Knowledge, Innovation and Technology: new tools for shallow water surveys at CNR

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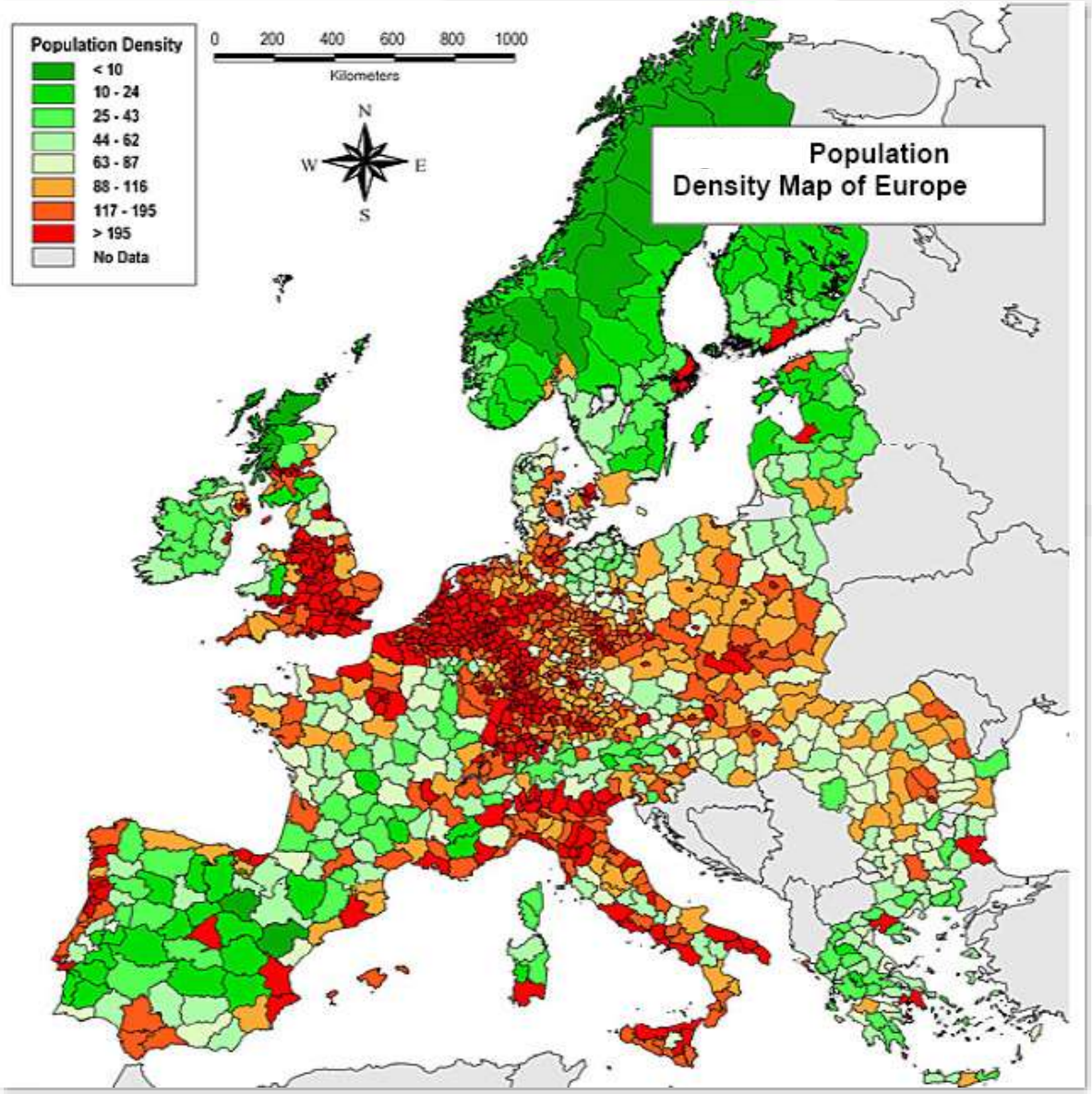
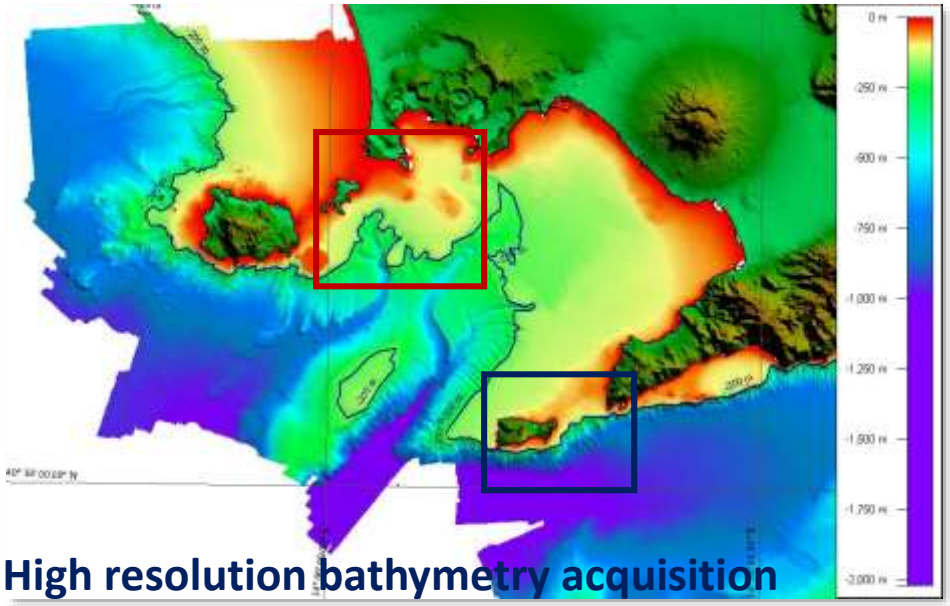
International Center for culture and higher education
for scientific research of Anacapri (Italy)

Coastal regions - population statistics

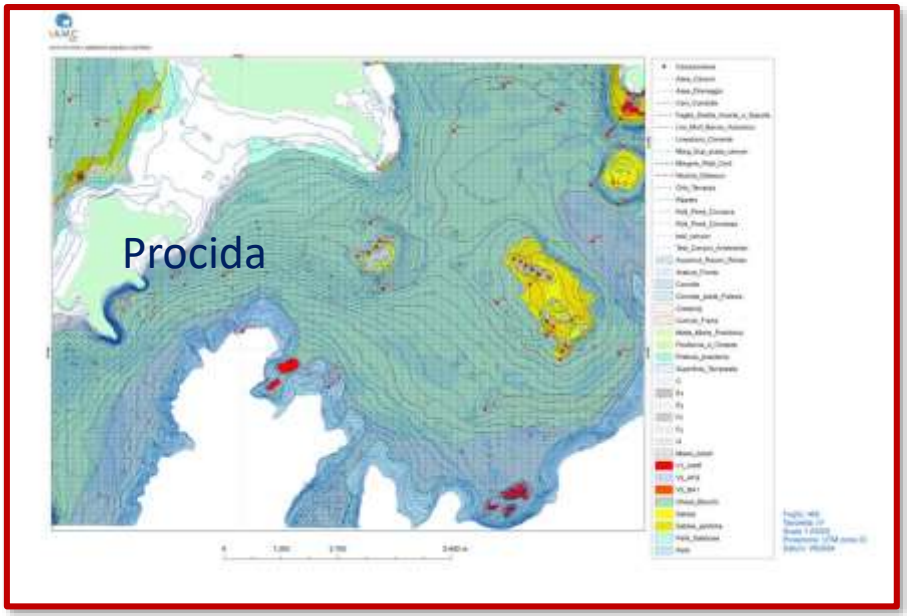



Coney Island, New York
1941

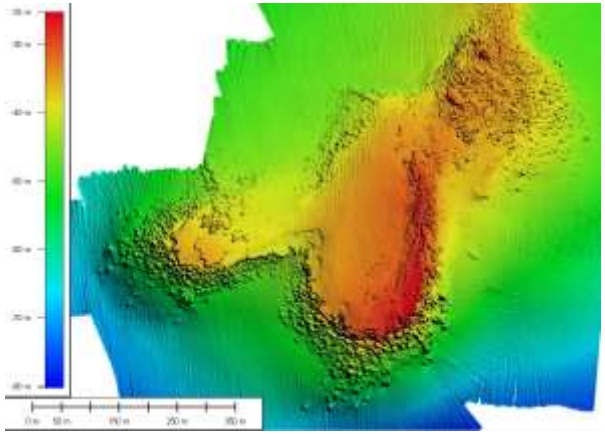
CAR.G. Project – Campania Region (Italy)



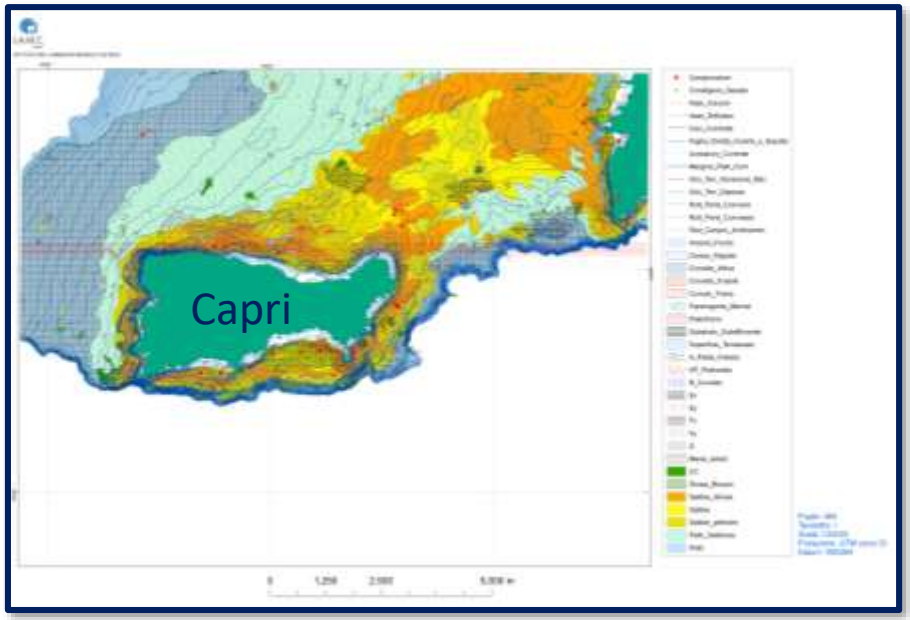
High resolution bathymetry acquisition



Miseno Bank (Gulf of Pozzuoli)



resolution - 50 cm -



Geological cartography

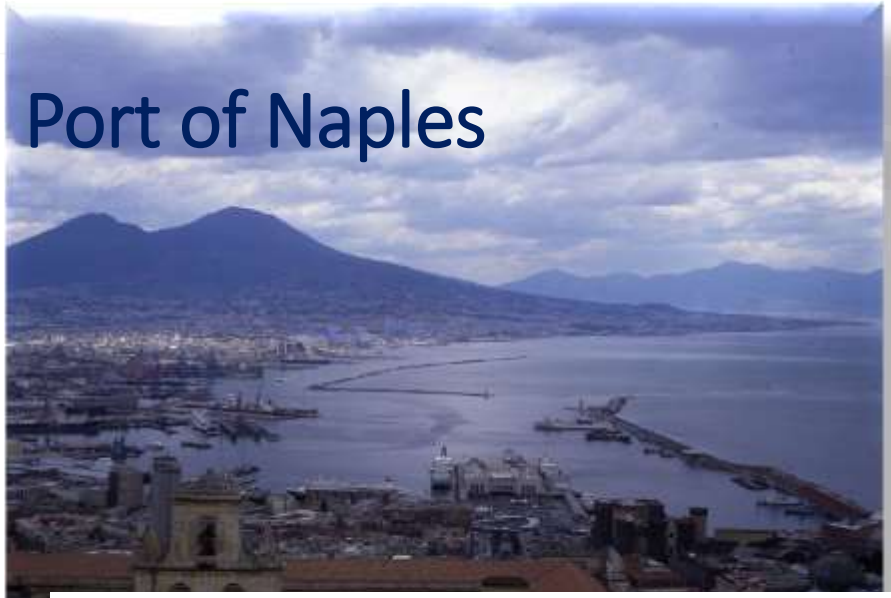
Port of Naples ..... a brief *history*

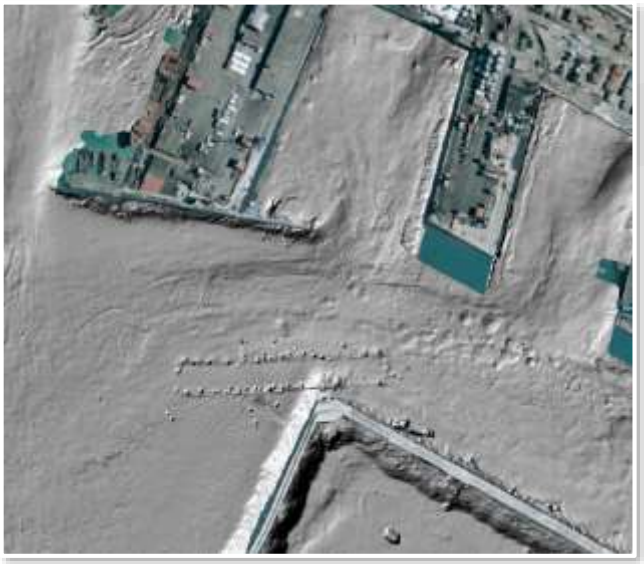
The origin of Naples and its port is part of the Greek colonization; in the IX centuries a.C. a group of sailors from Rhodes reached the coast and between the VII and VI centuries a.C. the Greek colony was founded on the Acropolis of Pizzofalcone.

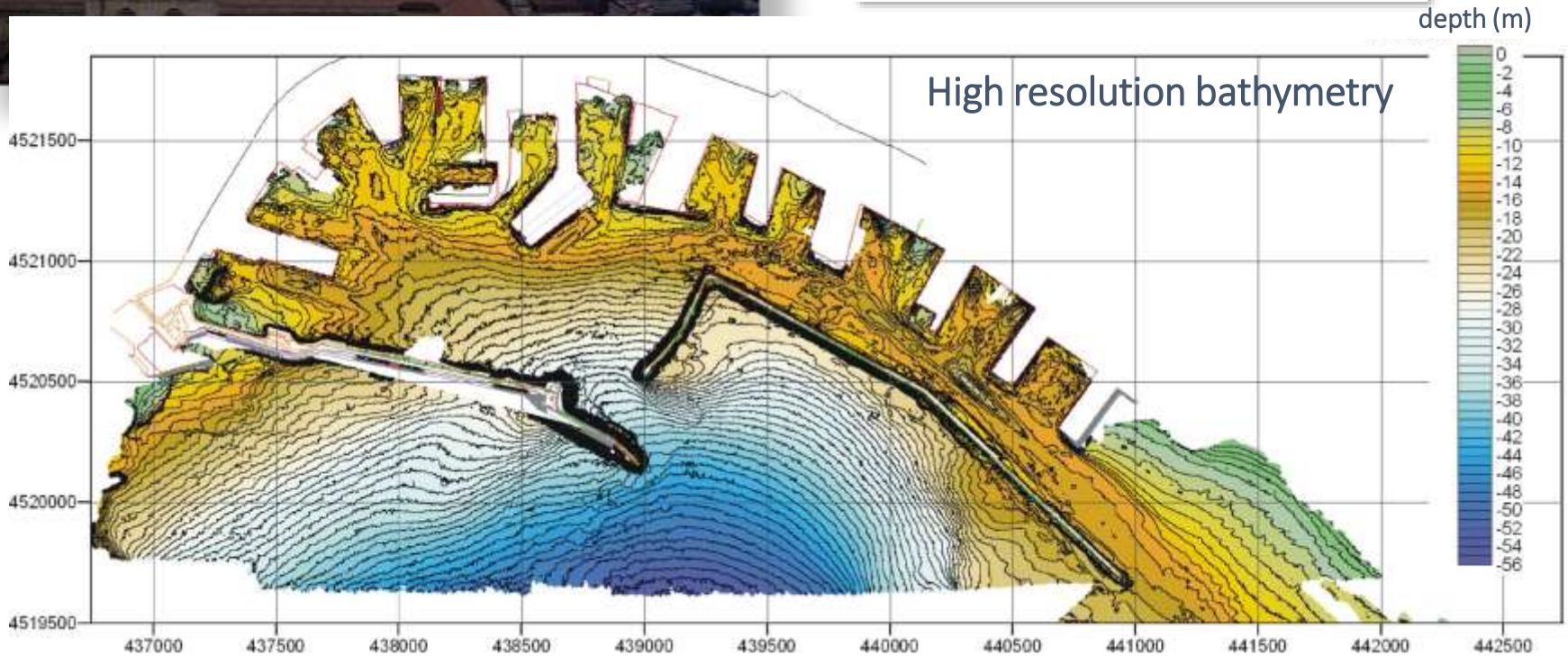
In 1164 Naples entered, only one among Italian maritime cities, in the Society's famous League, called the "Hanseatic City".

... during the Bourbon domination (1700) the port became one of the best equipped and strongest in Europe.

Port of Naples

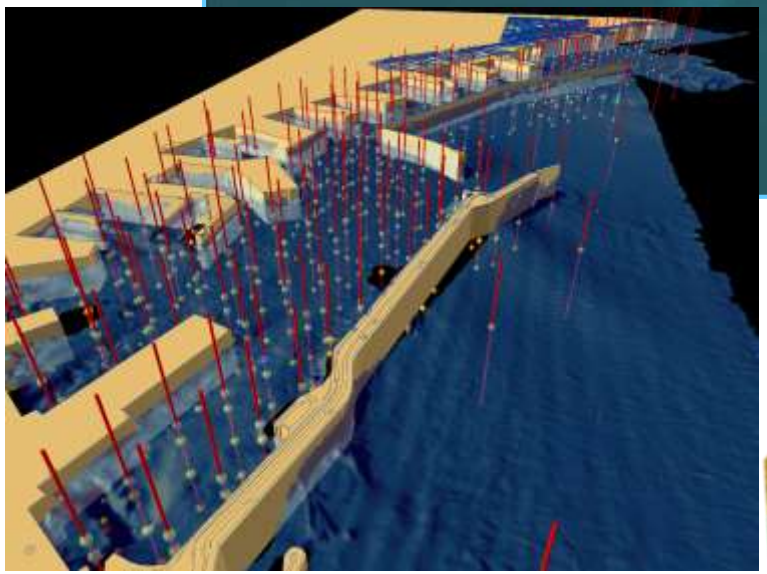


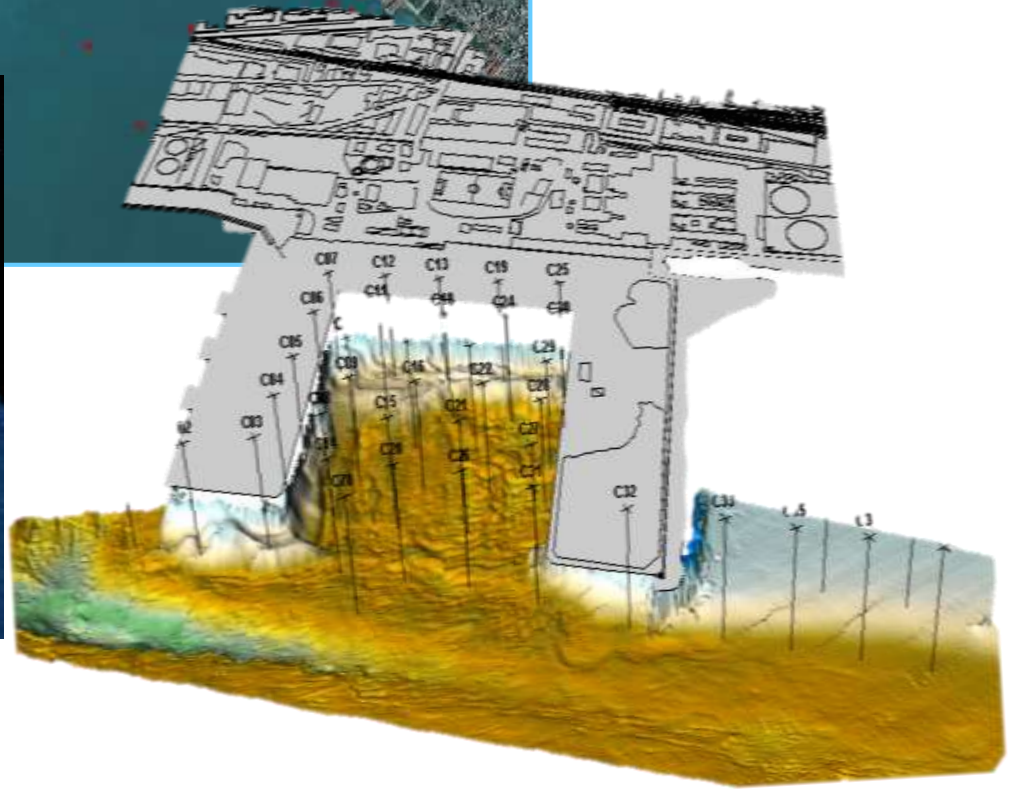




Port of Naples – Southern Italy
Vibrocore sampling

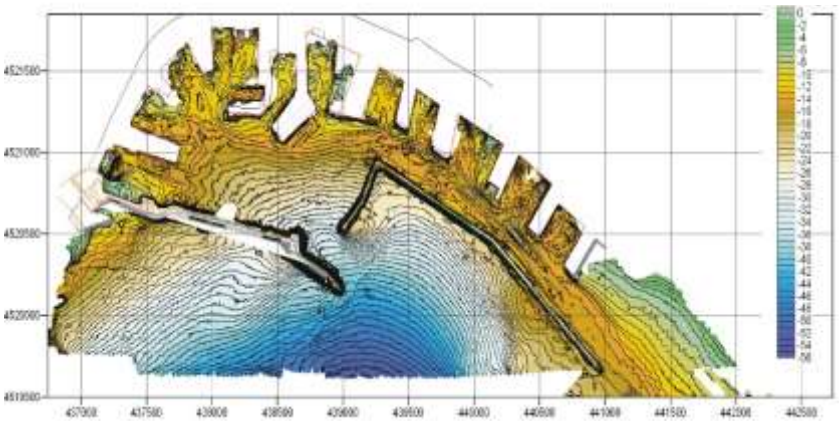
Port of Naples: Environmental & Geochemical data acquisition



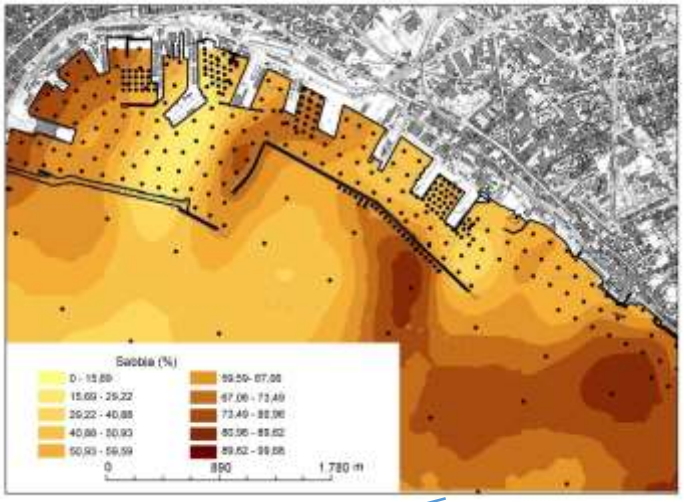


Example of Integrated surveys

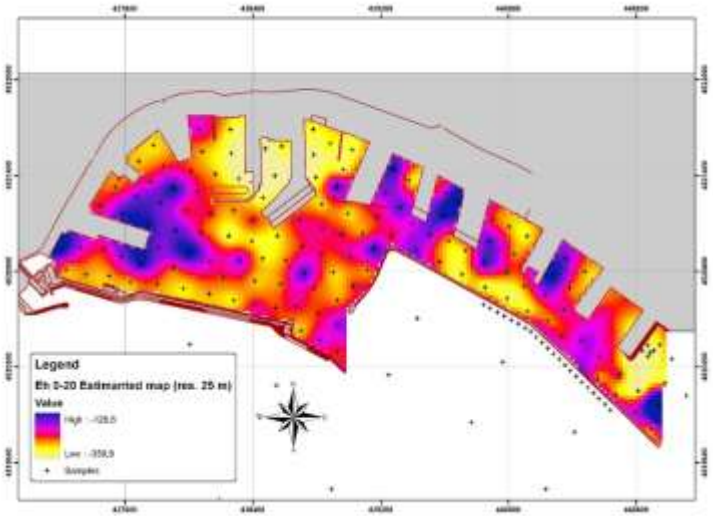
Bathymetric map

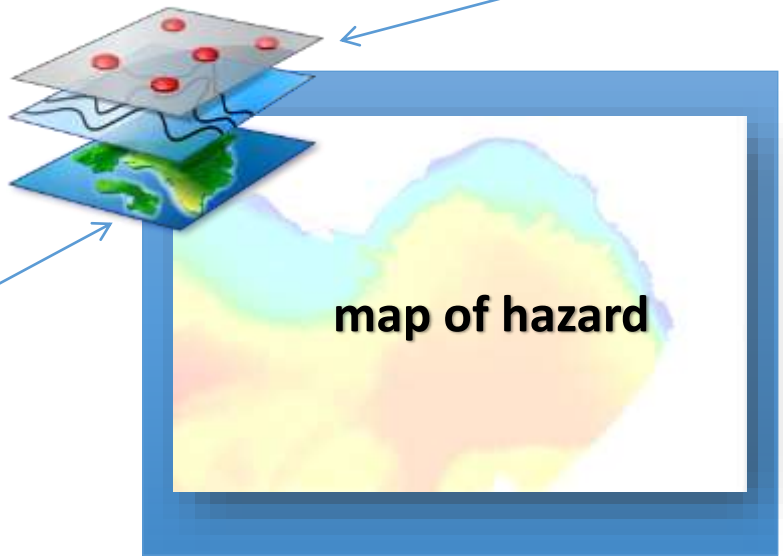


Distribution of the sands
in the superficial layers (0-20cm)

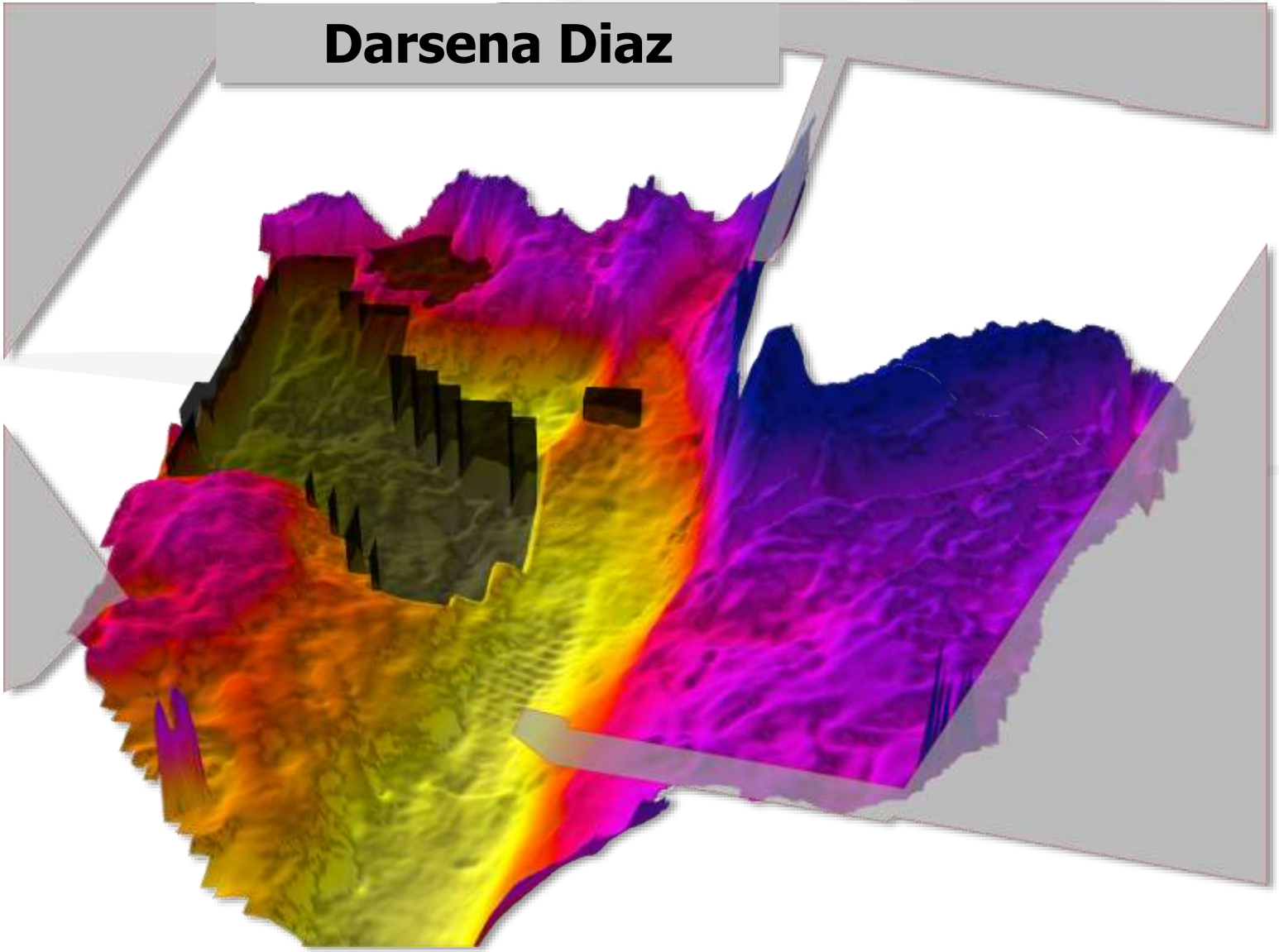


Redox potential map

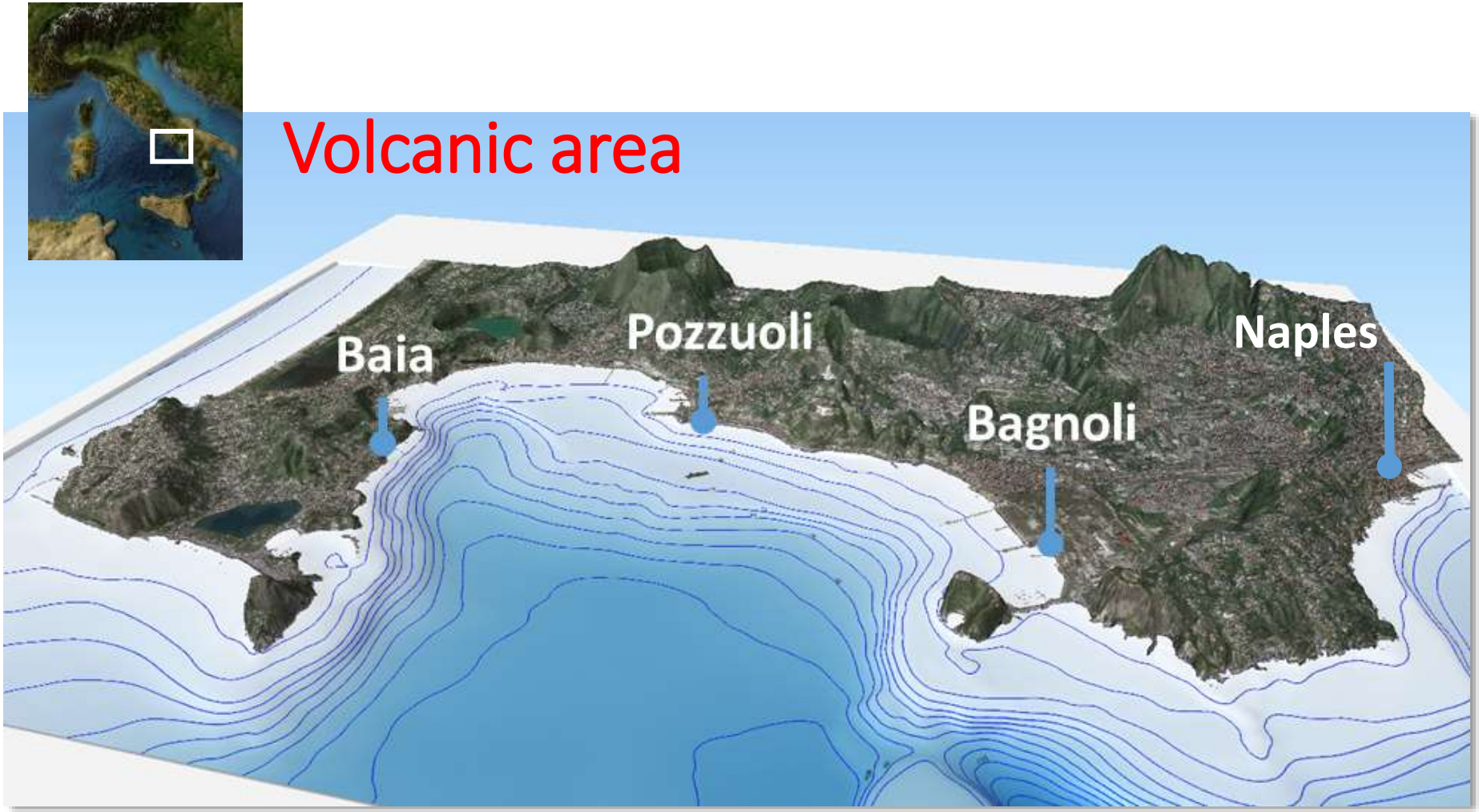




Port of Naples: Dredging Planning

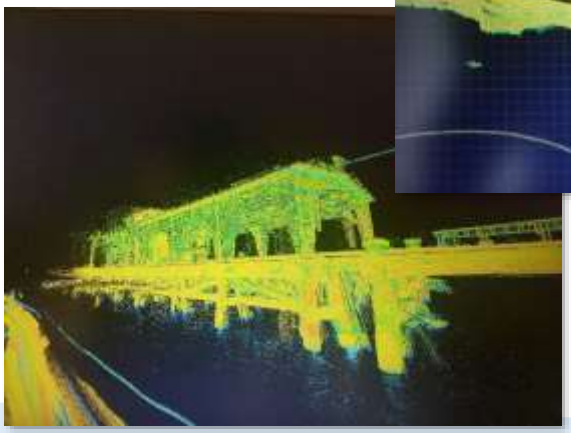


Geographical Setting



Applications of Integrated Vessel-based LiDAR, Multibeam Bathymetry (Gulf of Pozzuoli - Bagnoli)

Pioner - Technical Data
Model - Multi III
Weight - 430kg
Length x width - 530x215cm
Max persons - 8
Engine power - 50-80 HP



Gulf of Pozzuoli - Bagnoli

Platform options

Self Elevating marine Surveillance Platform

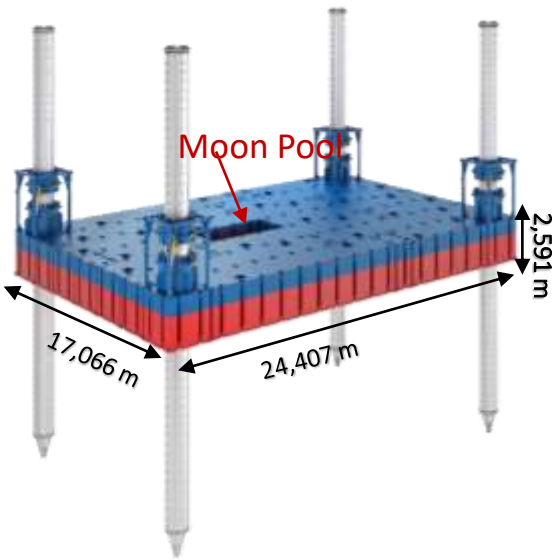
Hull Length:	150.0m	Operating Depth:	30.0m
Hull Width:	60.0m	The Num. of Legs:	8
Hull Depth:	8.4m	Air gaps:	3.0m
Leg Length:	50.0m		

Offshore Platform

Nearshore Platform

TECHNOLOGICAL JACK-UP PLATFORM

12-20 scientific & technical operators
Endurance: 7 days

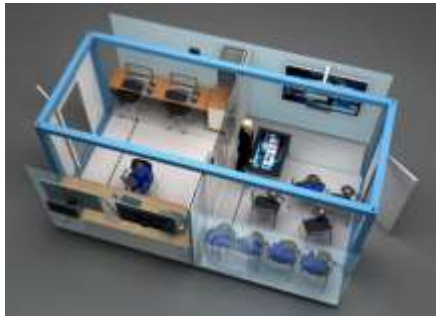


Min draft: 1,064 m abt.
Max draft: 1,245 m abt.
Length overall: 36 m
Max operating depth : 25 m
Lifting capacity: 4 x 250 mT
Autonomous drive
Power : 1000 kW abt

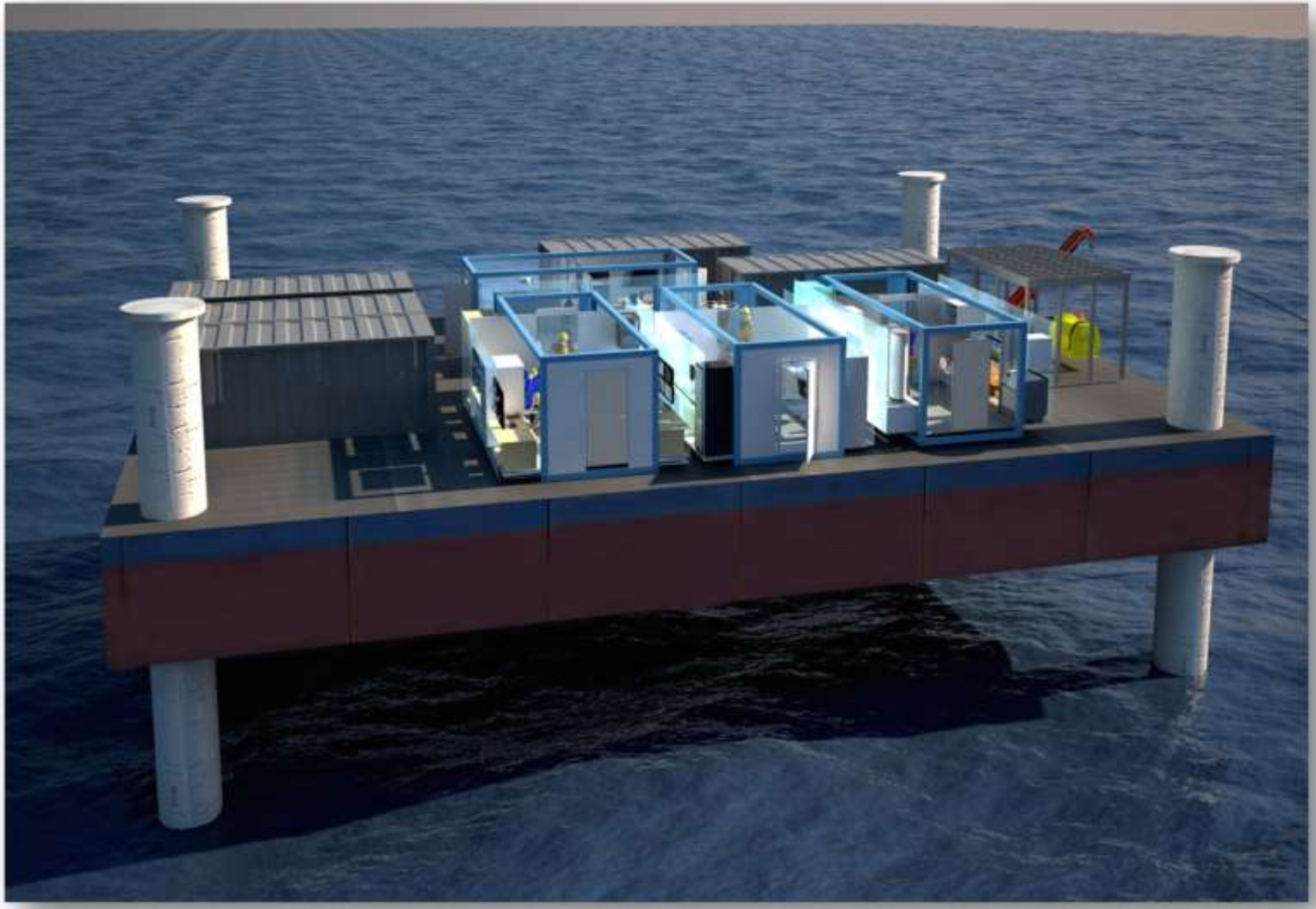
Design parameters
Wind: 10 m/s
Current Wave : 1 m/s
Wave Heigth: 1,5m

Shelter Lab

Control Room



Scientific Village

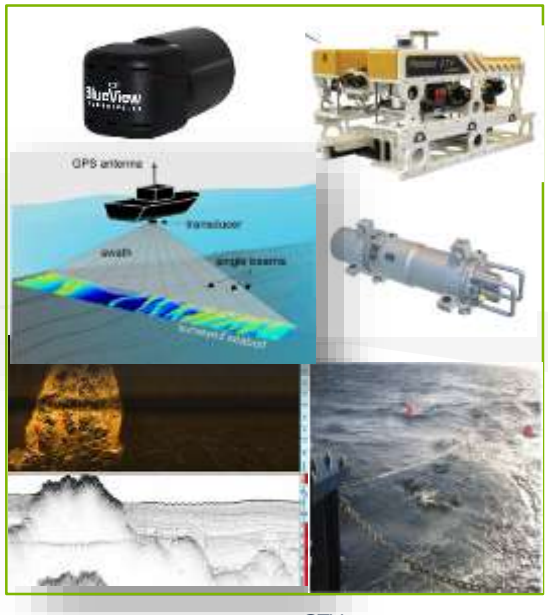


THE STRUCTURE

Mobile Shelter Labs

3 INTEGRATED RESEARCH LABORATORIES FOR MULTIDISCIPLINARY DATA ACQUISITION AT HIGH OPERATIONAL PERFORMANCES

Geophysical Lab



- ROV PERSEO^{GTV}
- 3D microbathymetry
- Laser scanning survey
- Thermic-camera survey
- Seismic reflection survey
- 3D velocity current profiling
- Magnetometric survey
- Seismic Streamer
- GI.GUN Seismic source

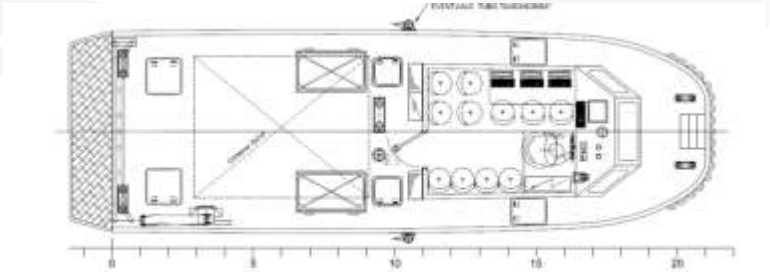
Geochemical Lab

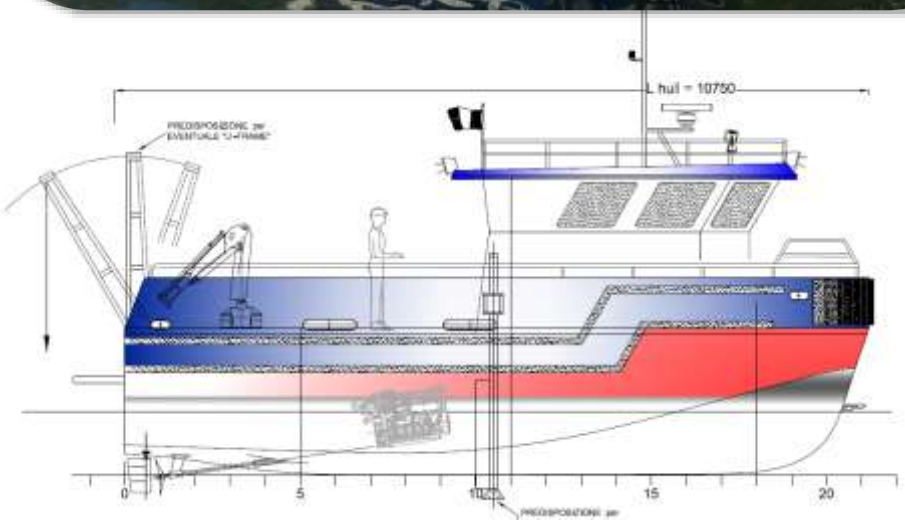
- Sampling water
- Sea-bird profiling CTDs
- Photometric analysis
- Trace metal analysis
- Black-carbon analysis concentration
- Aethalometer

Geotechnical Lab

- Sampling core (6m)
- Sea-bed CPT profile up to 1500m depth
- Mechanical characterization of soils under static and dynamic stress conditions

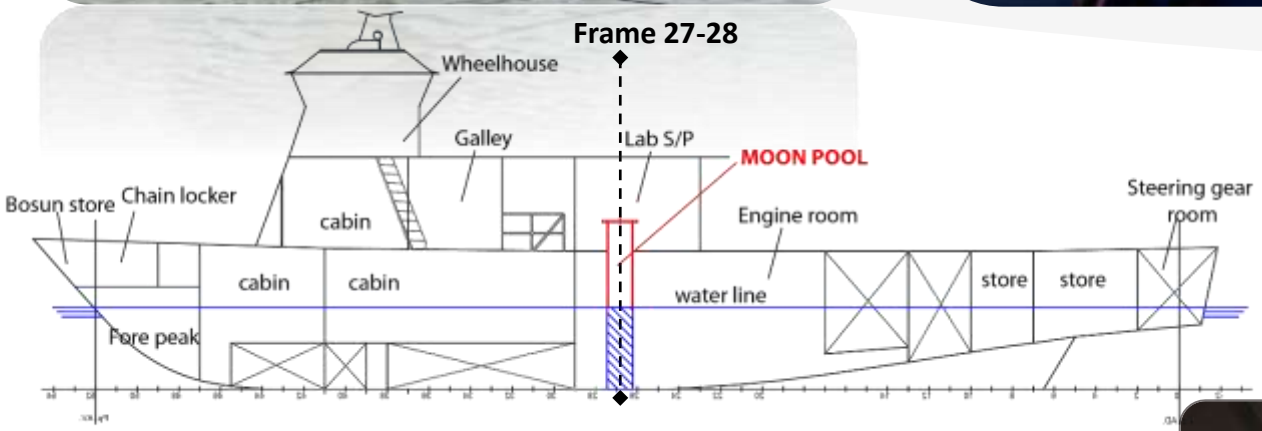
Tug – BOAT Technological Platform support Unit

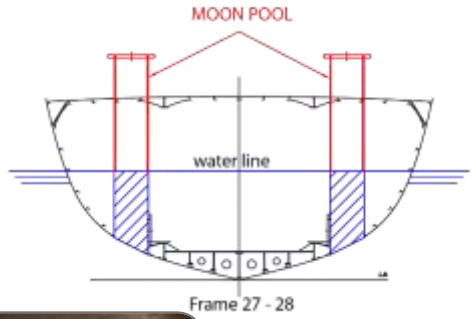




Lightweight Hull aluminum alloy
Length 11.3 m
Heigth 3.90 m
Dip <1.00 m
Full load dip<1.50 m
Construction Height 2.60 m
Maximum speed 20 knots
Displacement 8,000 kg
ISO10 containers deck carriage

FAST CARGO VESSEL





Length: 28.45m
Breadth: 7.00m
Heigth: 3.20m
Draught: 1.90m
Payload: 40t

Main engine power: 2x735 kW
Auxiliary engine power: 1x200kW + 1x50kW
Speed: 16 kn
technical operators: 5 people
scientific operators: 8 people
A-frame: 5t SWL

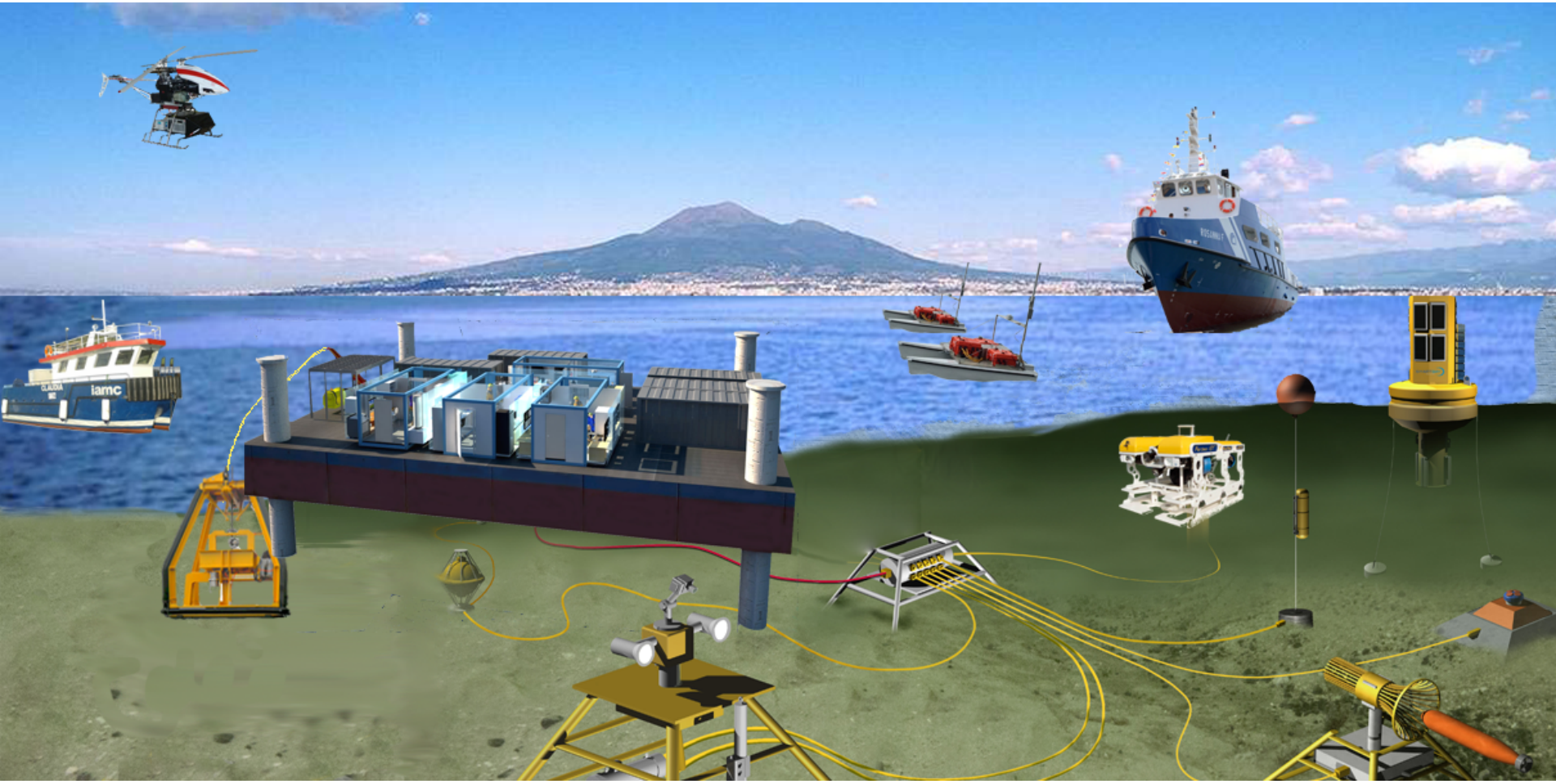
“ACQUA ALTA” OCEANOGRAPHIC TOWER

- located in the Northern Adriatic Sea 16 km off the coast of Venice
- **equipped** with a meteo-oceanographic station
- data are recorded on board and also telemetered to land
- measurements of atmosphere (*wind, temperature, humidity, solar radiation and rain*) and sea (*waves, tide and temperature*)

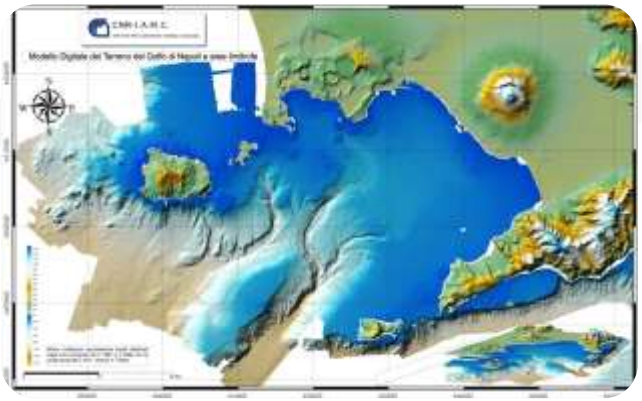
The Smart Bay Concept

The general aim is to integrate the **Gulf of Pozzuoli** (Southern Italy), as physiographic unit of considerable environmental, cultural and socio-economic value, in a virtuous circle between **Research**, **Technology** and **Economy**

Innovative multi-purpose platforms
The Smart Bay Concept…



Activities



Geology

Geological, seismic and volcanic risk

Laboratory of sea-bed morpho-bathymetric evolution

Water Column

Study of food webs and ecosystems.

Repopulation and management strategies

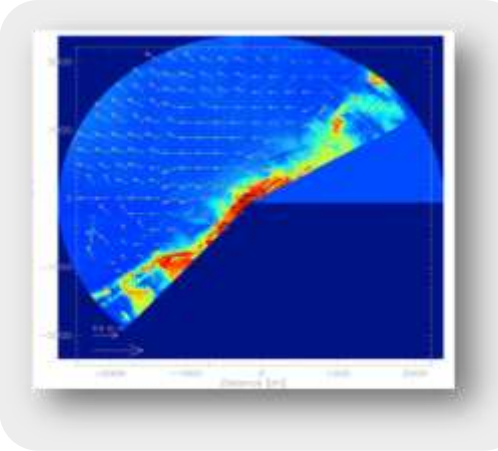
Marine organisms as environmental sensors

Dispersion and Physical-biological models

Risk assesment and monitoring

Network and innovative sensors

Models and Measurments



Activities

Archaeology and Tourism

- Promotion of cultural and historical resources in submerged land
- Restoration and development of archaeological and landscape heritage
- Analysis of the relationship with the coastal area economy: food, swimming, tourism, productive activities

Scuttling

In this framework, the idea of **Scuttling**, or the deliberate disposal of ships or similar industrial structures, as **"virtuous" activities** at low environmental impact, intended to encourage the restocking of fish and underwater tourism attraction

The recovery of abandoned ships and the transformation, after an appropriate remediation, in artificial reef, could provide benefits to the environment and marine life, especially in areas of seabed between 10 and 50 meters

Outreach (container pool)

Thanks for your attention (from me !)