



Roman coastal settlement at Fazine near Portoroz/Portorose (Slovenia): recent research of harbour complex with fish ponds (1st century BC – 6th/7th century AD)

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Irun, 3/4/5 November 2021
International Congress ENTRE MARES :
LOCATION, INFRASTRUCTURE AND ORGANISATION OF ROMAN PORTS



Roman coastal settlement at Fizine near Portorož / Portorose (Slovenia): recent research of harbour complex with fish ponds (1st century BC - 6th/7th century AD)

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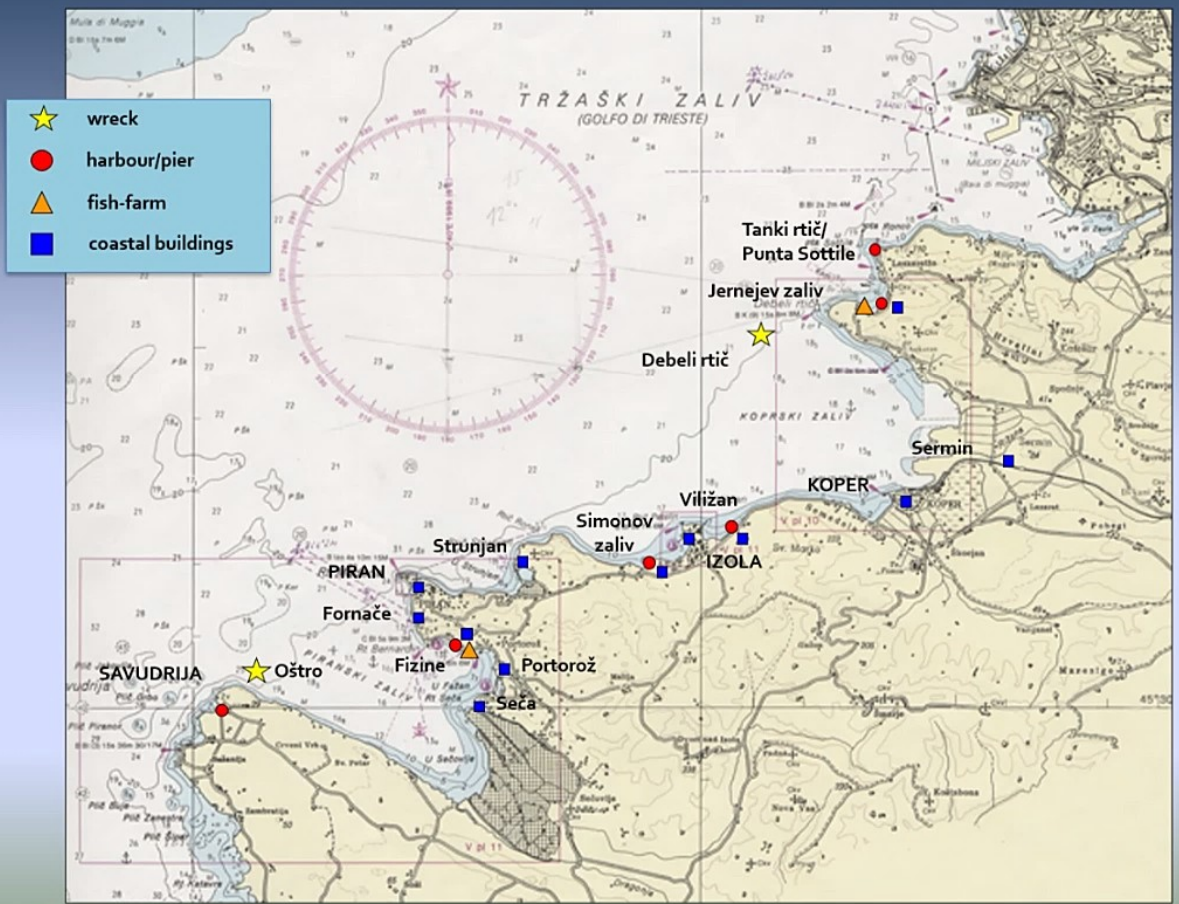
**Institute for Underwater Archaeology



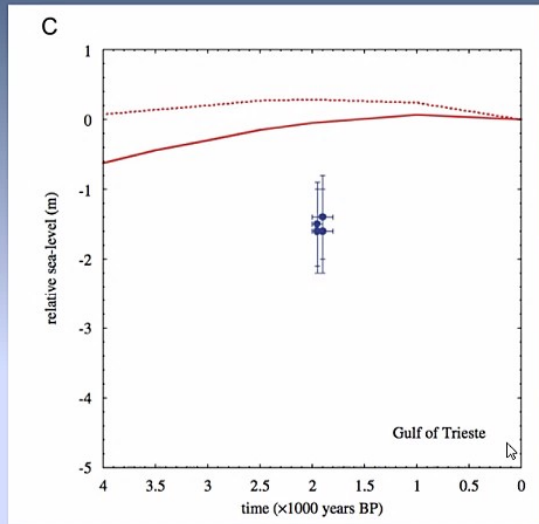
Entre Mares

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Archaeological sites from Roman Antiquity at the southeastern part of the Gulf of Trieste

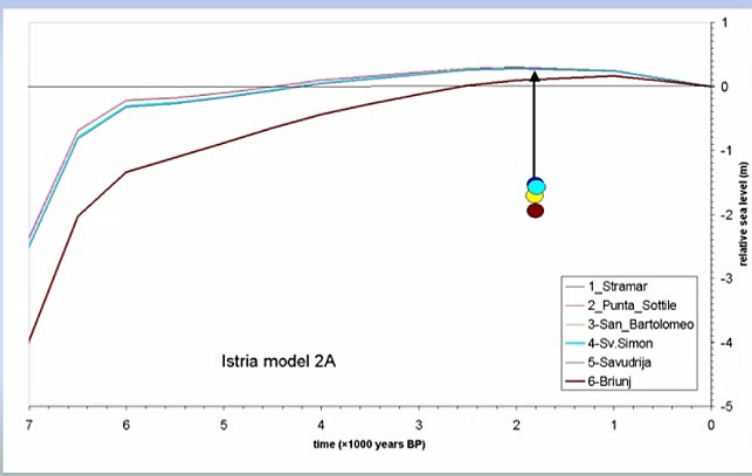


Relative rise of the sea-level in Holocene Subsidence of the coast as the result of global isostatic adjustment and tectonics



Southern part of the Bay of Trieste subsided from 1.4 to 1.6 m in the last 2000 years at the rate around 0.75 mm per year.
Relative sea-level change is estimated at -1,53 m +/-0.08 m and 1,70 +/-0.10 m.

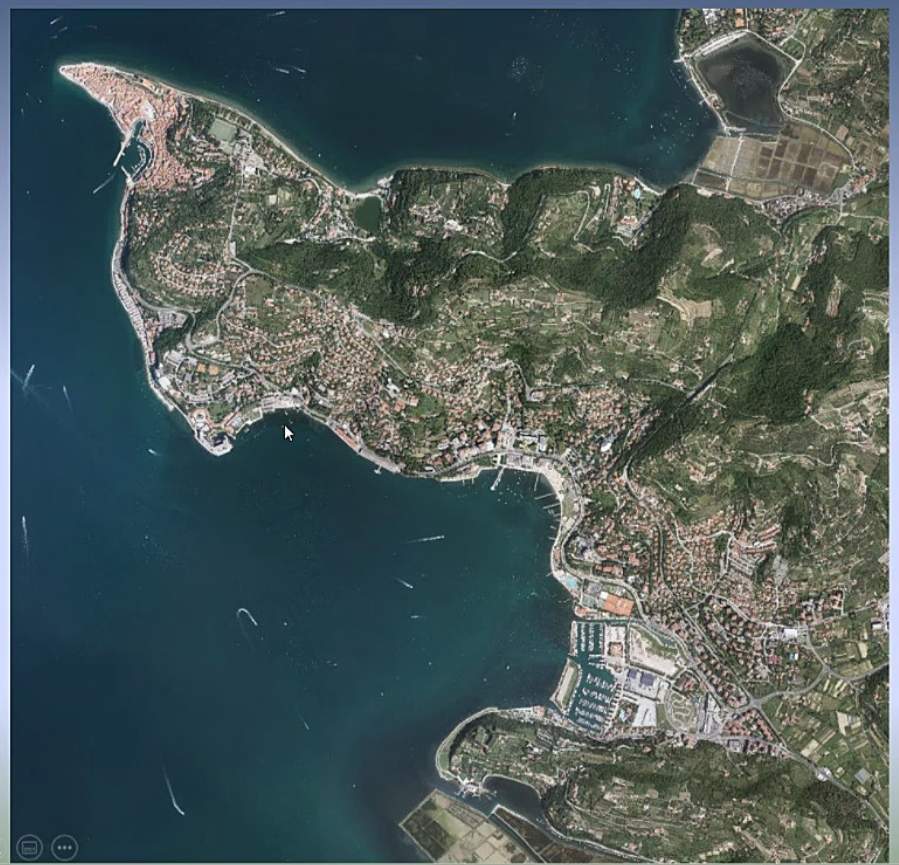
The difference between archaeological and geomorphological evidence and used predictive model of the sea-level rise (Lambeck et al. 2006) is the consequence of active tectonics in the last 2000 years.



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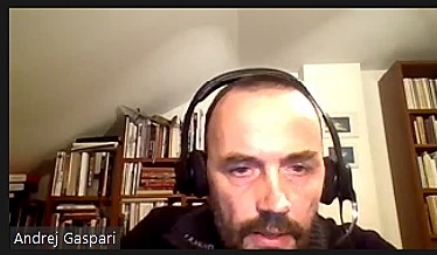
Fizine near Portorose

Roman coastal settlement with harbour and fishponds
1st century BC– 6/7th century AD



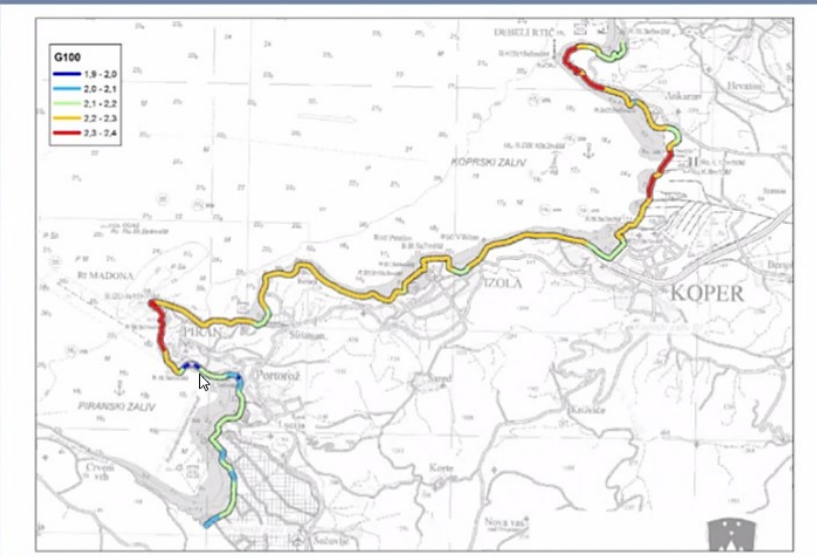
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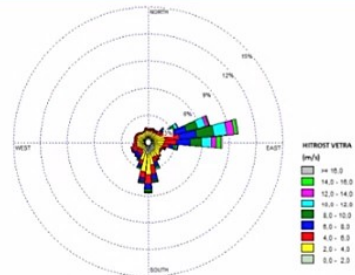
Fizine near Portorose Roman coastal settlement with harbour and fishponds 1st century BC– 6/7th century AD

The most quiet bay in the whole Slovenian coast of NW Istria.

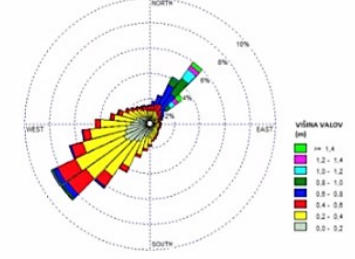


Slika 7: Prikaz vrednosti G100 vzdolž celotne slovenske obale. Vrednosti predstavljajo višino v državnem višinskem koordinatnem sistemu izraženo v metrih (Centa in dr. 2014).

tide height/100-years return + wave's height/2 year return



Slika 1: Roža vetrov za celotno obdobje meritev od 20. 6. 2008 do 9. 2. 2011 (36 smeri).



Slika 2: Roža valov za celotno obdobje meritev od 20. 6. 2008 do 9. 2. 2011 (36 smeri).

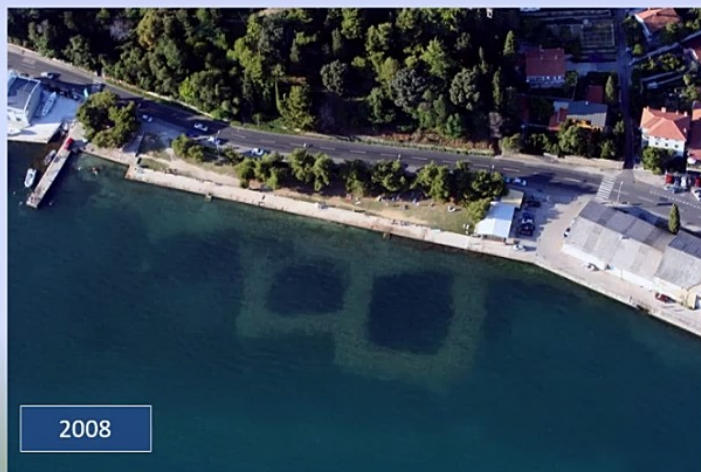
Wind rose



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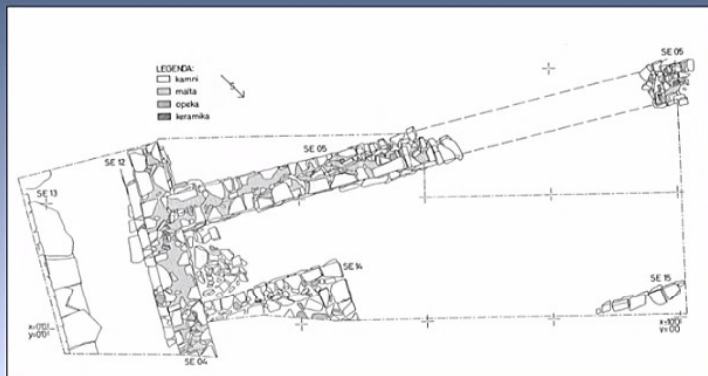
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Fizine near Portorose

Roman coastal settlement with harbour and fishponds

1st century BC– 6/7th century AD

Rescue excavations in 1998
Intermunicipal Institute for the Protection
of the Natural and Cultural Heritage,
Piran



Economic and residential buildings in the the cove

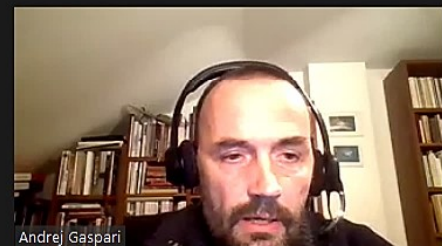
The excavation revealed parts of the masonry architecture, including the hallway leading from the presumed coast into the interior of the settlement

Two building phases were documented:

- I. Imperial (Early 1st–2nd century AD)
- II. Late Roman (4th–6/7th century AD)



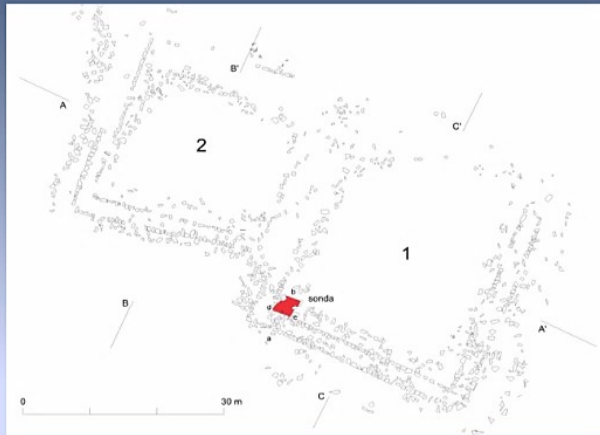
The excavation reached the **mid-1st Century BC beach deposits and embankment at 0,0 asl. level**, but the existence of older structures is very probable



Fizine near Portorose
Roman coastal settlement with harbour and fishponds
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Underwater test excavations in 2005

Underwater archaeology workgroup of the Institute for the Protection of the Cultural Heritage of Slovenia



The walls with faces made of calcarenite flysch blocks were erected on the jetties of smaller stones

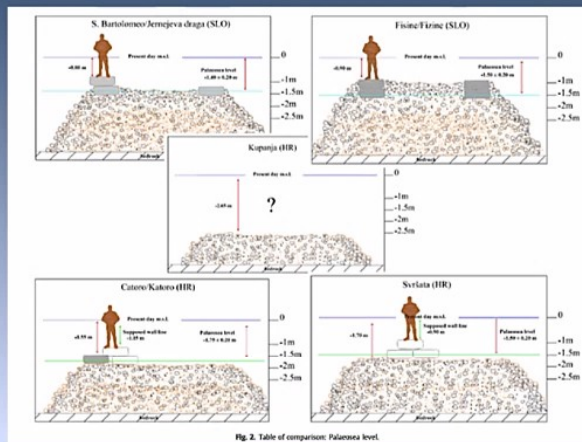
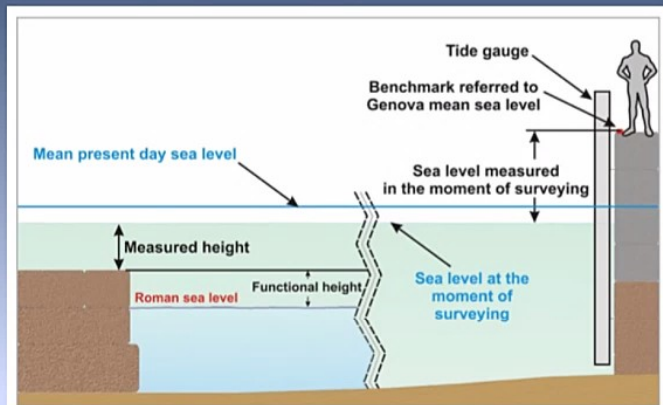


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Fizine near Portorose

Roman coastal settlement with harbour and fishponds

1st century BC– 6/7th century AD



Preserved floor surfaces and presumed functional heights of the fishpond perimeter walls above the mean sea level enable the calculation of the sea level change and the rate of tectonic subsidence

Table 1
Data and measurements.

A	B	C	D	E	F	G	H	I	L	M	N
Site name	Survey date (yyyy/mm/dd, h)	Type and measured height (m)	Coordinates	Archaeological age (yr BP)	Tide(m)	Corrected height (m)	Functional height (m)	S. I. change (m)	Predicted values from Selen model	tectonic rate (mm/years)	References
1. Jernejeva draga	2005/11/10, h 15:10 GMT	Walking surface, -0.70	45.5930° 13.7151°	1900 ± 100	-0.10	-0.80	0.60	1.40 ± 0.20	-0.21	-0.63	Antoninoli et al. (2007)
2. Fizine Fizine	2005/07/8, h 13:30 GMT	Walking surface, -0.80	45.514640°	1900 ± 100	-0.10	-0.90	0.60	1.50 ± 0.20	-0.20	-0.68	Gaspari et al. (2006, 2007), Stokin et al. (2008)
3. Katoro Katoro	2007/07/12, h 10:00 GMT	Top of the blocks, -1.3	13.580701° 45.460447° 13.516530°	1900 ± 100	-0.25	-1.55	0.60	1.75 ± 0.20	0.23	-0.8	This paper
4. Kupanja	2004/07/29, h 15:00 GMT	Embankment-2.65	45.2829° 13.5923°	1900 ± 100	-0.00	-2.65	0.60	1.40 ± 0.20	-0.25	-0.61	This paper
5. Svrata	2008/07/31, h 10:15 GMT	Embankment, 1.60	43.8624° 15.2704°	1900 ± 100	-0.10	-1.70	0.60	1.50 ± 0.2	-0.58	-0.48	This paper

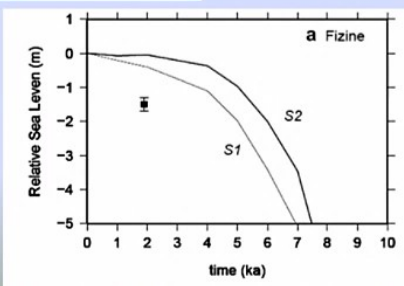


Fig. 9. The predicted sea-level curves at Fizine and Svrata (the northern and southern sites) compared at the altitude and the archaeological age of the fishponds.



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Fizine near Portorose

Late Roman mooring area

3rd – 5th ct AD

Underwater test excavations in 2017
Consortium for Underwater Archaeology
(commercial enterprise, established for public tender) & Institute for Underwater Archaeology (NGO)



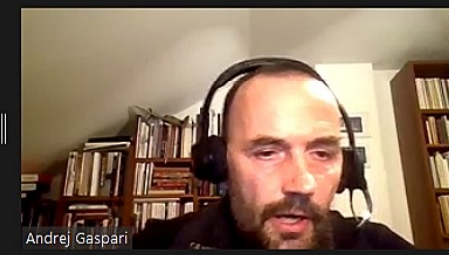
Underwater trenching and preventive excavations in the inner part of the bay (before the renovation and enlargement of the training pier of the Faculty of Maritime studies and transport) revealed the **Late Roman mooring area** of the ancient harbour at Fizine



Fizine near Portorose

Late Roman mooring area
3rd – 5th ct AD

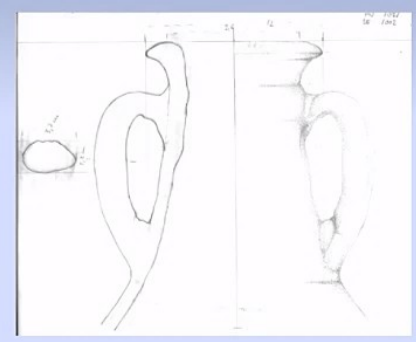
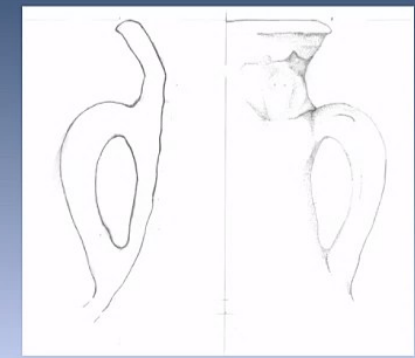
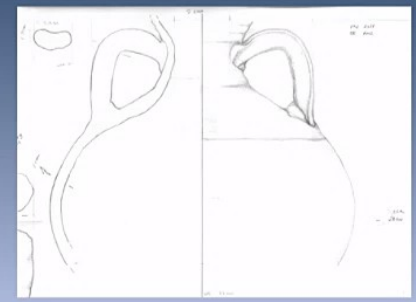
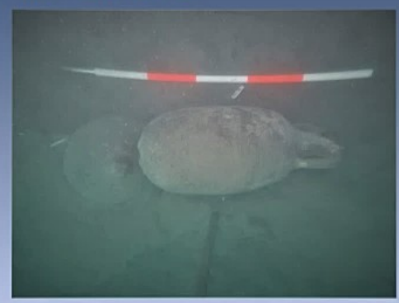
Underwater test excavations in 2021
Consortium for Underwater Archaeology
(commercial enterprise, established for public tender) &
Institute for Underwater Archaeology (NGO)



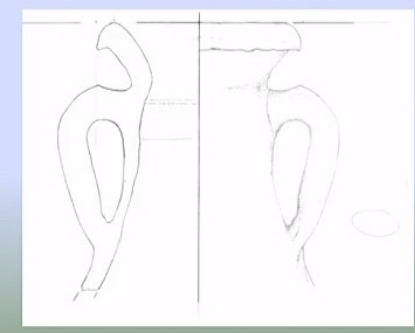
Fizine near Portorose

Late Roman mooring area

3rd – 5th ct AD



The ceramic finds predominantly consist of **African amphorae** (IIIa, IIIb, Keay XXV) and **fine tableware** from mid-4th to 5th century AD



Fizine near Portorose

Late Roman mooring area

3rd – 5th ct AD



One of the piles (l. 155 cm; diam. 6.5 cm) was made of reused pole from spruce wood (*Picea abies*).

Perhaps of it is a yard (antenna) of a square-sail or pole of a supported sprit-sail,

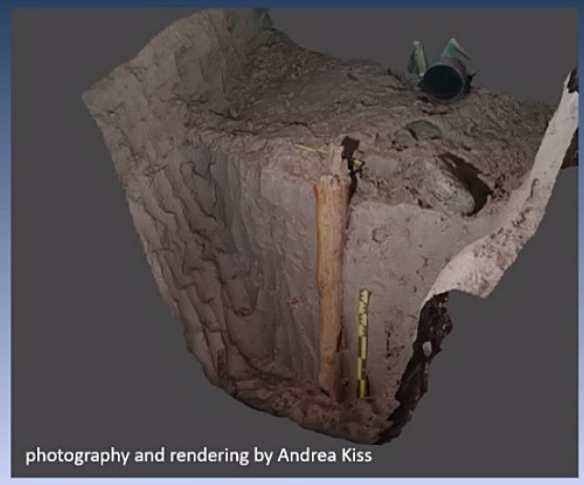
radiocarbon dated to late 3rd/4 century AD.



Sprit-sails were in use from 2nd ct. BC to around 200 AD. They reappeared primarily in Aegean and in Adriatic traditional navigation.



Mast(head)?
(Picea abies; c. 35 years)
 Preserved length: 1.01 m
 Diameter at the lower end: 11.5-12.0 cm
 Diameter at the upper part: 10.0 cm
Disc sheave with concave funnel
 Rectangular slot dimension: 10.5 x 2.8 cm
 Max. diameter: 8 cm; thickness: 2.5 cm
 Pin diameter: 1.1 cm

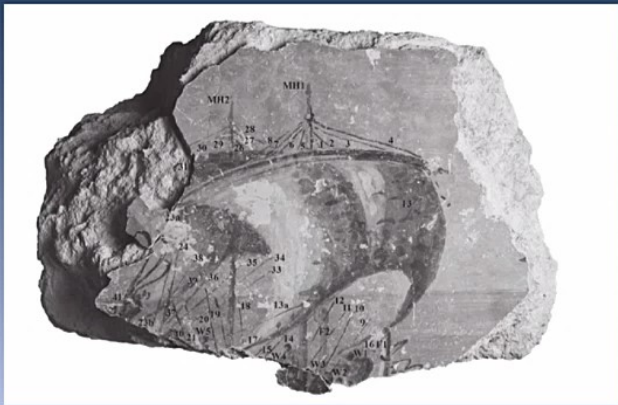


secondary tapered and straight cut end

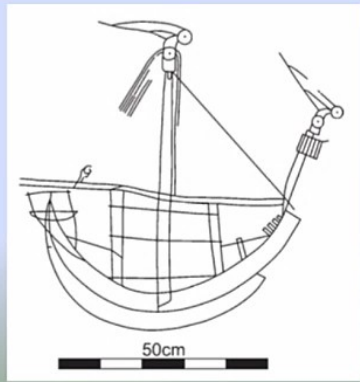




Graffito of a ship, Cucuron, 50 - 75 AD
square sail
(Pomey 1993)



painting of a war ship, Herodium, 20 - 15 BC
masthead sheave for halyard
(Kahanov et al. 2015)



Graffito of a ship, Corinth, 5th/6th century
square or lateen/settee sail
(Whitewright 2017)



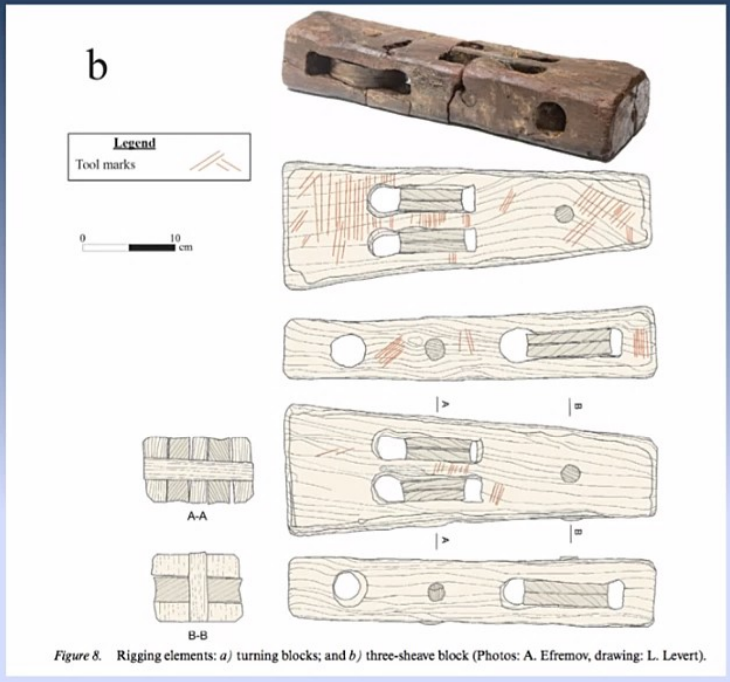


Figure 8. Rigging elements: a) turning blocks; and b) three-sheave block (Photos: A. Efremov, drawing: L. Levert).

Ma'agan Mikhael, c. 7th/8th century
 Block from the halyard system
 (Cohen, Cvikel 2020)

Table 2. Three-sheave block (dimensions in mm)

Artefact no.	Total length	Average width	Average thickness	Hole, average diameter	Pin 1, average diameter	Pin 2, average diameter	Sheave 1, diameter, thickness	Sheave 2, diameter, thickness	Sheave 3, diameter, thickness
286	419	122	84	38	18	20	69, 23	69, 23	84, 25



Fig. 11-4. RG 1 and RG 1 reconstructed. Scale: 1:3

Serçe Limani, c. 1025
 Upper block from the foremast halyard system
 diameter 88mm, mid thickness diameter 78mm, thickness 26mm, pinhole diameter 28mm

