

Beneath the waters of Nemi: High-resolution mapping, memory, and archaeological insights

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4 Direttrice Museo delle Navi romane di Nemi, Direzione Regionale Musei Lazio, Roma,

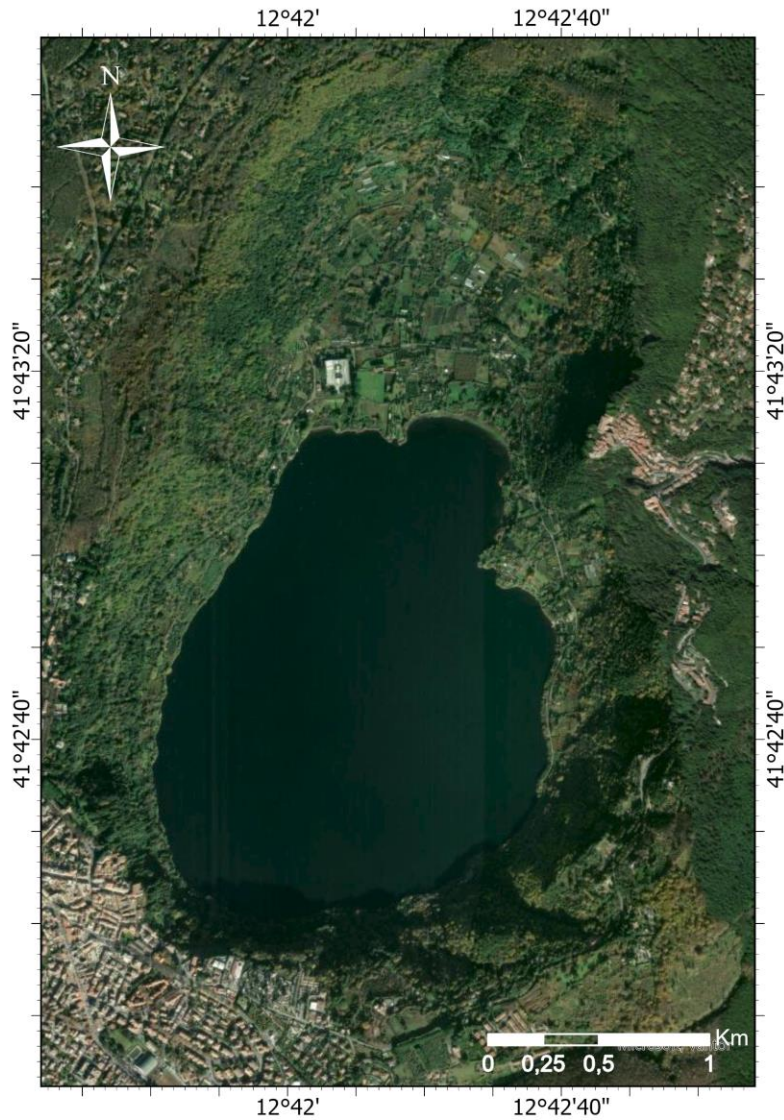
5 Direttrice Laboratorio di Analisi Materiali Antichi, Università Iuav di Venezia

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29 September – 2 October 2026, Genova, Italy.

The Nemi lake



Surface: 1,67 km²

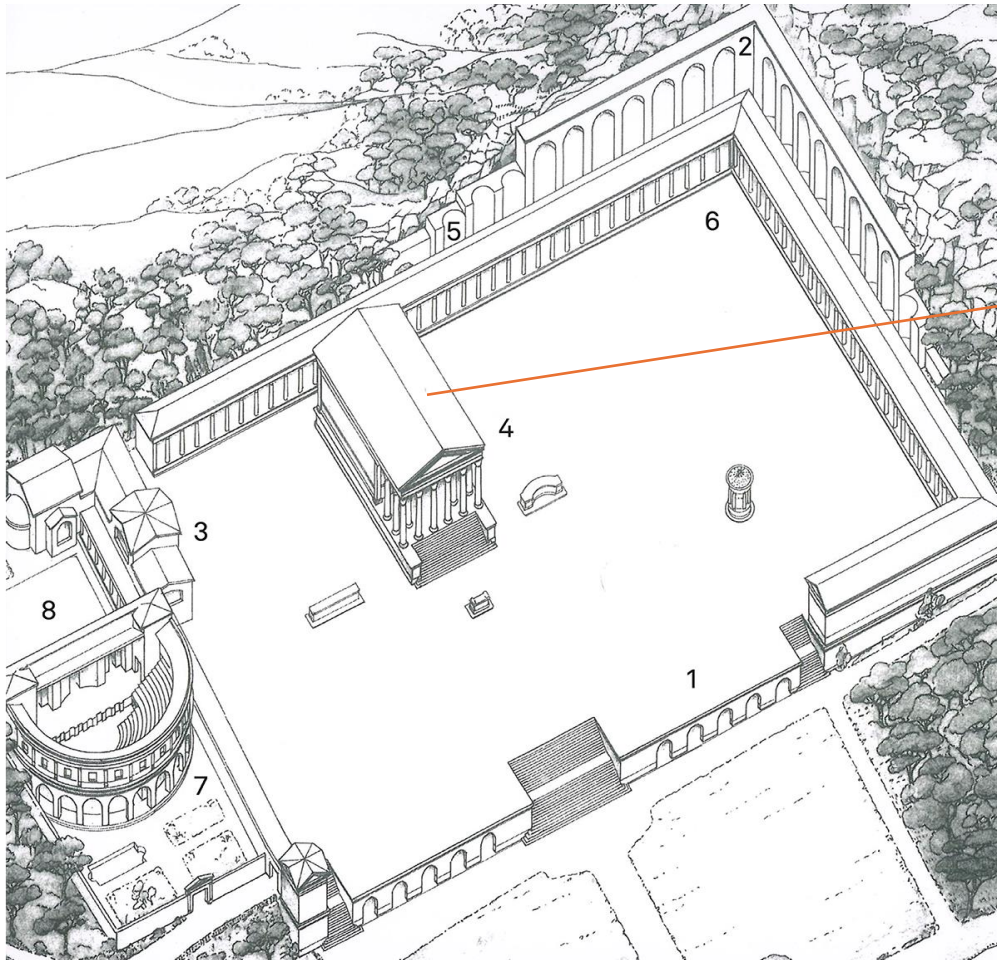
Max depth: 33 m

Volume: 32.000.000 m³

Origin: Volcanic (36.000 years)

Elevation: 316 m

Archaeological importance of Nemi

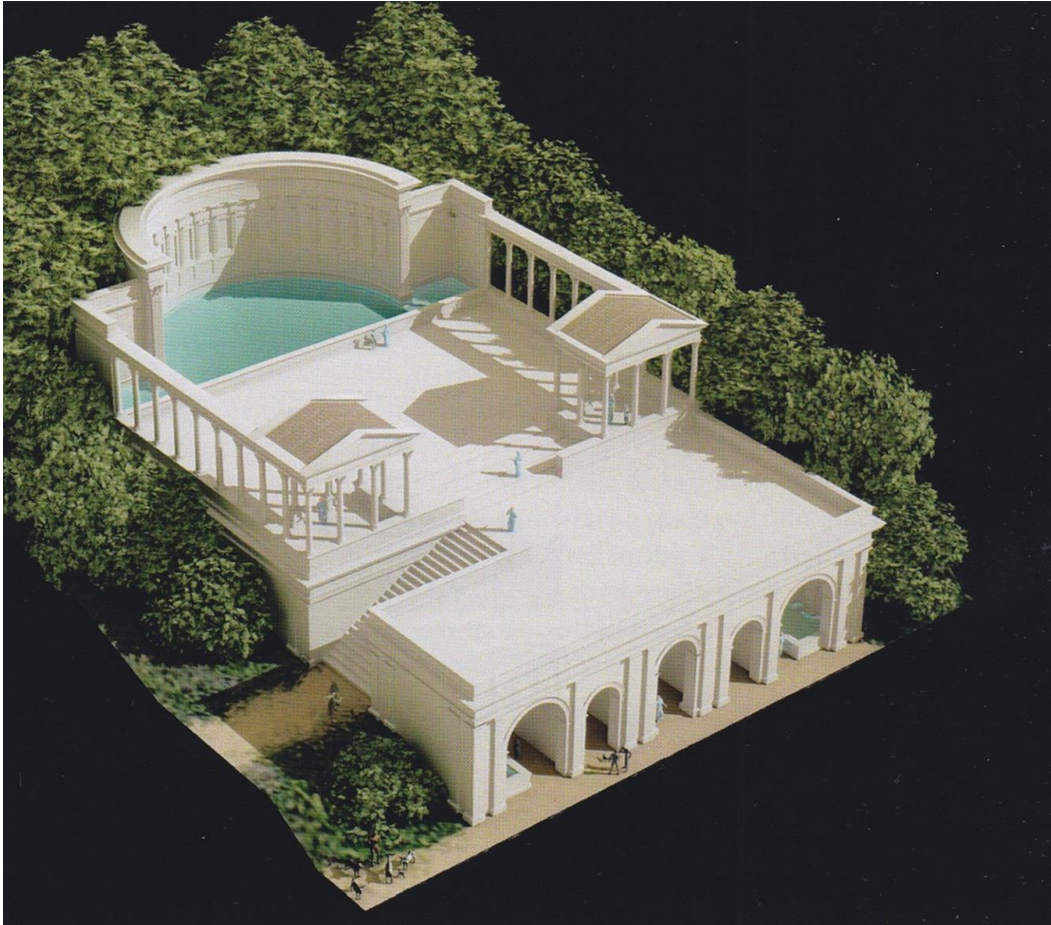


Reconstruction of the Nemi sanctuary with the monumental nymphaeum

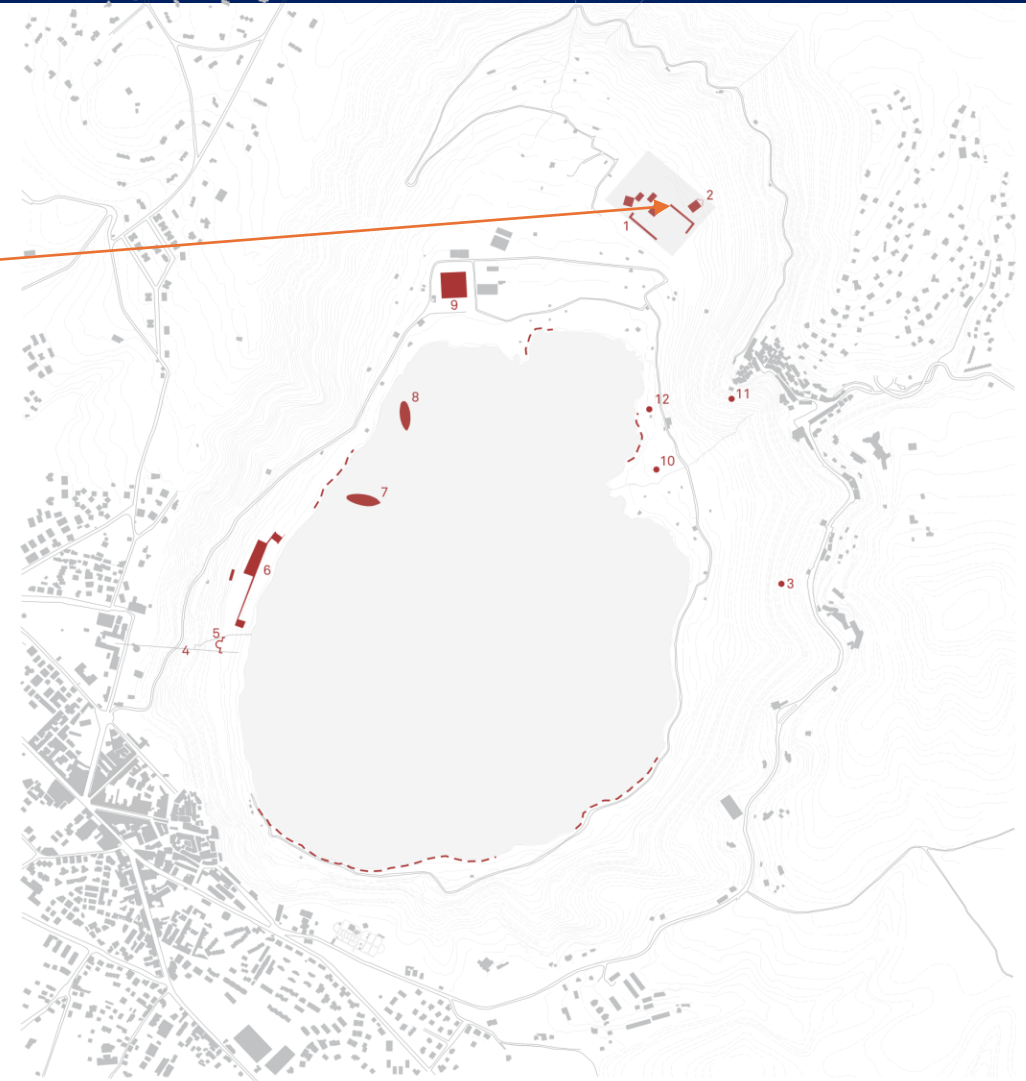


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|--|---|--|
| 1. Santuario di Diana Nemorese | 5. Esedra | 10. Villa con impianto termale romano in località San Nicola |
| 2. Ninfeo di Caligola | 6. Villa di Caligola in località S. Maria | 11. Eremo di San Michele |
| 3. Complesso della villa in località La Cavalleria | 7. Seconda nave | 12. Necropoli "Le Mole" |
| 4. Emissario | 8. Prima nave | --- Banchine romane |
| | 9. Museo delle Navi Romane | |

Archaeological importance of Nemi



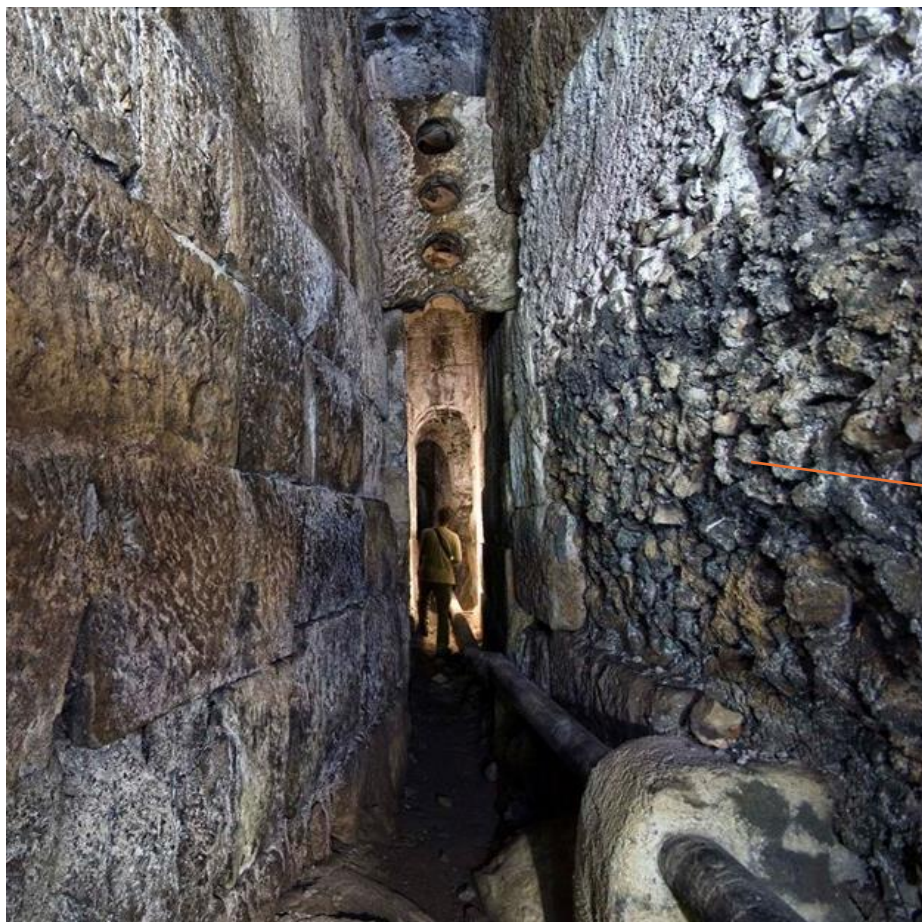
The monumental nymphaeum



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| 1. Santuario di Diana Nemorese | 5. Esedra | 10. Villa con impianto termale romano in località San Nicola |
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Archaeological importance of Nemi



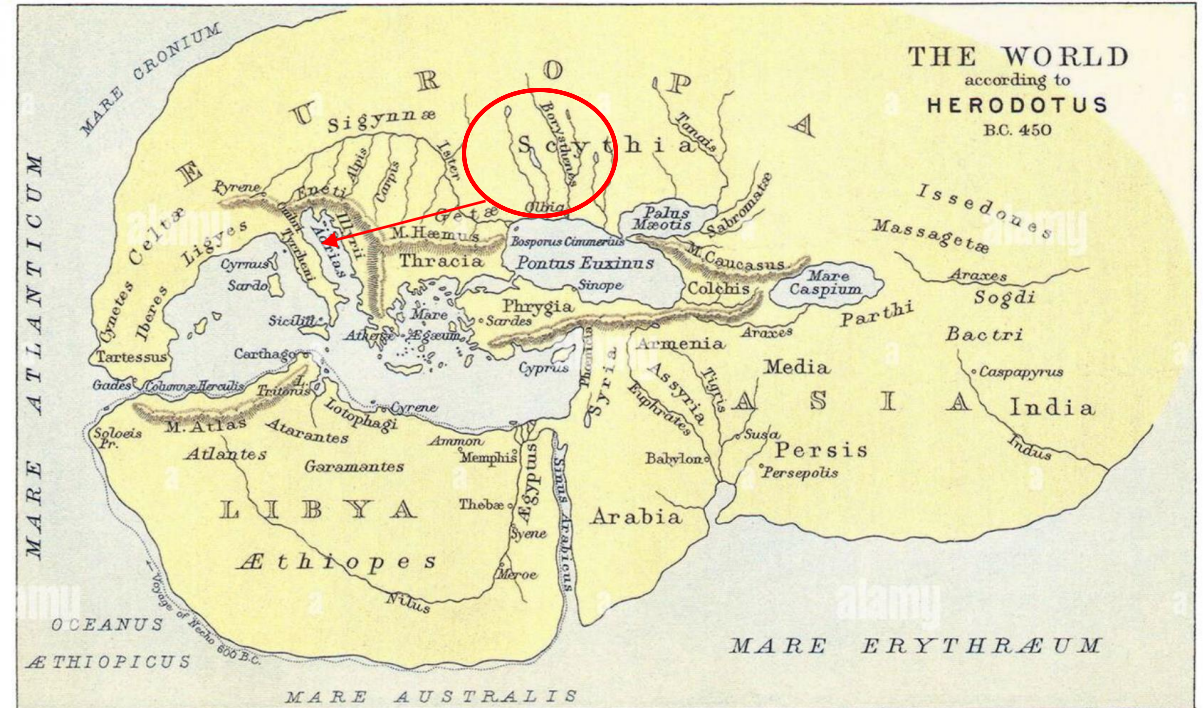
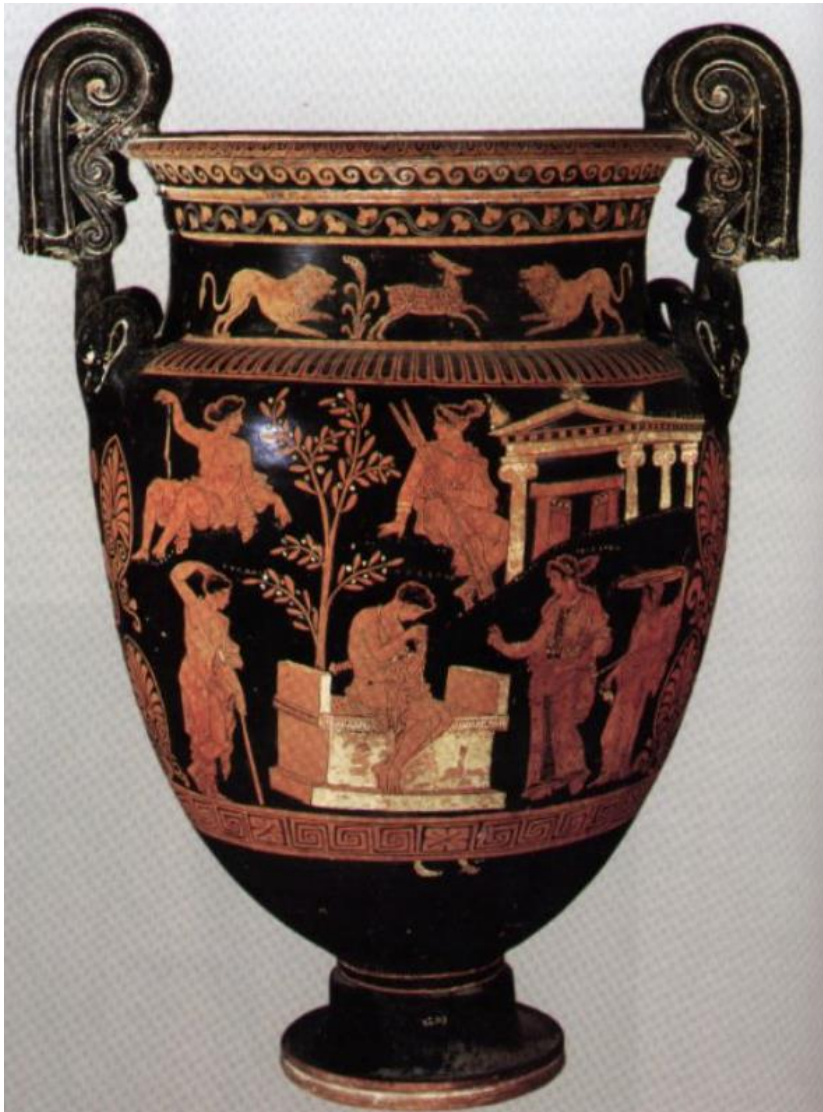
Roman emissary of the lake 1653 m long



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|---|---|---|
| 1. Santuario di Diana Nemorese | 5. Esedra | 10. Villa con impianto termale romano
in località San Nicola |
| 2. Ninfeo di Caligola | 6. Villa di Caligola in località S. Maria | 11. Eremo di San Michele |
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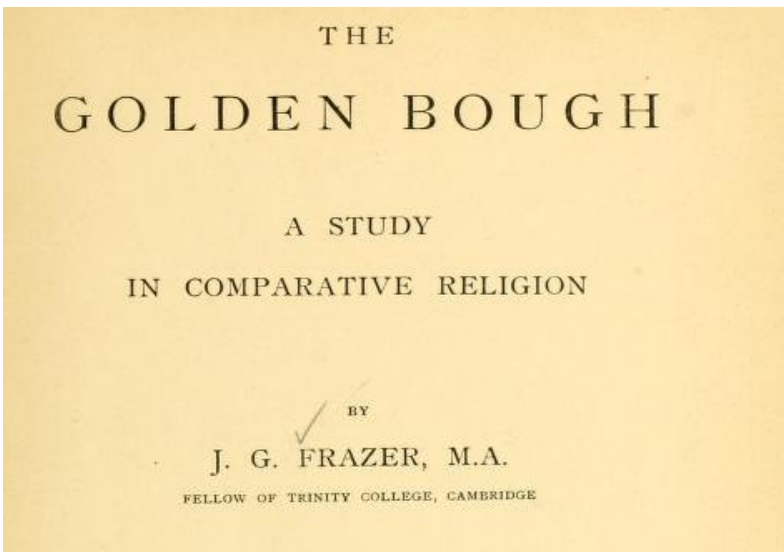
Ancient and modern myths surrounding the lake



The area of the
Tauris in the reconstruction of the world at the time of
Herodotus (5th century BC)

Oreste and Ifigenia in Tauris, 360 a.C.
Naple, Archaeological Museum

Ancient and modern myths surrounding the lake



- *Who does not know Turner's picture of the Golden Bough? The scene, suffused with the golden glow of imagination in which the divine mind of **Turner** steeped and transfigured even the fairest natural landscape, is a dream-like vision of the little woodland lake of Nemi— "**Diana's Mirror**," as it was called by the ancients. No one who has seen that calm water, lapped in a green hollow of the Alban hills, can ever forget it. [...]. Diana herself might still linger by this lonely shore, still haunt these woodlands wild.*
- *Such was the rule of the sanctuary. A candidate for the priesthood **could only succeed to office by slaying the priest**, and having slain him, he retained office till he was himself slain by a stronger or a craftier.*

J. Frazer, incipit of *The Golden Bough*, 1890

top, W. Turner, *Lake Nemi* (oil on canvas, 1827–1828), held at Tate Britain in London;
bottom The English edition of *The Golden Bough* by J. Frazer, 1894

Ancient and modern myths surrounding the lake



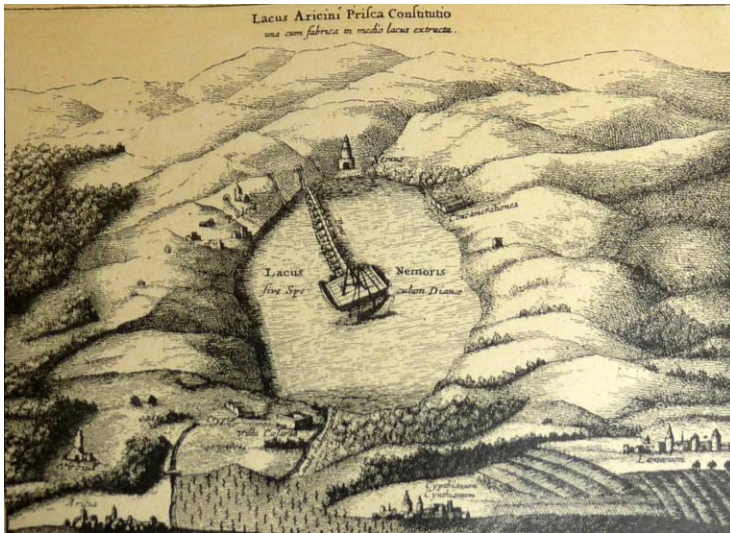
F. Coppola, *Apocalypse Now*, last ten minutes of the film, reference to the myth of *Rex Nemorensis*; shot showing Frazer's book, *The Golden Bough*, on General Kurt's desk.

Ancient and modern myths surrounding the lake



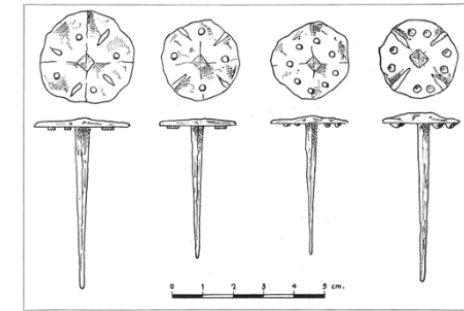
F. Coppola, *Apocalypse Now*, last ten minutes of the film, reference to the myth of *Rex Nemorensis*; shot showing Frazer's book, *The Golden Bough*, on General Kurtz's desk.

Explorations in the lake: Renaissance



li di Nemore inteso alcuna uolta dire, che erano in quel
lago **due nane annegate**, che non erano così putride
anco, che se ne uenissero à pezzi con **le reti**, che ui s'e-

Flavio Biondo, 1474
Roma ristaurata et Italia illustrata.



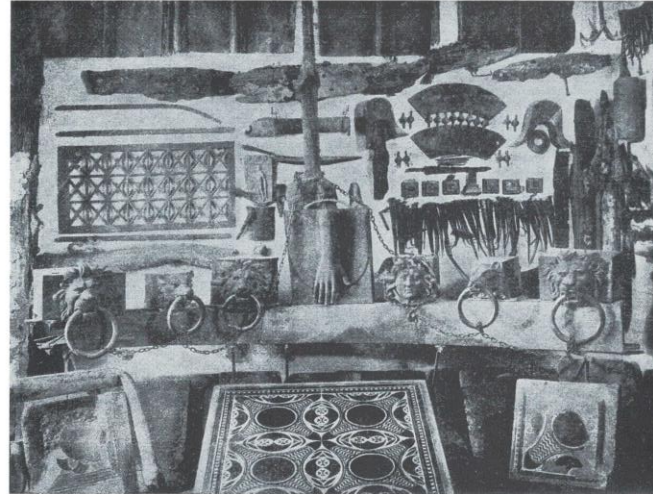
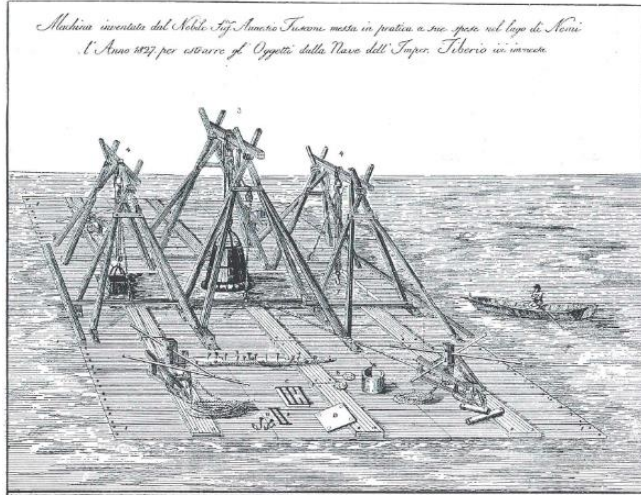
Leon Battista Alberti



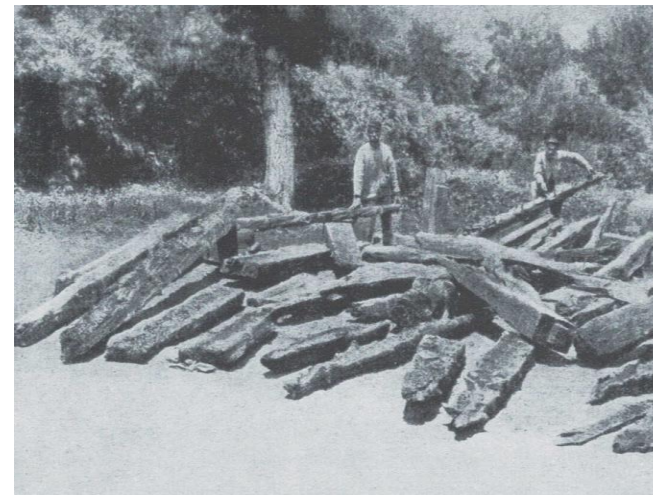
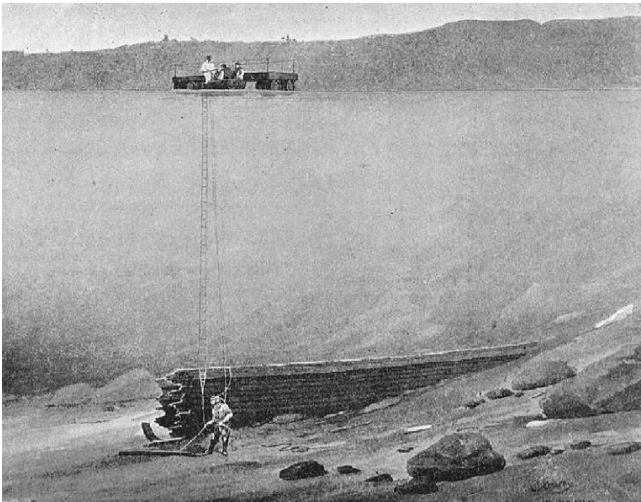
FIG. 5 - FRANCESCO DE MARCHI (1504-1576)

- **1446:** Attempt by **Leon Battista Alberti** with rafts. The first Nemi Ship is found, from piping elements recovered, they understand it is Roman.
- **1535:** Exploration by **Francesco De Marchi** with a wooden bell. First measurements and description of the hulls and other artifacts, such as rounded nails

Explorations in the lake: XIX century



- **1827:** Exploration and recovery of artifacts with Halley bell mounted on a raft, by **Annesio Fusconi**.
- **Discovery of a second Roman ship in the lake**
- **1895:** Study and recovery of artifacts with hard hat diving suit by **Eliseo Borghi**.



Artifacts recovered in the XIX century: mosaic panels, bronze heads of linos and wolves with rings, apotropaic bronze hand, metal bearings for windlasses, bronze railings, pump elements, hardware for doors and windows, nails, bronze tiles. Below, timber extracted from the ships and left rotting on the beach

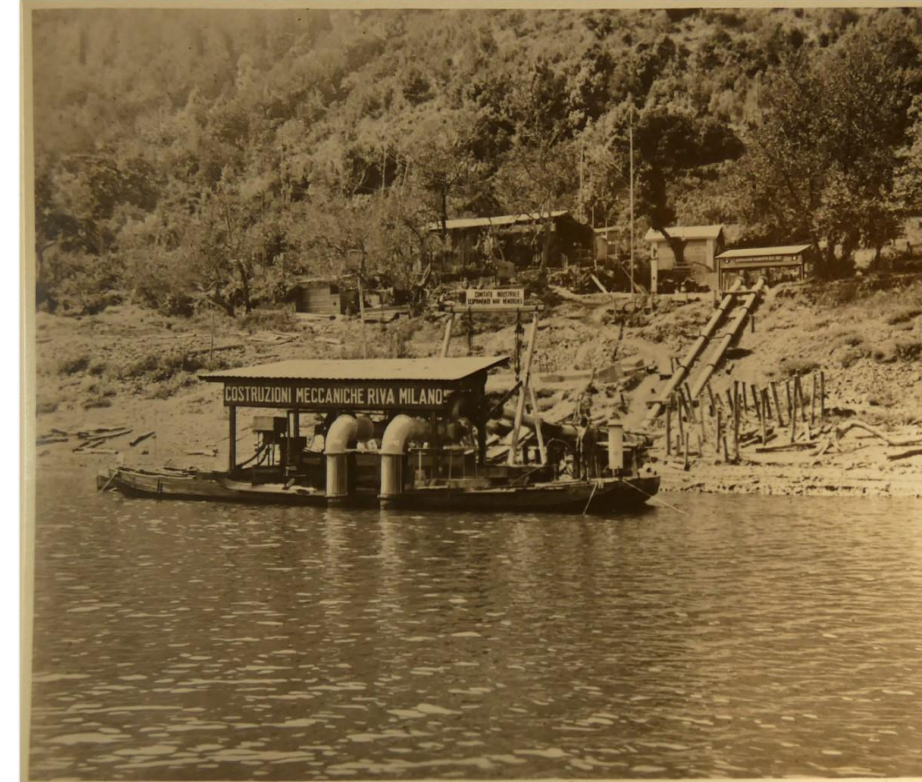
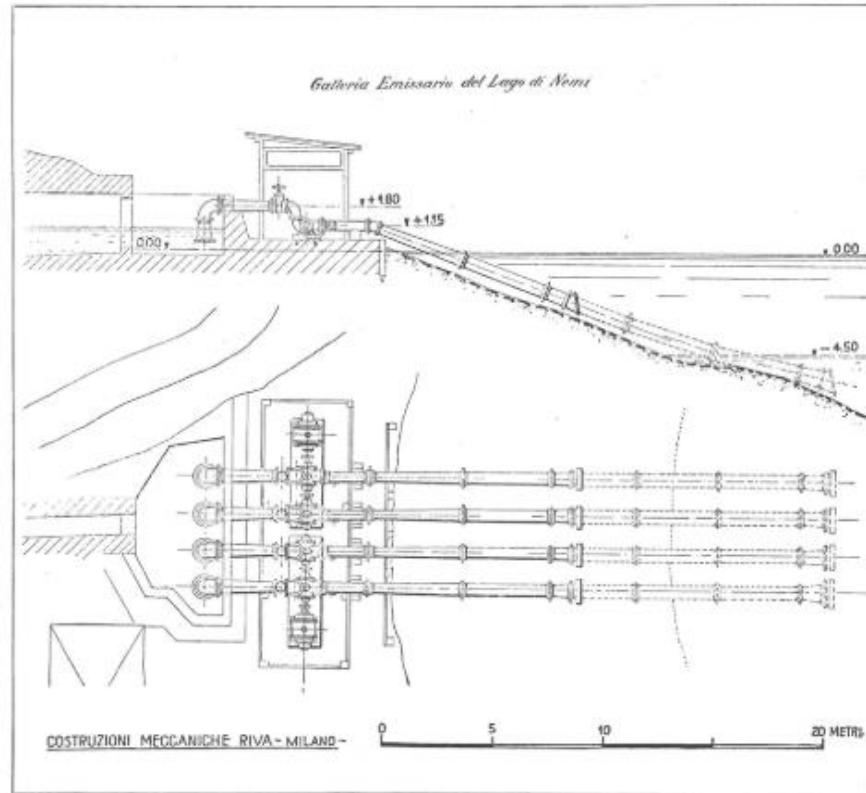
The great recovery of 1928-32



1928 Mussolini by the Nemi lake

- In the Twenties: **Fascist propaganda through Archaeology**
- The greatness of Rome past and present
- Great archaeological endeavours such as Via dei Fori Imperiali
- Decision to display **technical power** through the drainage of the lake using the same machines used in for farmland reclamation.

The great recovery of 1928-32



G. Ucelli, Le navi di Nemi, third reprint, Rome [1950] 1996



1928-1932

Excavating the ancient emissary
and emptying the lake

The great recovery of 1928-32



1928-32: Emptying the lake and excavating the ships

The great recovery of 1928-32



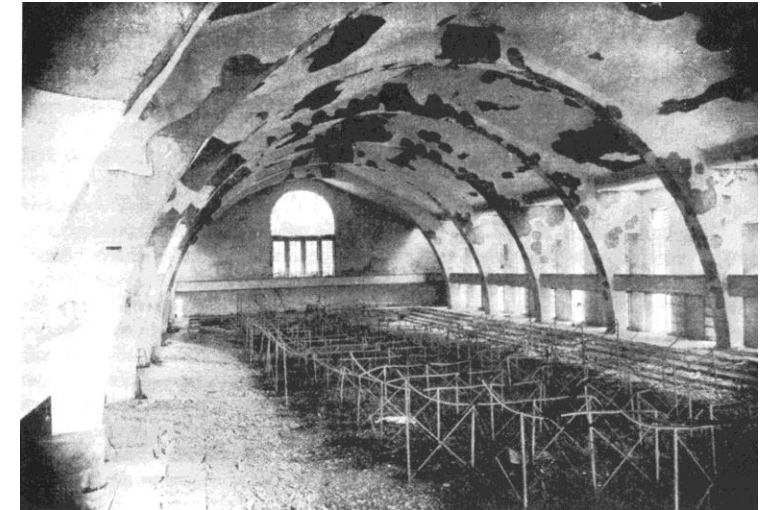
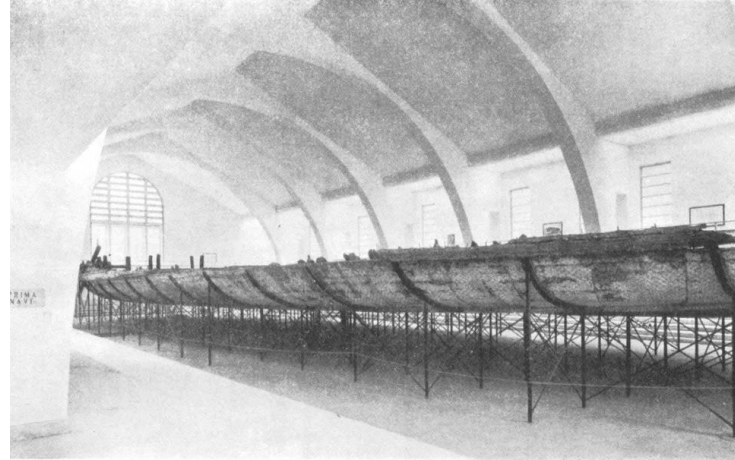
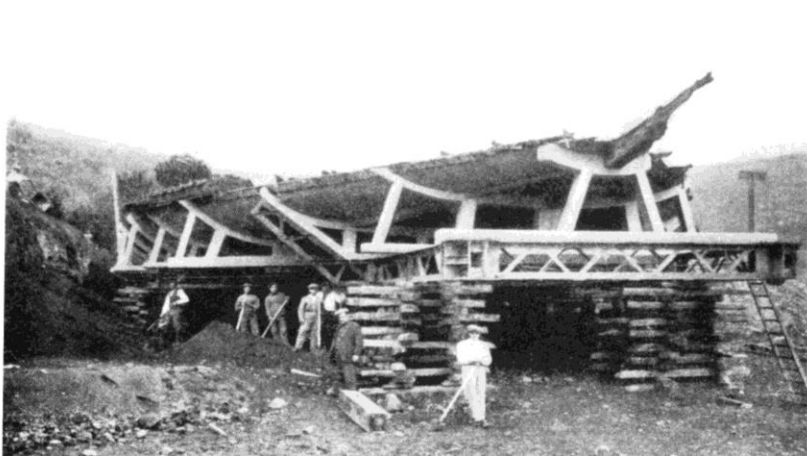
1928-32: Emptying the lake and excavating the ships

The great



1928-32: Emptying the lake and excavating the ships

Display and Destruction



Hauling of the ships, 1935; Display at the museum, 1940,
The museum used as a shelter during the war; Aftermath of the Allied bombings, 1944.

NEW HIGH RESOLUTION MBES SURVEY

Research objectives:

- Was there a third sunken ship, as legends say?
- Are the traces of the 20th century excavation visible?
- Is there other archaeological material?
- Morphological data on underwater features such as landslides and for monitoring water volumes: severe water loss in recent years.

Morphobathymetric Survey using MBES

Survey carried out in October 2024

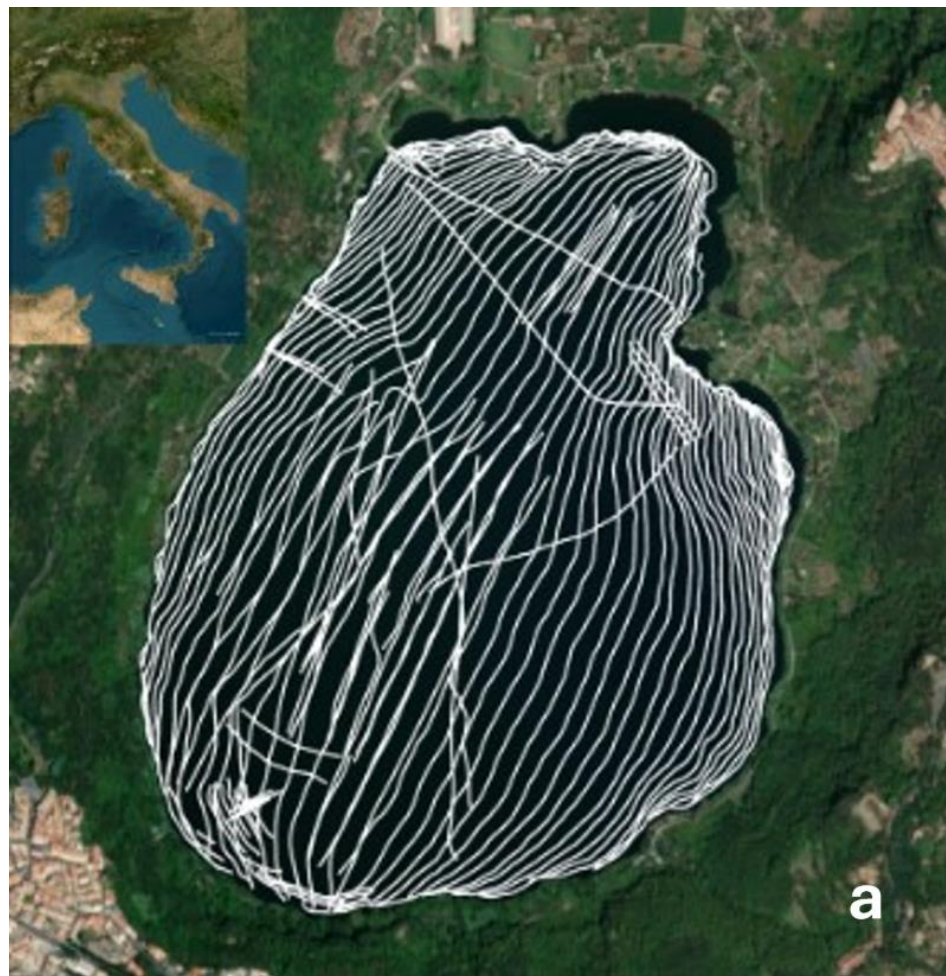
Kongsberg MBES EM2040P with an aperture of up to 140 degrees, frequency of 400 kHz

Kongsberg Seapath 130 positioning system, with a Kongsberg Seatex MRU5+ Motion Sensor inertial unit

RTK (Real Time Kinematic) real-time correction

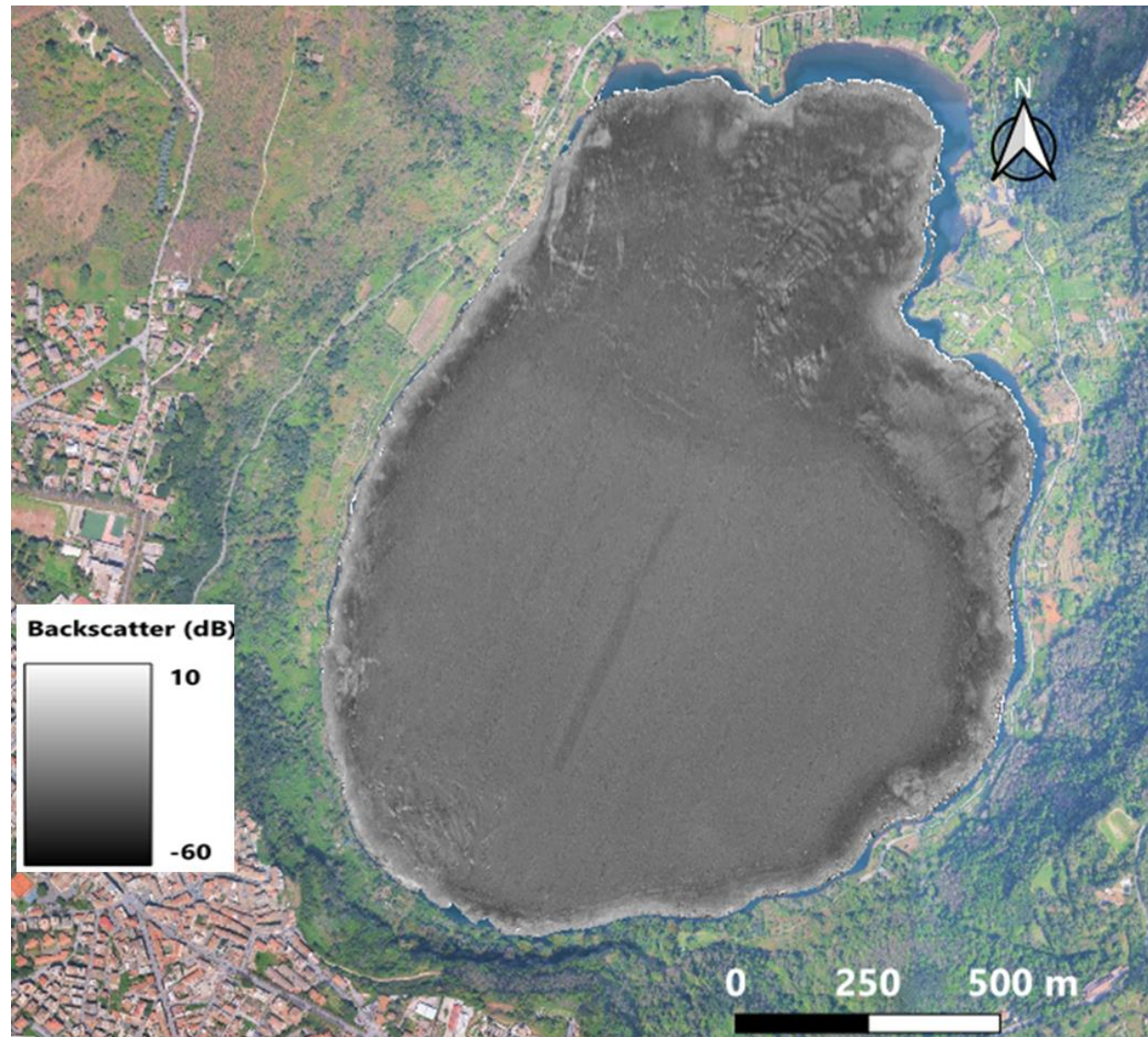
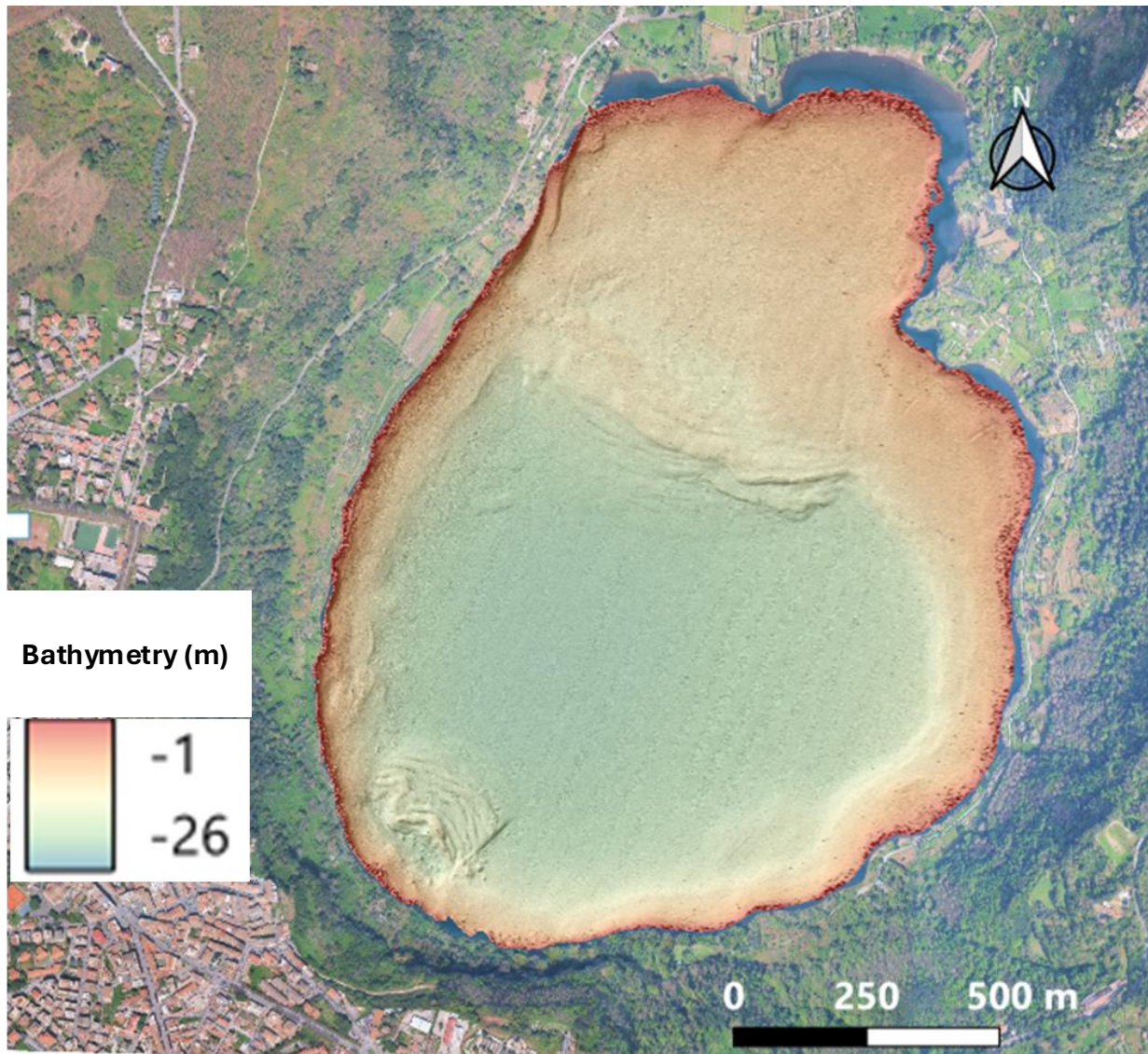


Morphobathymetric Survey using MBES

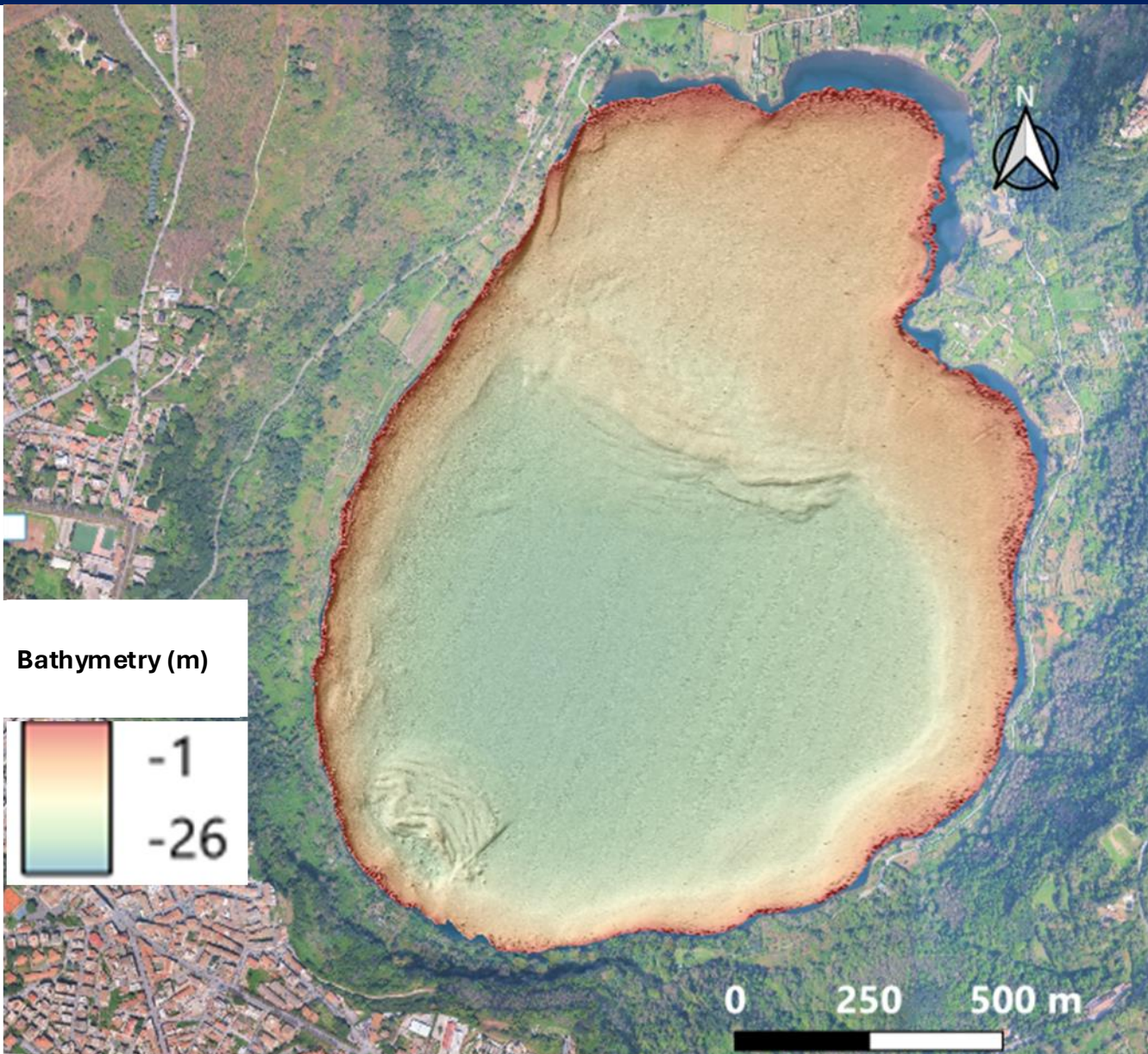


180 navigation lines for a total of about 90 linear km, at an average speed of 3.8 knots.

Morphobarymetry and acoustic reflectivity maps

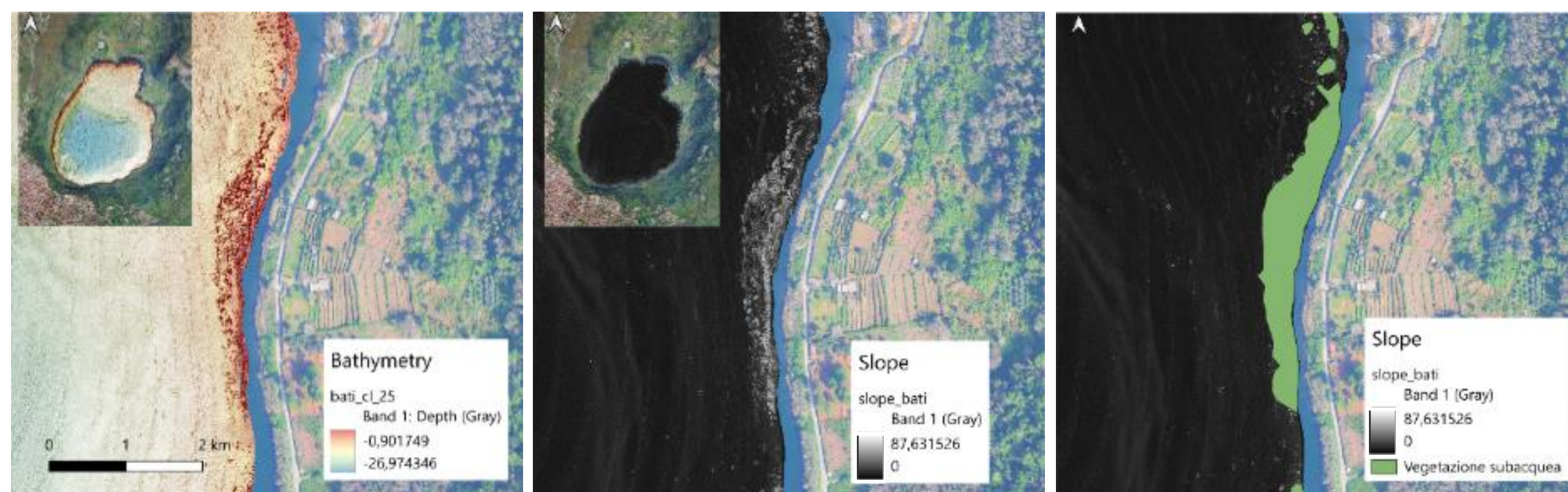


First observations from morphobathymetry data



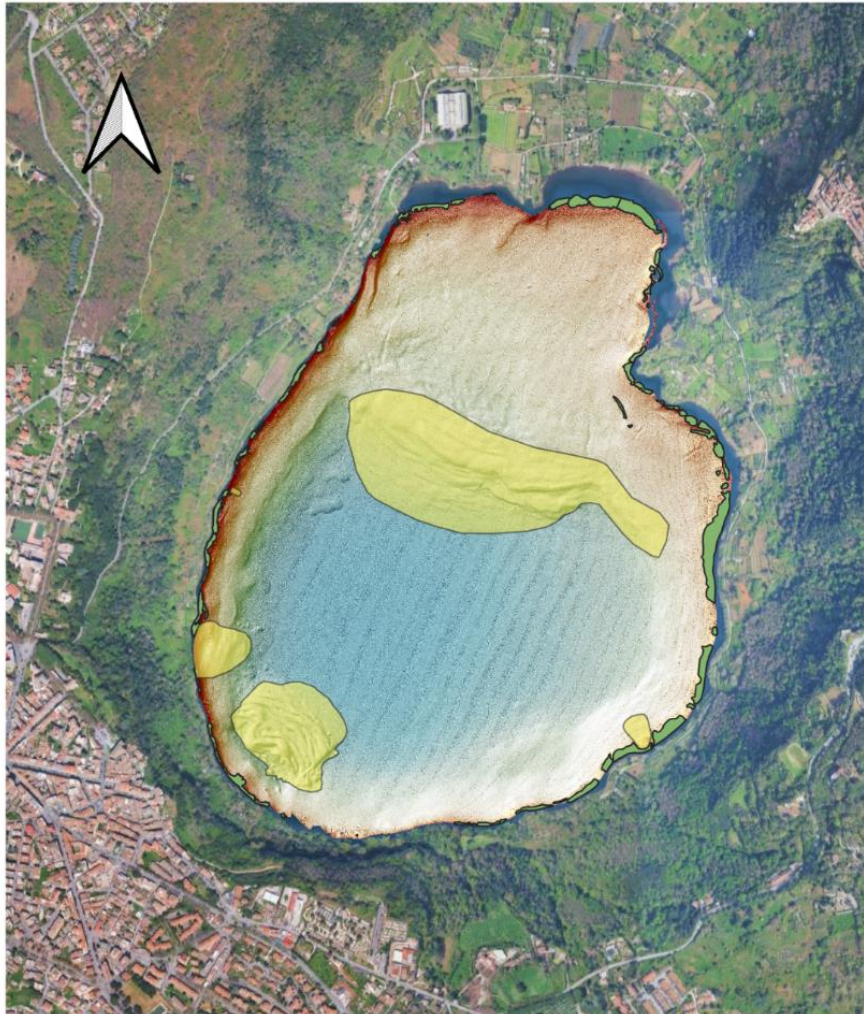
- It was not possible to map some areas very close to the shore due to the presence of **submerged vegetation**
- Complex morphology of the submerged areas in which **two sub-circular shapes** are recognizable.
- The first corresponds to the deepest part of the southern crater estimated at about 25 m compared to the local hydrometric zero
- A second, relating to the northernmost crater located from the shoreline to a depth of about 15 m.

The problem of underwater vegetation



Example of bathymetry and its slope and related area affected by mapped underwater vegetation.

First observations from morphobathymetry data



- In the southern crater there are two **extensive deposits of gravitational instability**
- The first in the northern sector extends for about 680 m in width and over 380 in length and estimated thickness of a few meters
- The second on the southern slope has a width of about 270 m for a length of about 235 m and thicknesses estimated at a few meters.

Record of landslides during the emptying

VARIAZIONI DI LIVELLO DEL LAGO DI NEMI DURANTE LE OPERAZIONI DI RICUPERO DELLE NAVI (1928-1932)

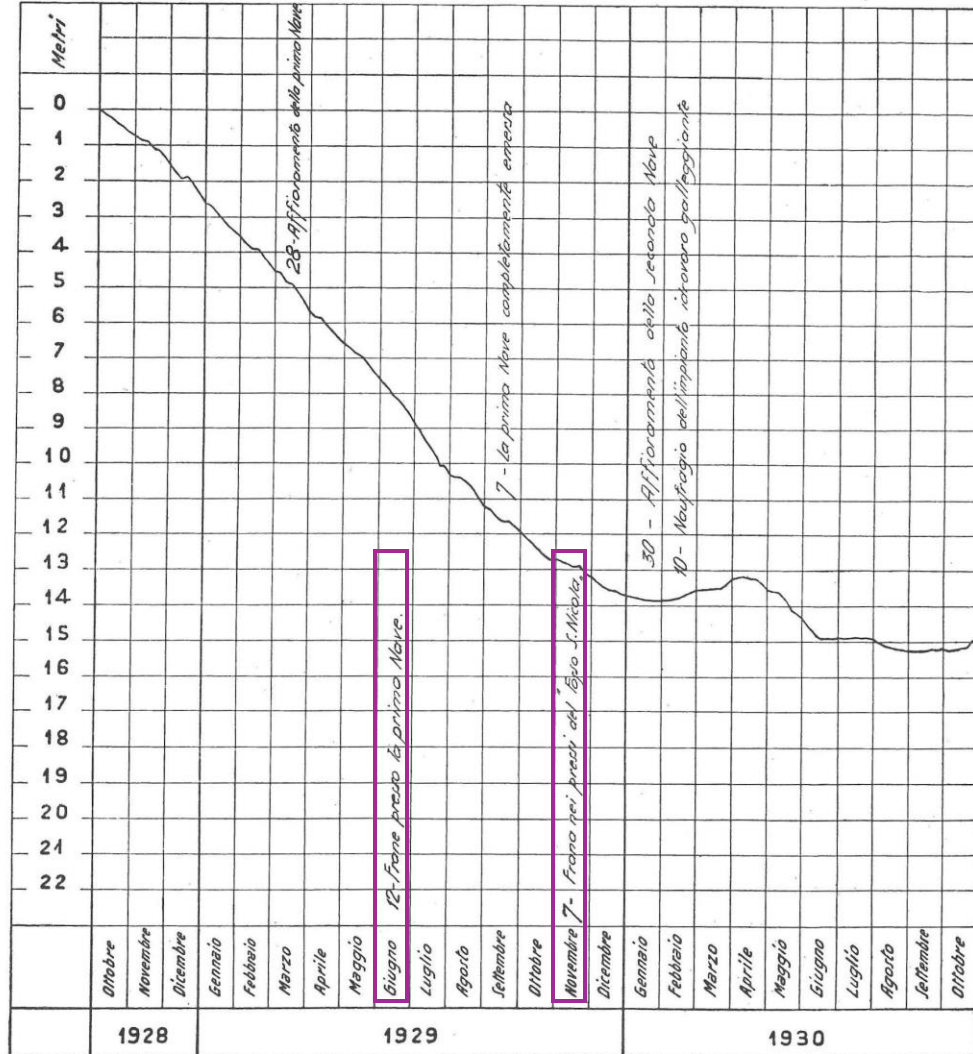
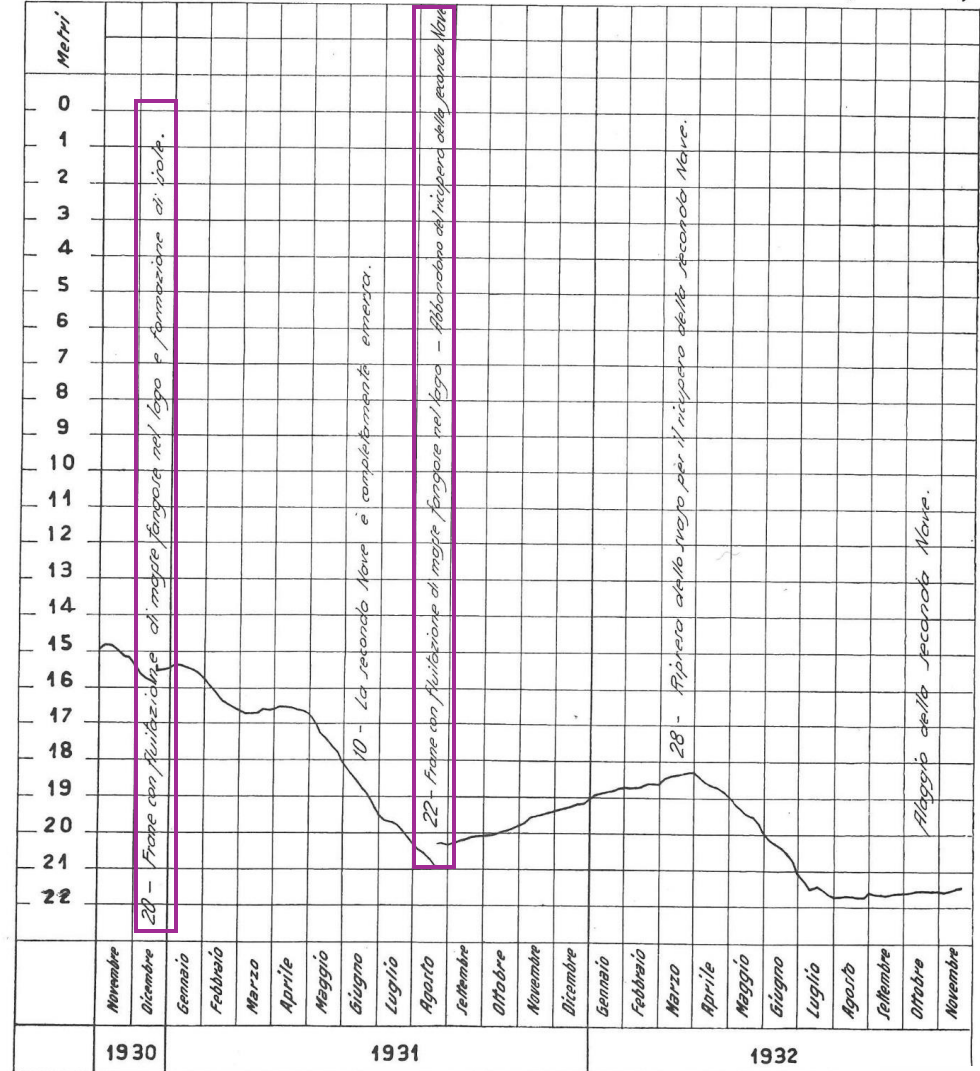
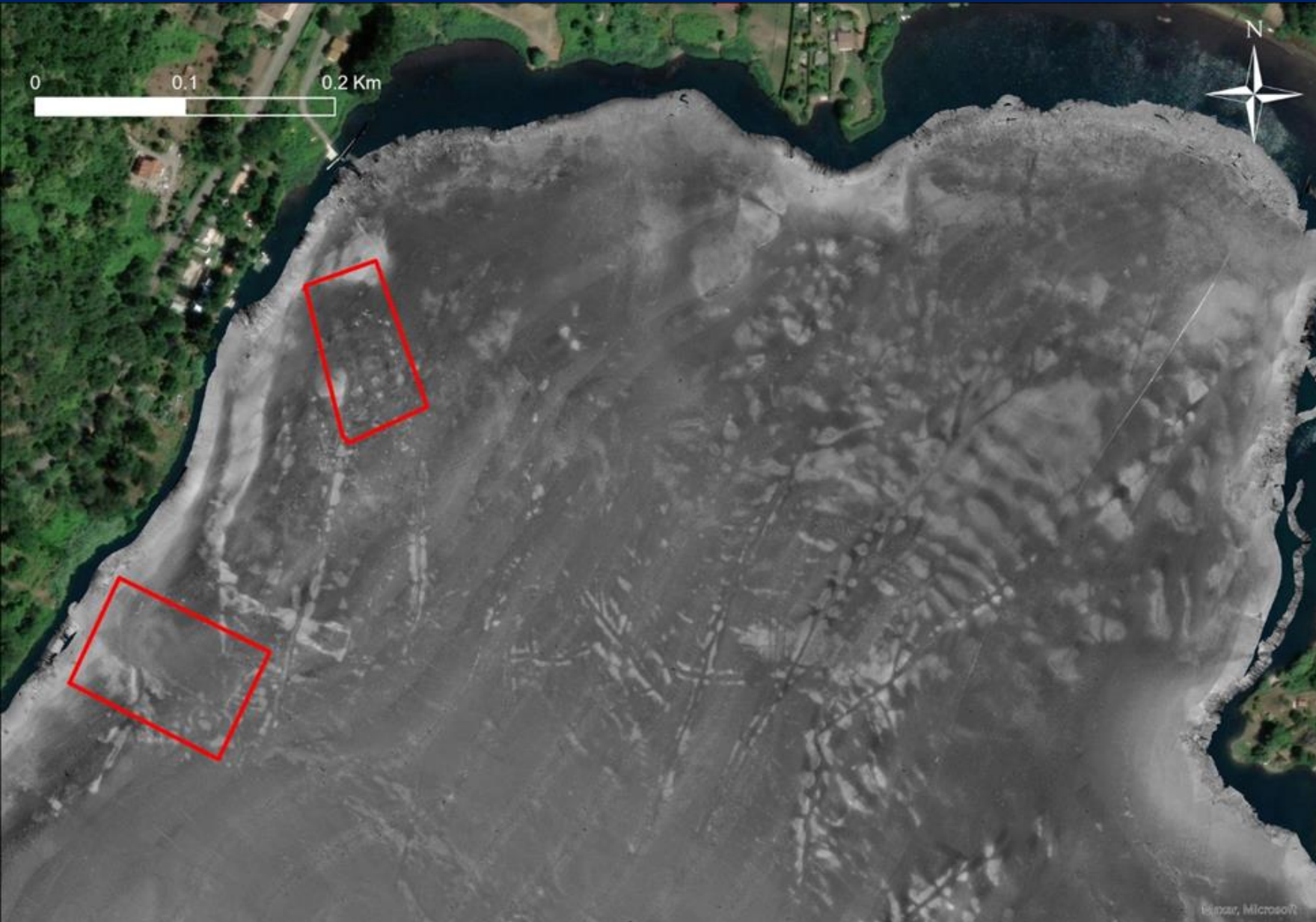


FIG. 121-a

VARIAZIONI DI LIVELLO DEL LAGO DI NEMI DURANTE LE OPERAZIONI DI RICUPERO DELLE NAVI (1928-1932)



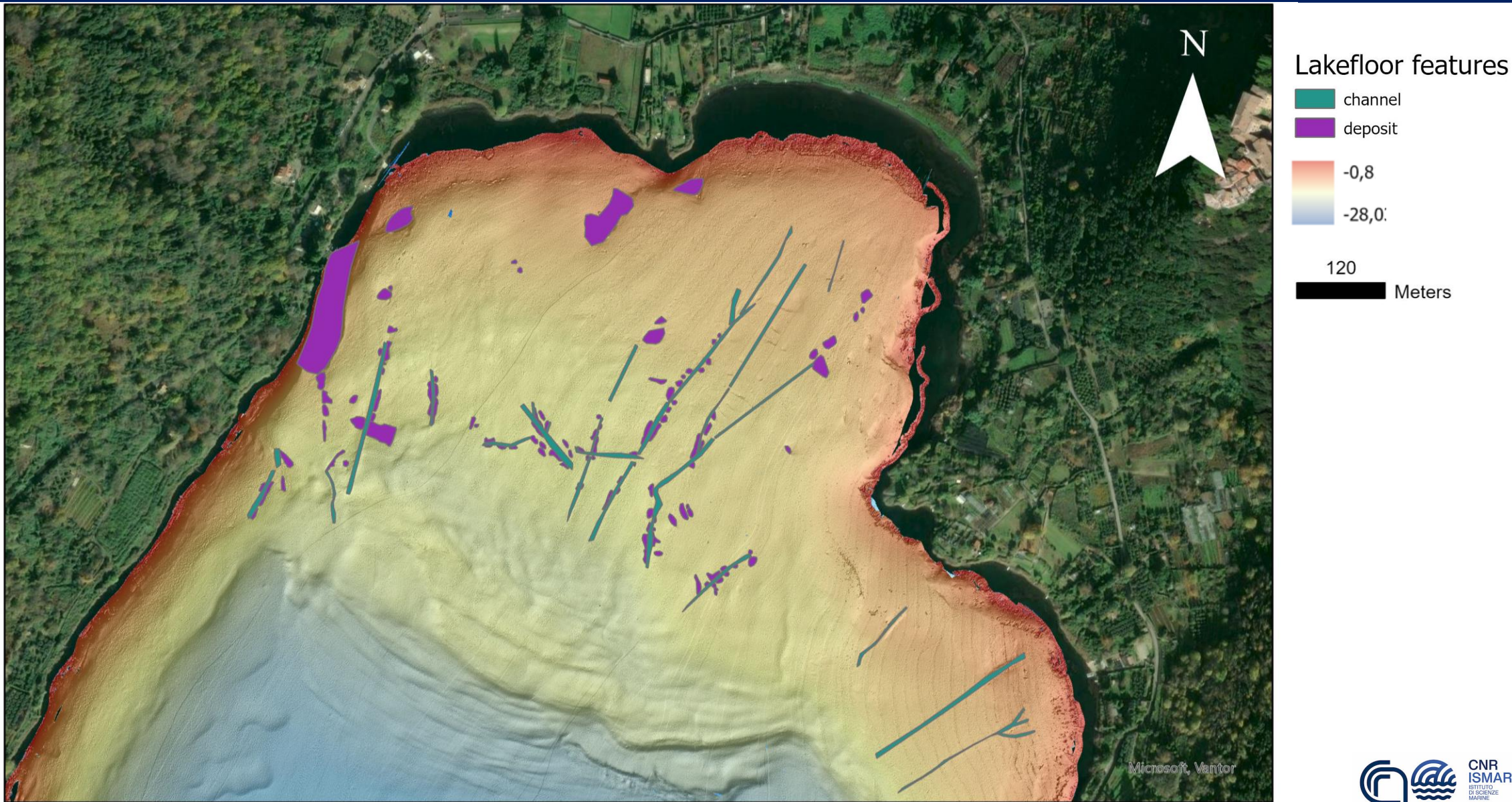
First observations from acoustic reflectivity data



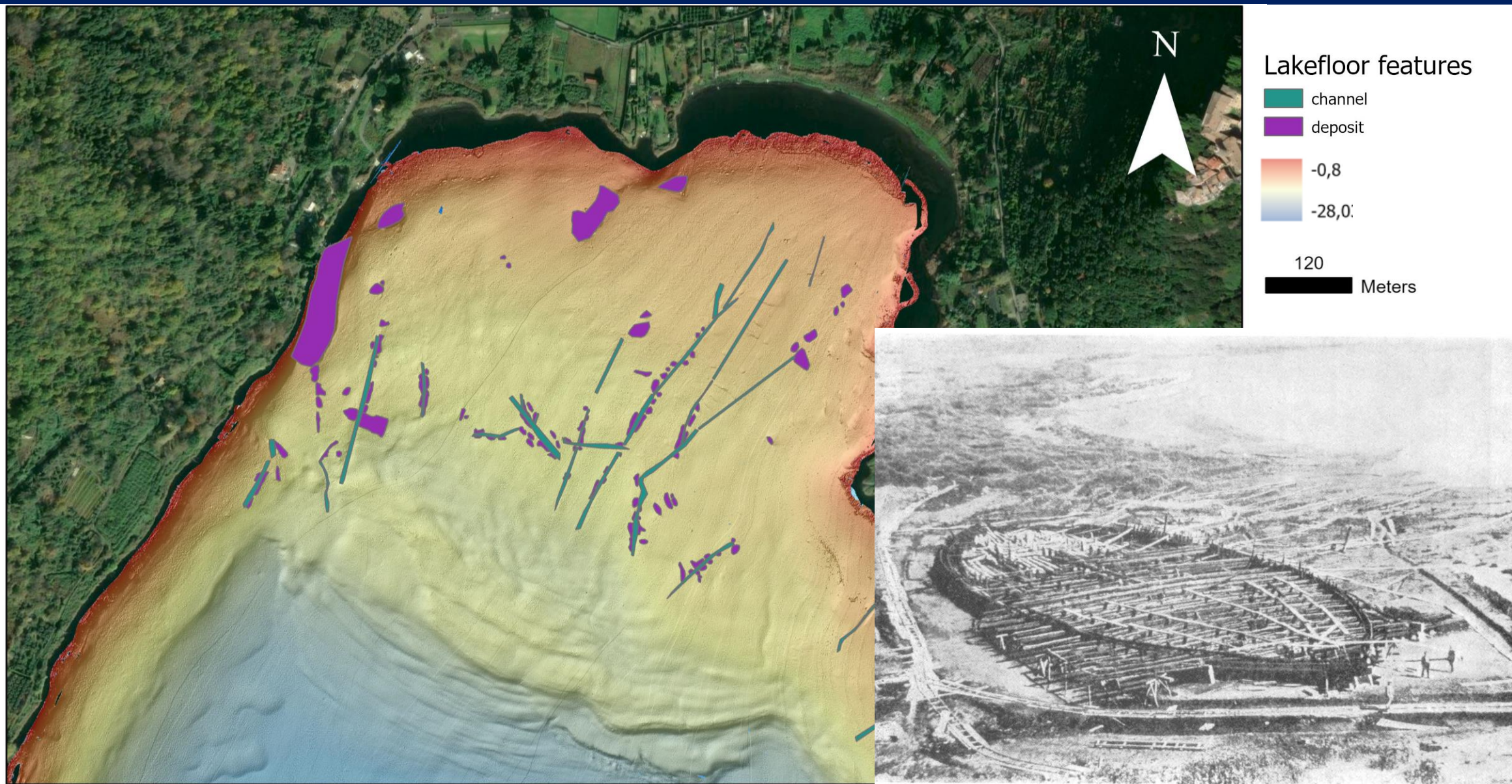
WHERE EXACTLY WERE THE SHIPS AT THE TIME OF RECOVERY?

HAS EVERYTHING BEEN RECOVERED?

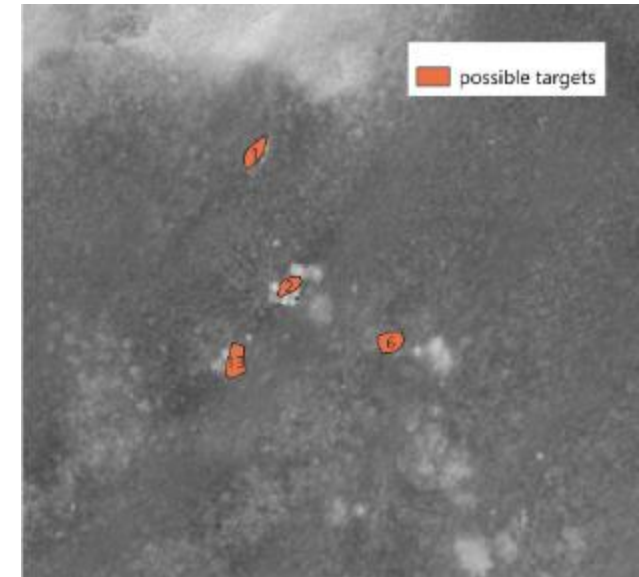
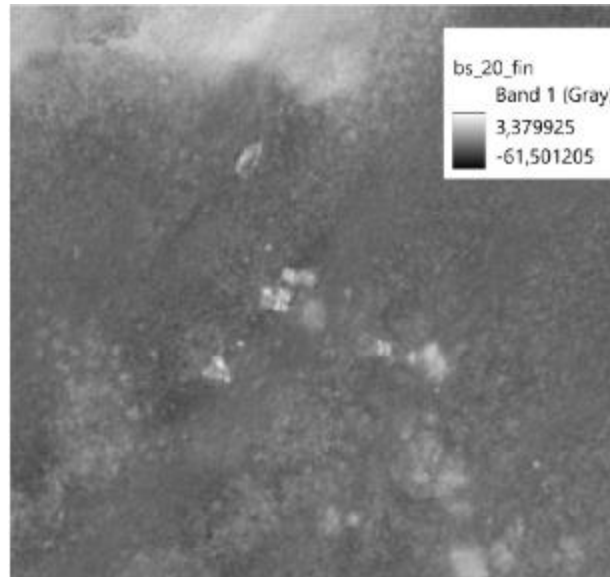
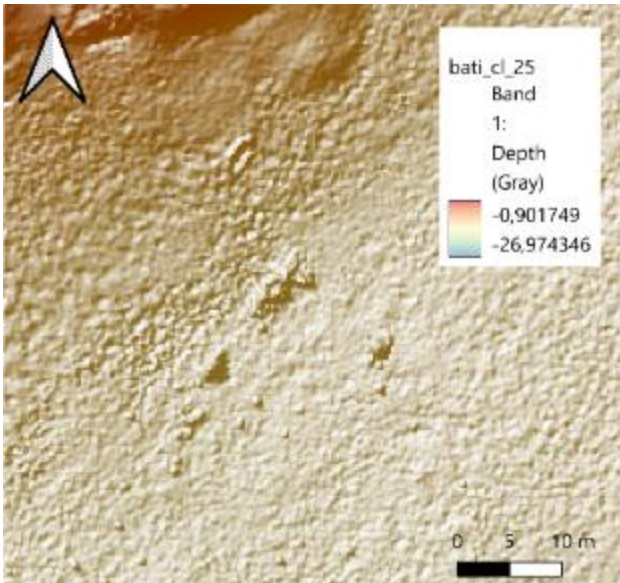
Mapping artificial features of the lakebed



Mapping artificial features of the lakebed



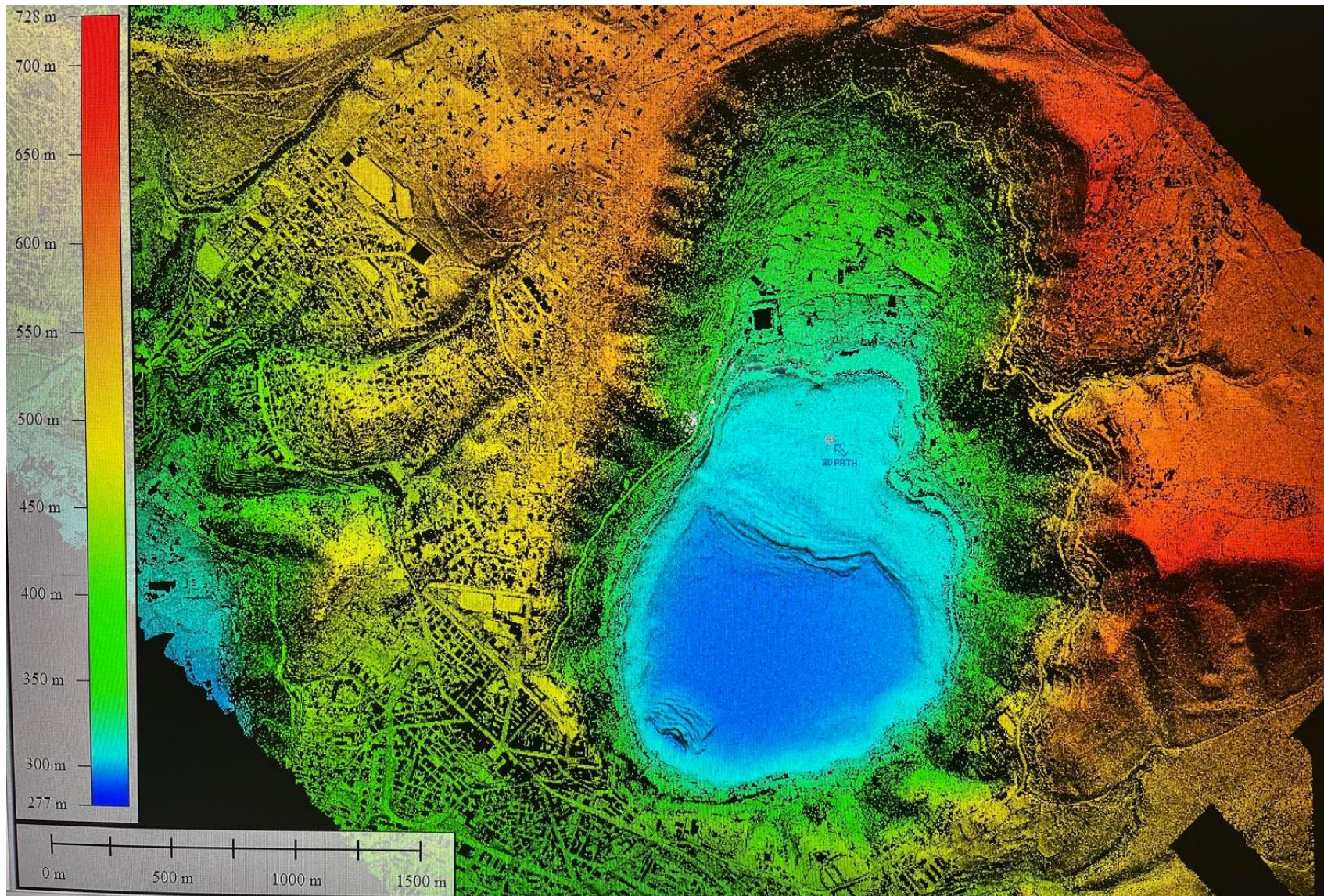
Identification of possible targets



Example of a target in bathymetry and backscatter. In particular, target no. 1 could be a small boat (most likely modern).

Data integration

The data were then integrated with the digital model that emerged from Alessandro Bosman (CNR-IGAG, Rome) thanks to the Lidar data of 2007 kindly made available by Marco Anzidei INGV



GEOREFERENCING OF ARCHIVE DATA

Through integration of MBES and LiDAR data, it was possible to cross reference historical documents and images in order to reconstruct the exact location of different features

Georeferencing historical cartography

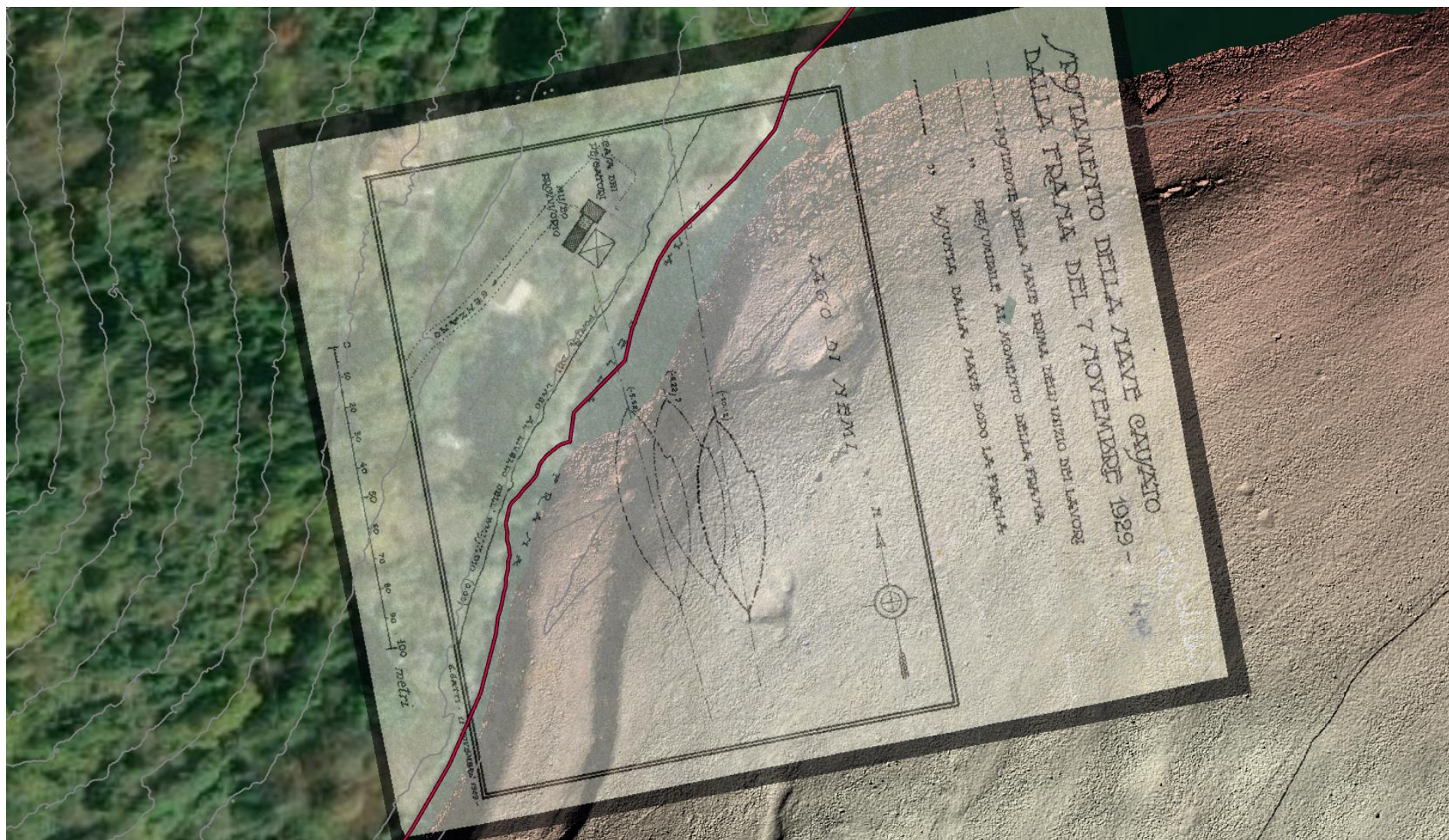
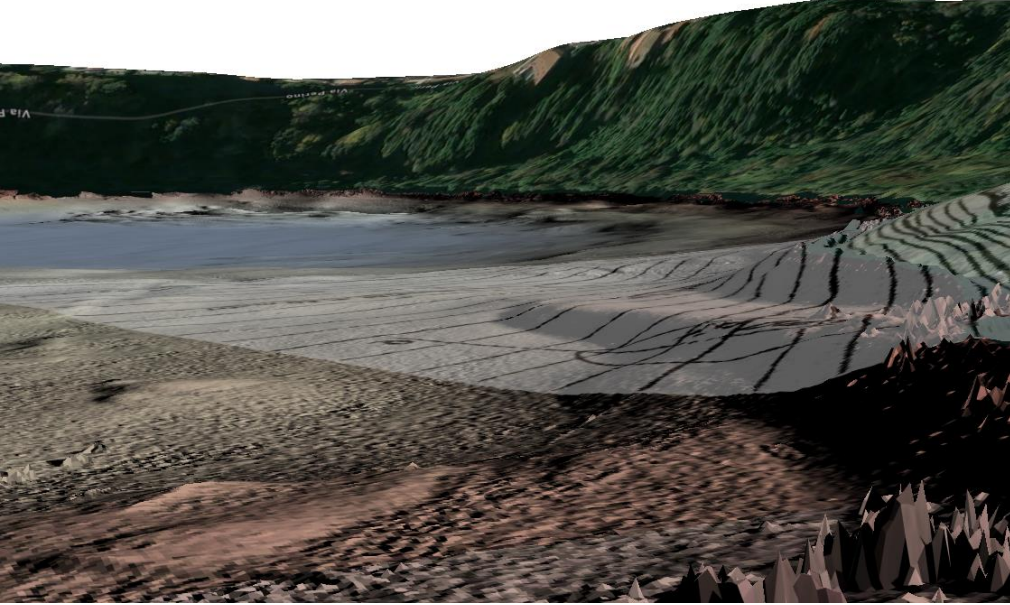
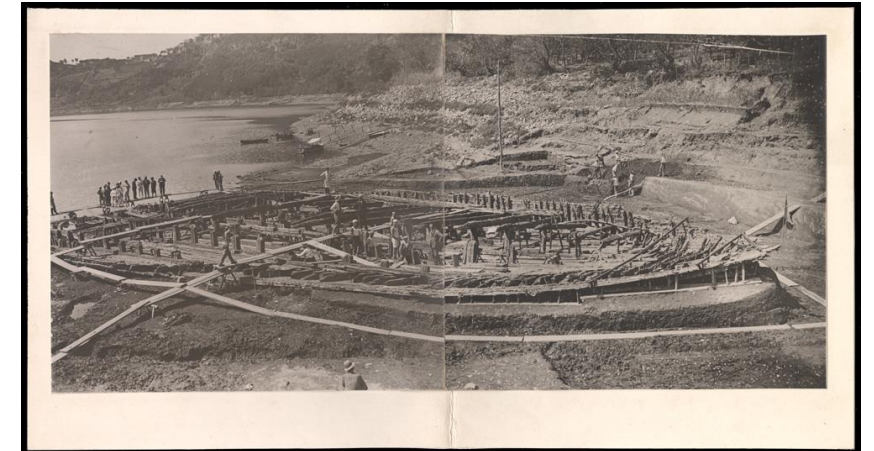
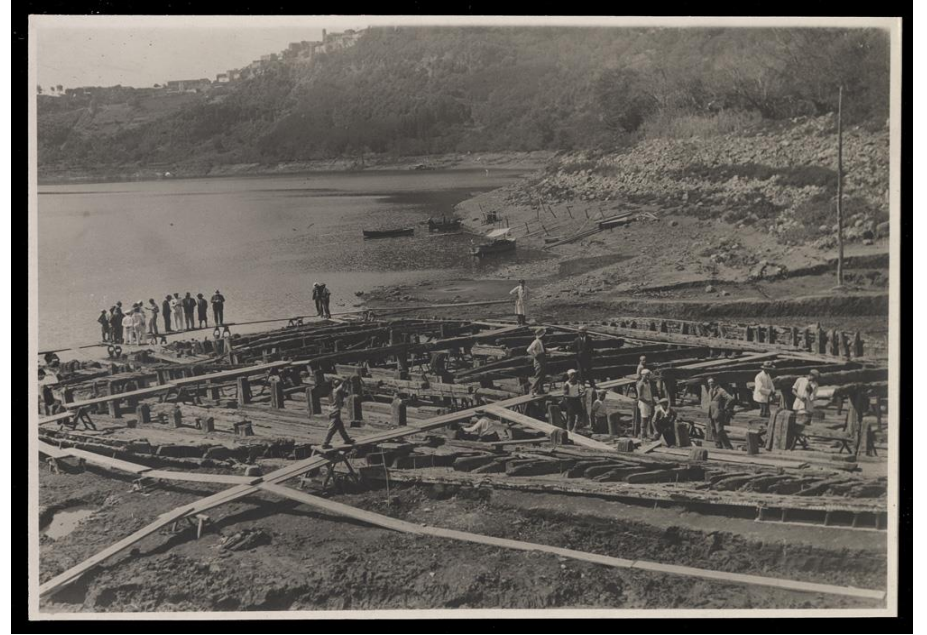


Image from the INASA Archive in Rome - Relief by G. Gatti

Georeferencing historical images

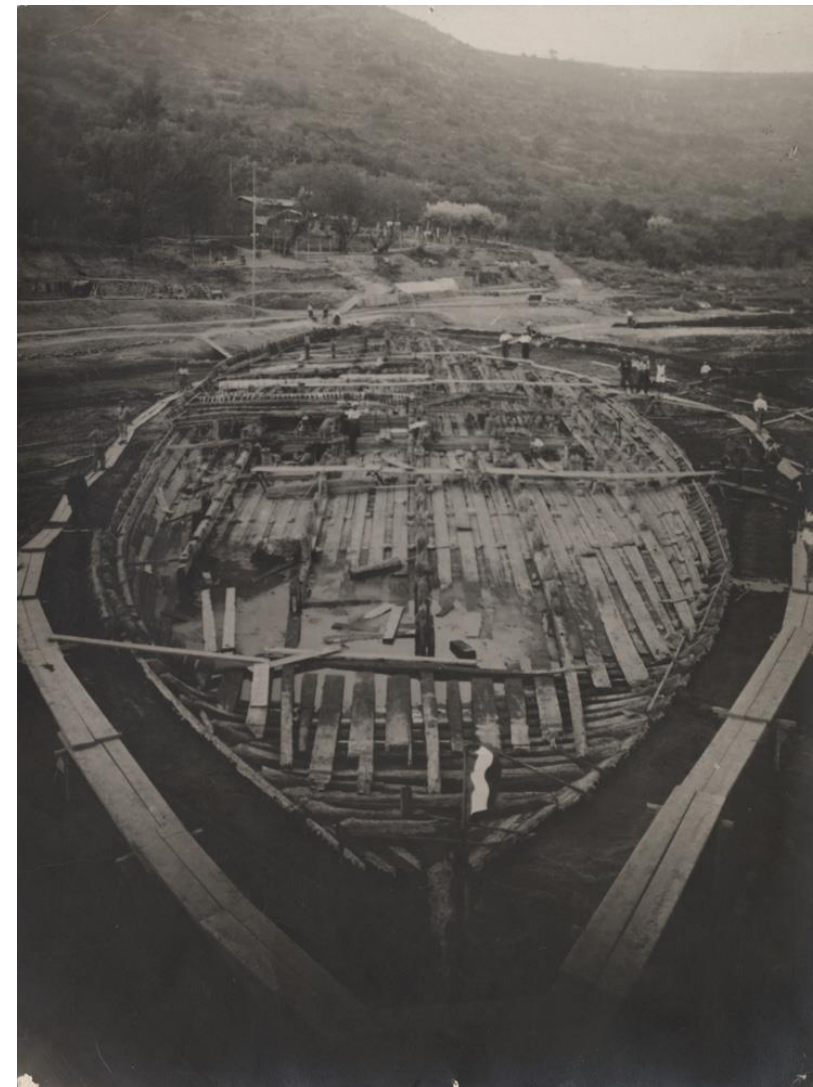
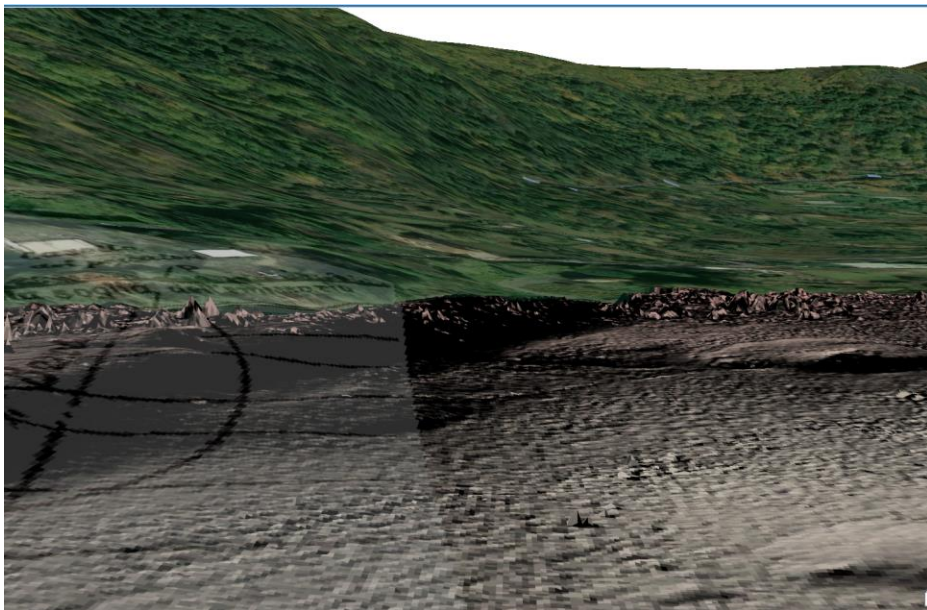


3d matching of historical picture perspectives using combined MBES-DTM model, First ship



Images from the INASA Archive in Rome, 5-7 May 1929

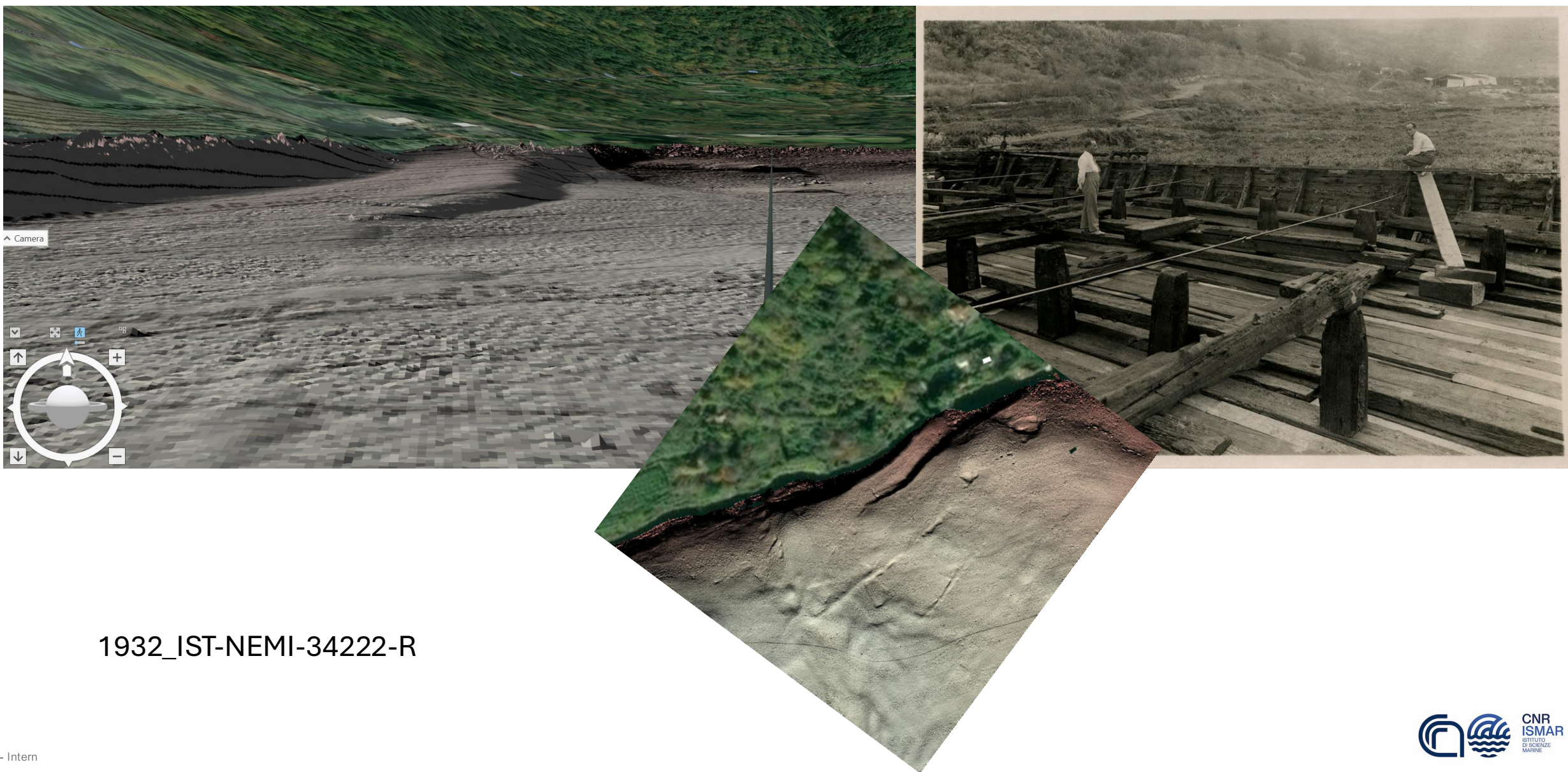
Georeferencing historical images



The access ramp is clearly visible in the bathymetry

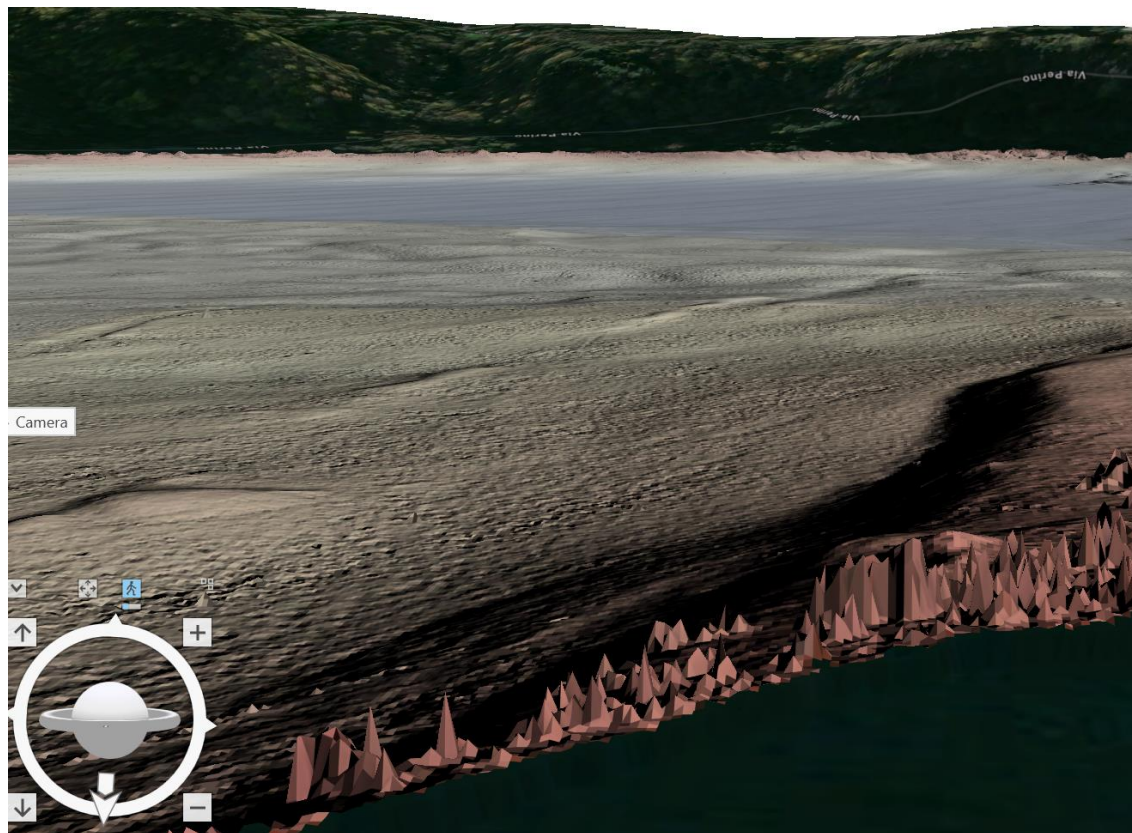
Images from the INASA Archive in Rome, 10 September 1929

Georeferencing historical images

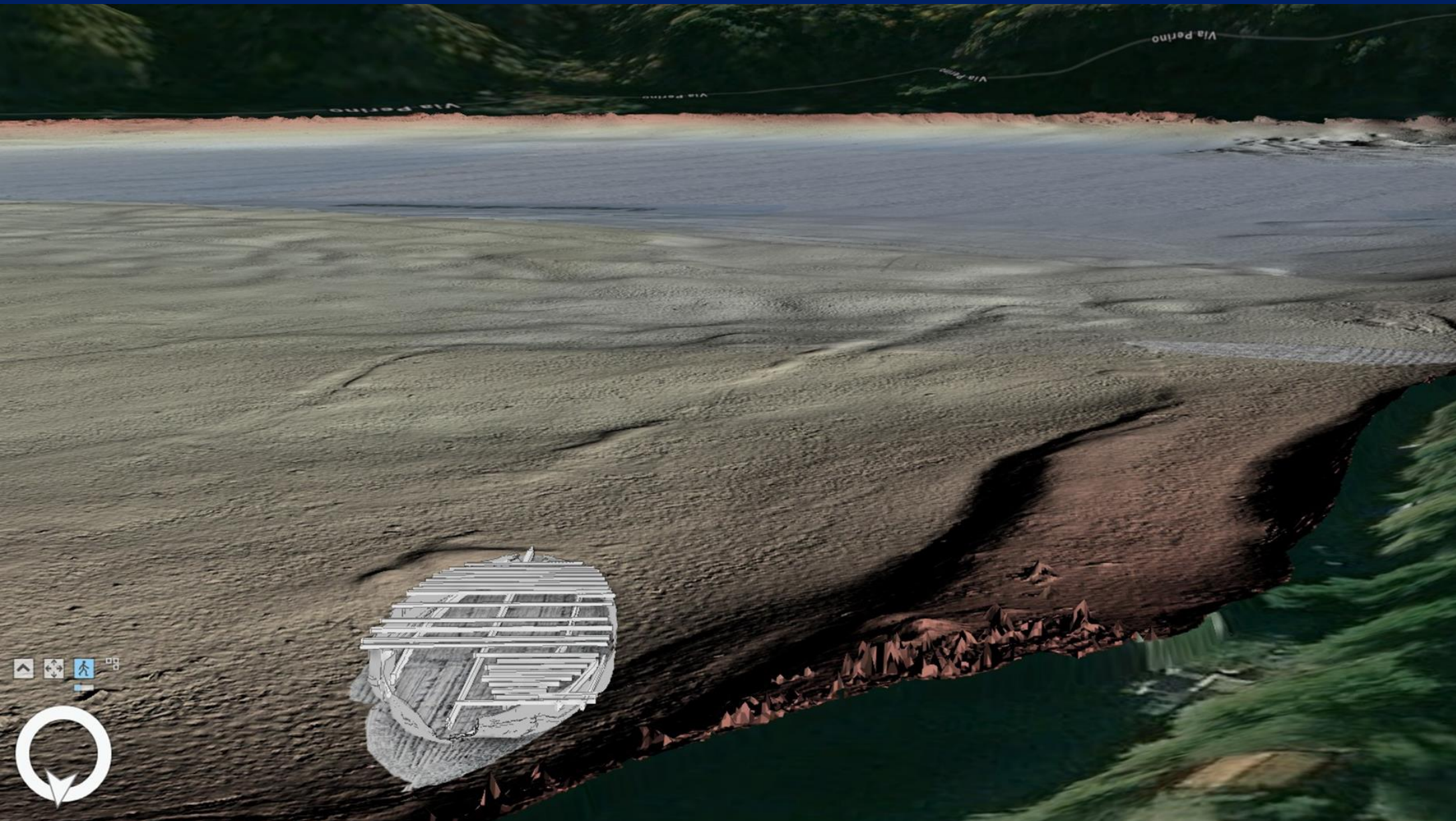


1932_IST-NEMI-34222-R

Georeferencing historical images

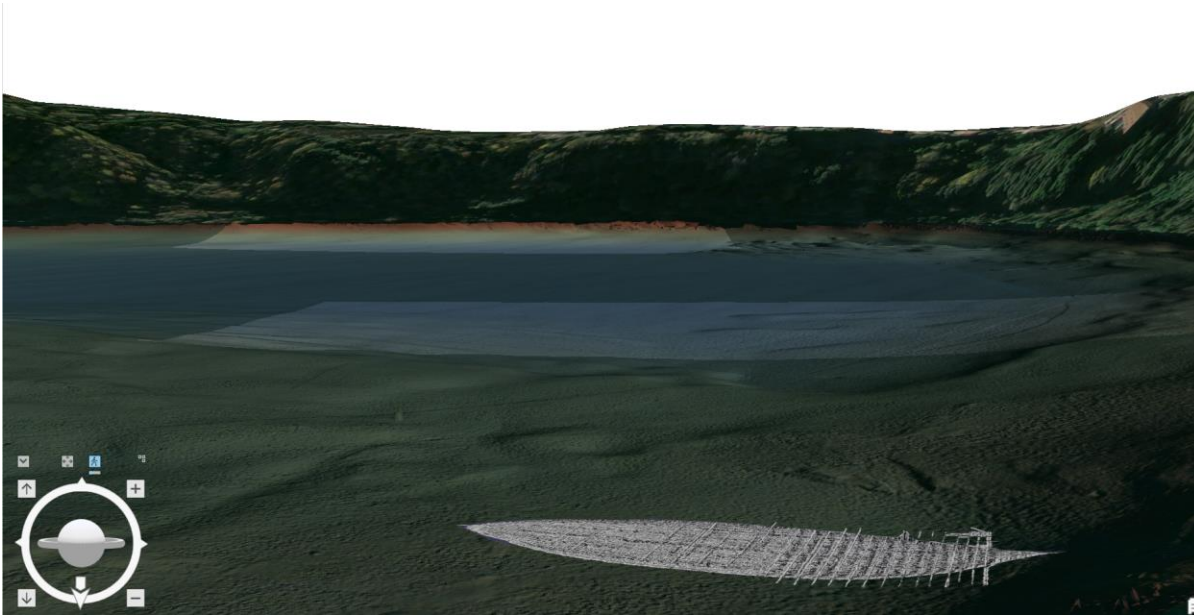


The position of the first ship

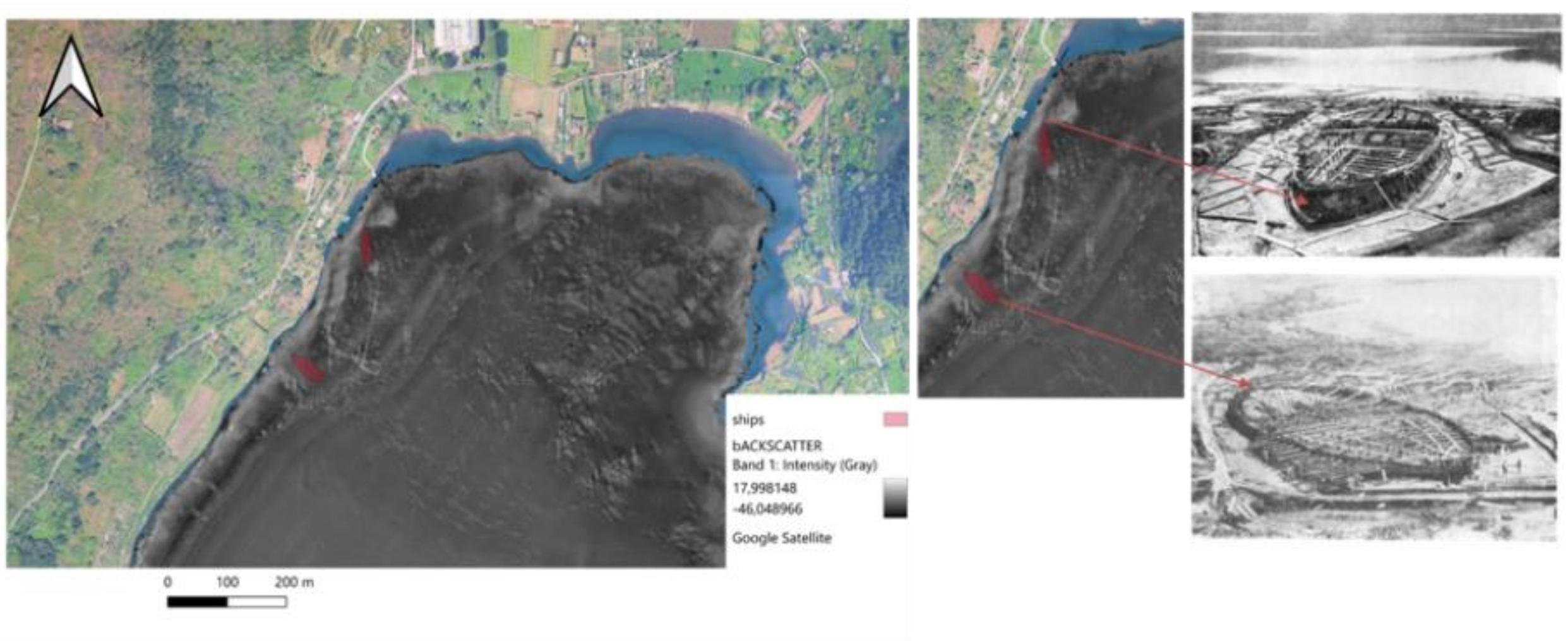


3d model
reconstruction

The 3D CAD model of the ship in the landscape



The position of the ships



CONCLUSIONS and NEXT STEPS

- New high-resolution mapping of the Nemi lake
- No presence of a third ship on the lake floor (but it could be buried under a landslide)
- Archive Data Georeferencing
- Production of new maps of possible targets for future archaeological investigation

THANK YOU FOR YOUR ATTENTION!

QUESTIONS?

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