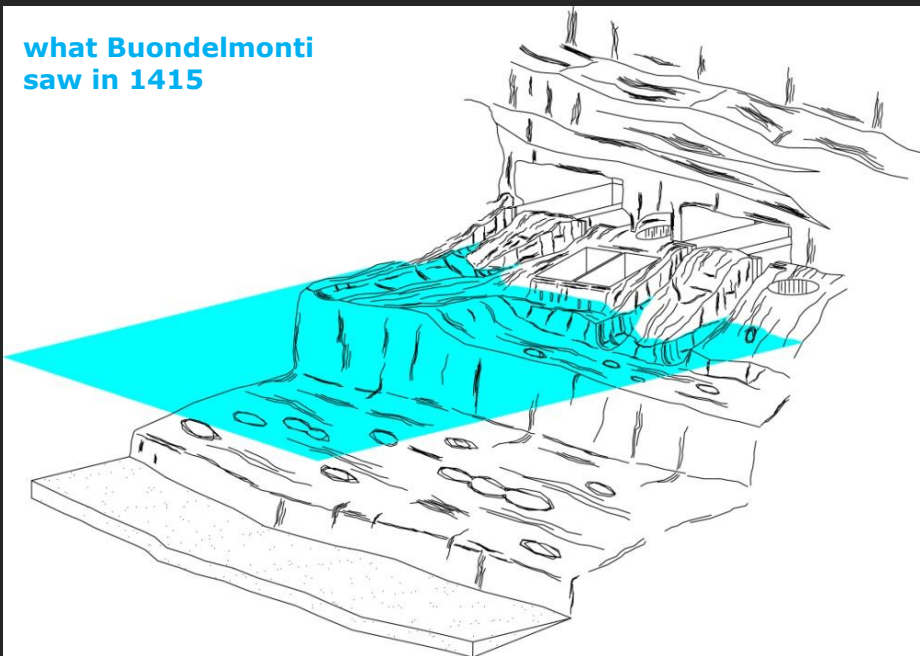
When were the fish tanks of eastern Crete submerged?

In 1415, the Florentine traveler *Christoforo Buondelmonti* described the fish tanks of Matala in his book: *“Descriptio insule Crete: et, Liber insularum”*



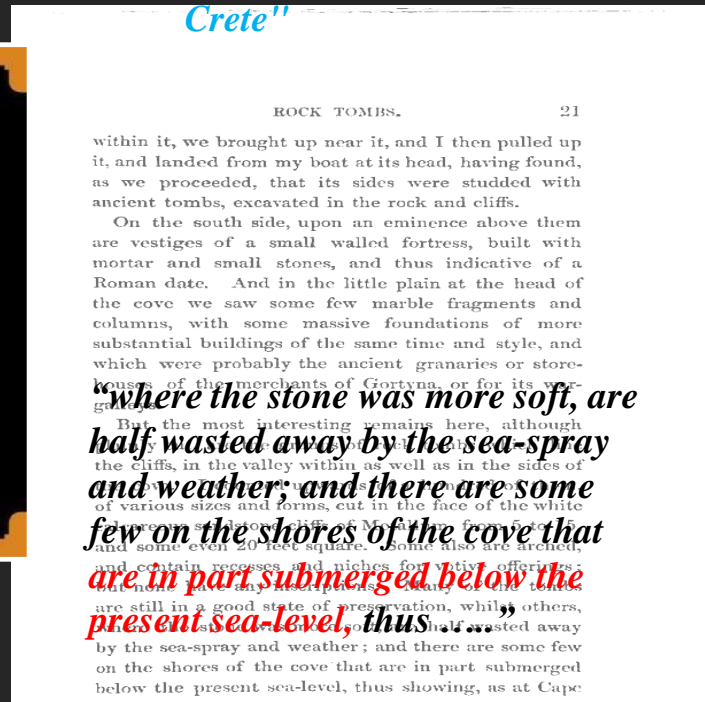
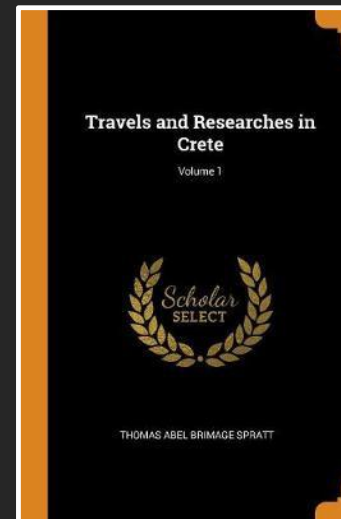
“Look at the edge of the sea at those fish-tanks, cut from rock, where sea water could go up and down by a system of narrow channels”

what Buondelmonti saw in 1415

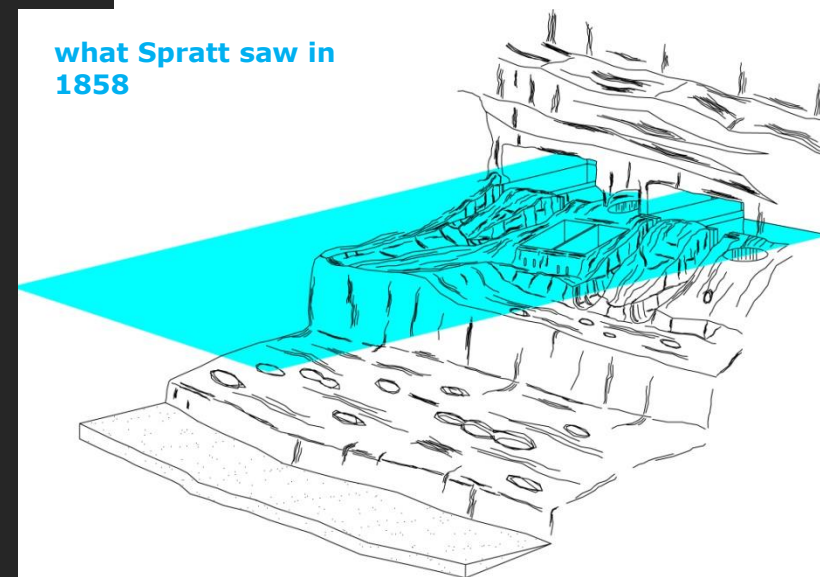


The submersion is probably related to the strong earthquake of 1604 (M=6.8) centered off the southern coast of central Crete. The earthquake was devastating and caused ground subsidence throughout the island (Stavrakakis 1890; Kriaris 1930-1935; Platakis, 1950; Papazachos and Papazachou, 1989).

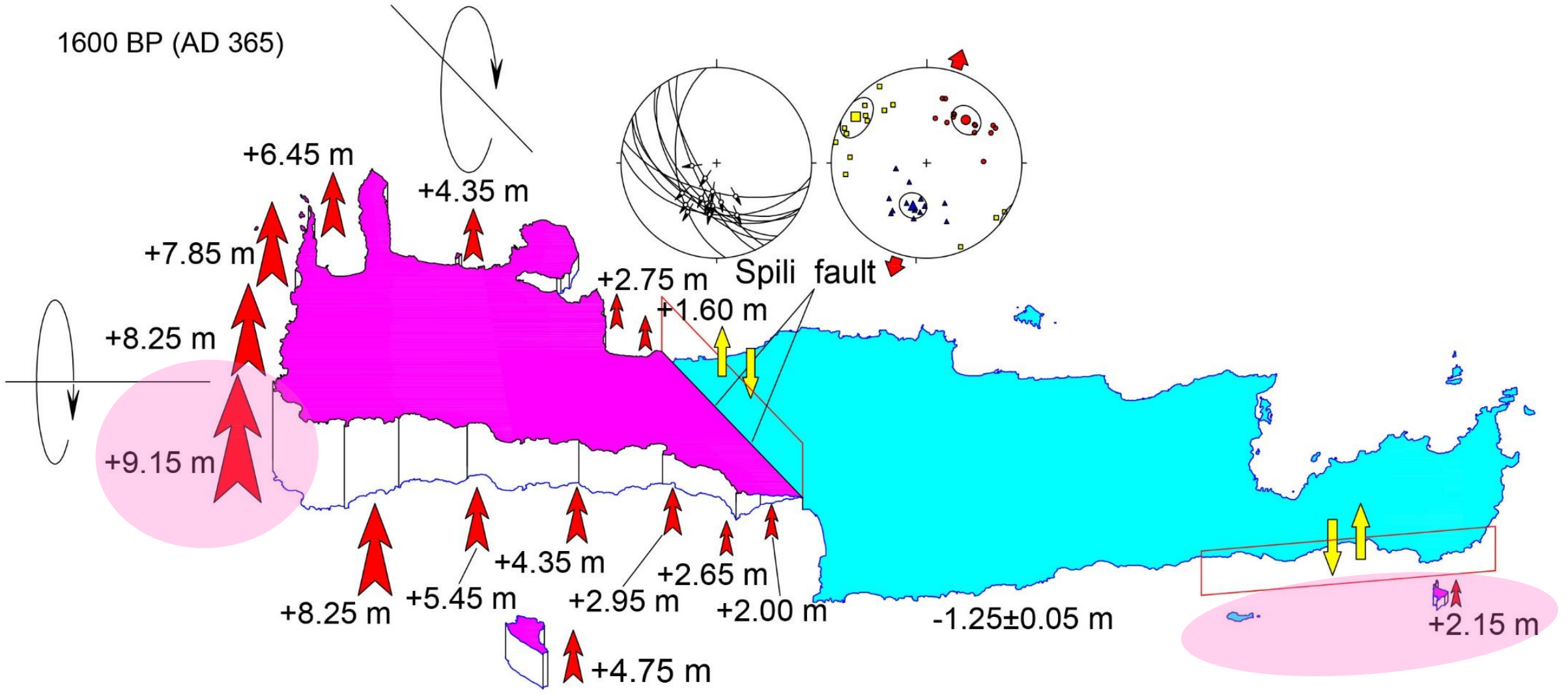
In 1865, the English vice-admiral *Thomas Spratt* reported in his book: *“Travels and Researches in Crete”*

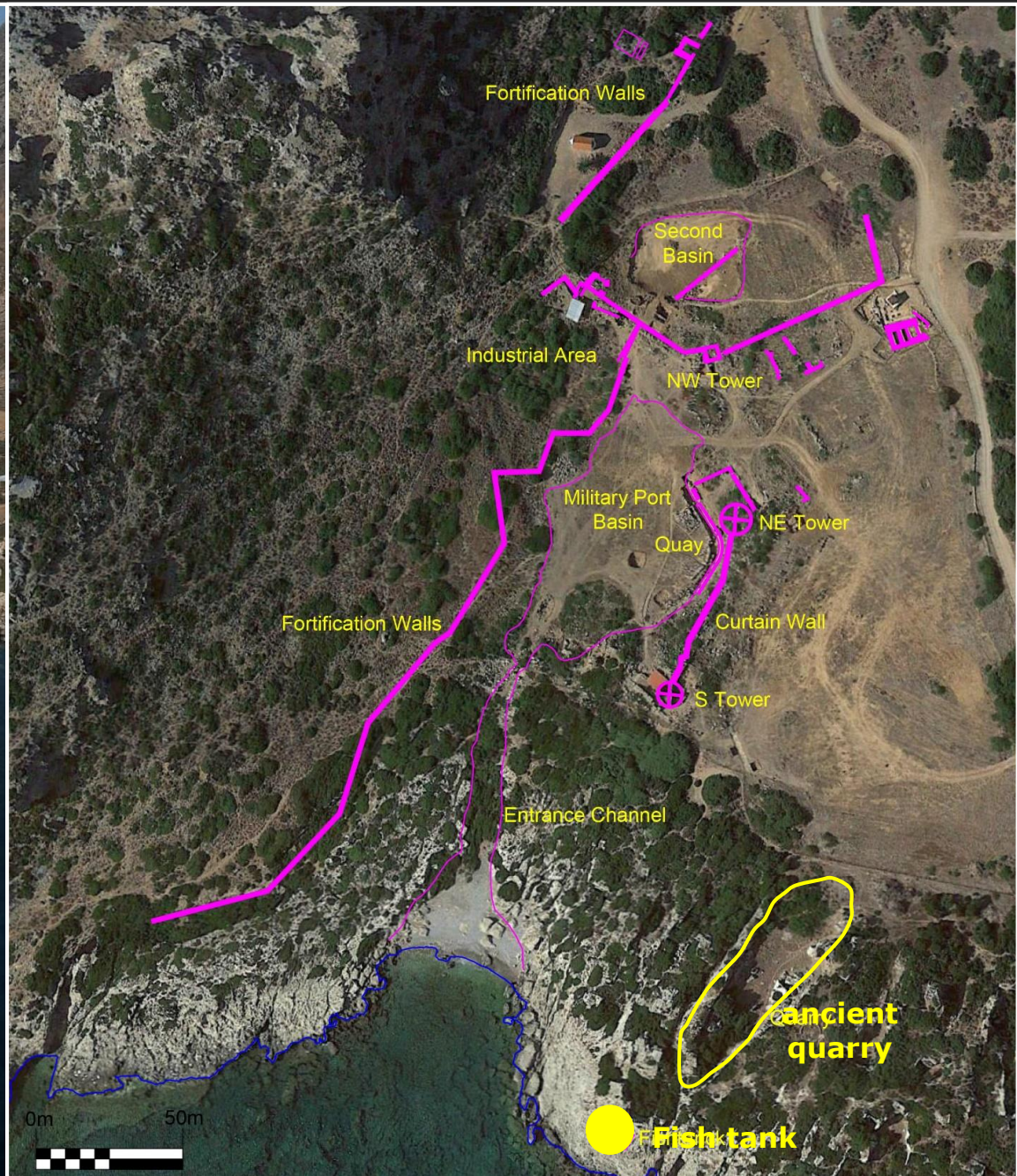


what Spratt saw in 1858



1600 BP (AD 365)







+6.60m 365AD

+6.50m 66 BC

+6.32 67 BC

+6.00m 4th century BC

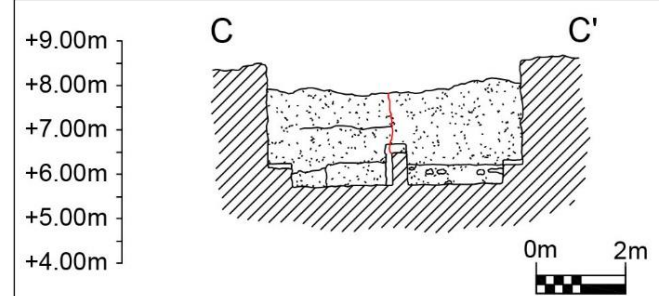
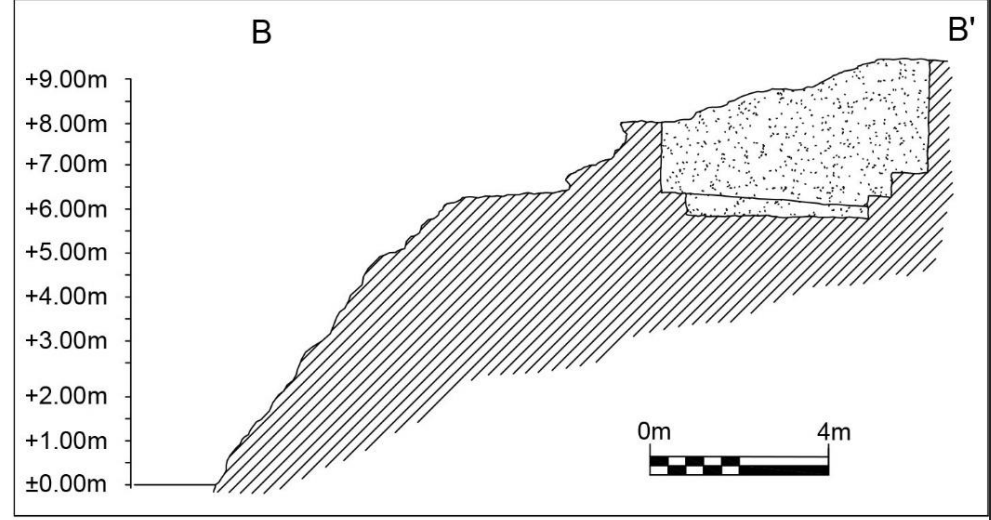
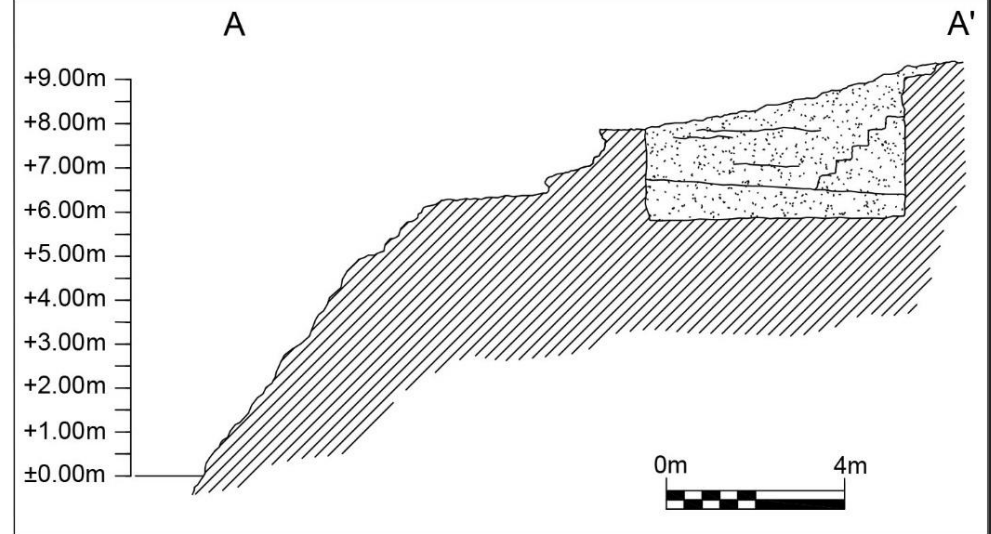
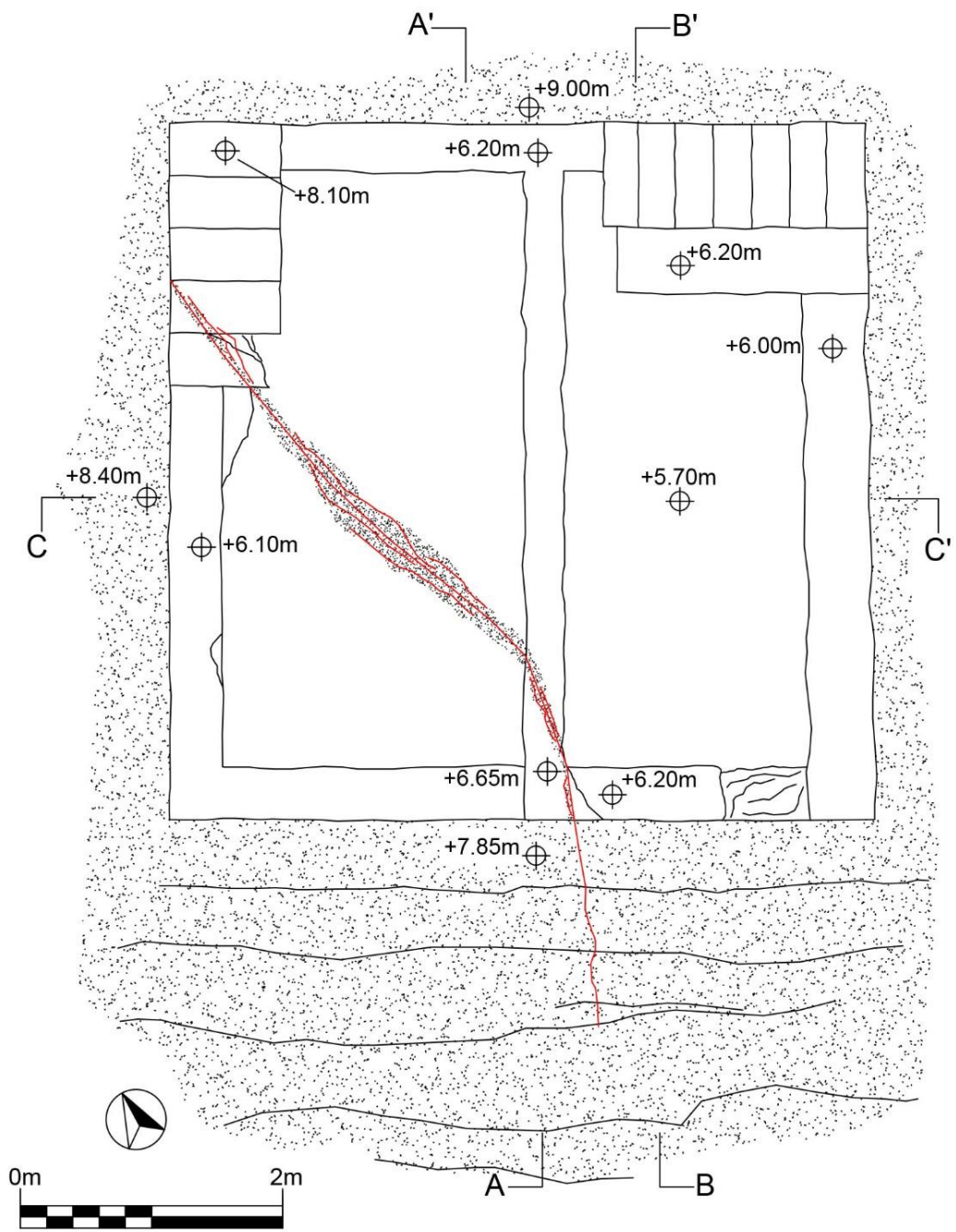
uplift

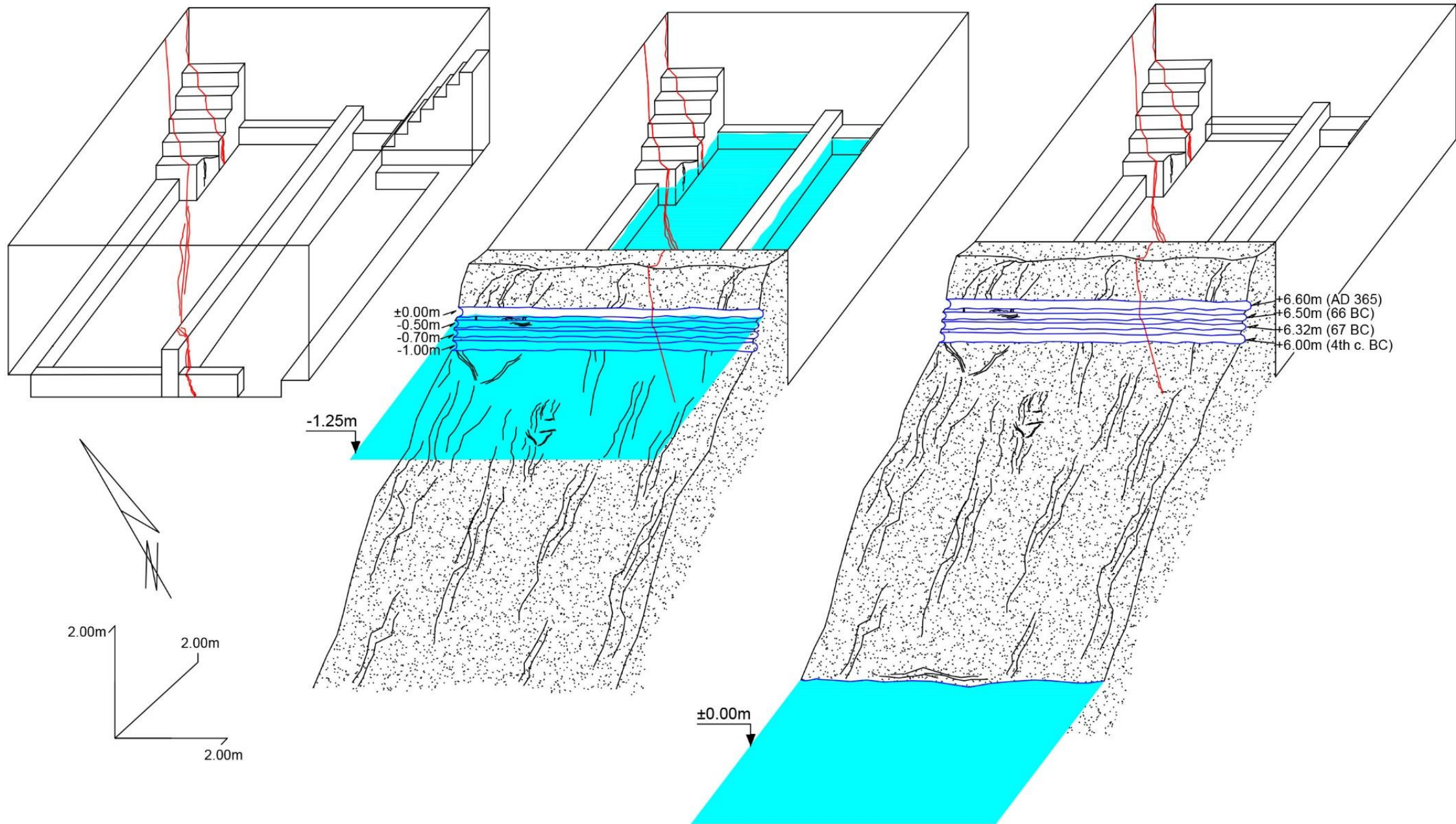
subsidence





outer seaward side







Thank you for your attention!