Workshop on training
For less experience Users of Hardware

European Initiatives: Coastal and Open Sea Infrastructures

Vanessa Cardin

Trieste, 15-17 September 2015

Environmental Problems

Monitoring the marine environment not only constitutes a challenge for the scientific community, but is also recognized as a priority for policies aimed at managing the environment.



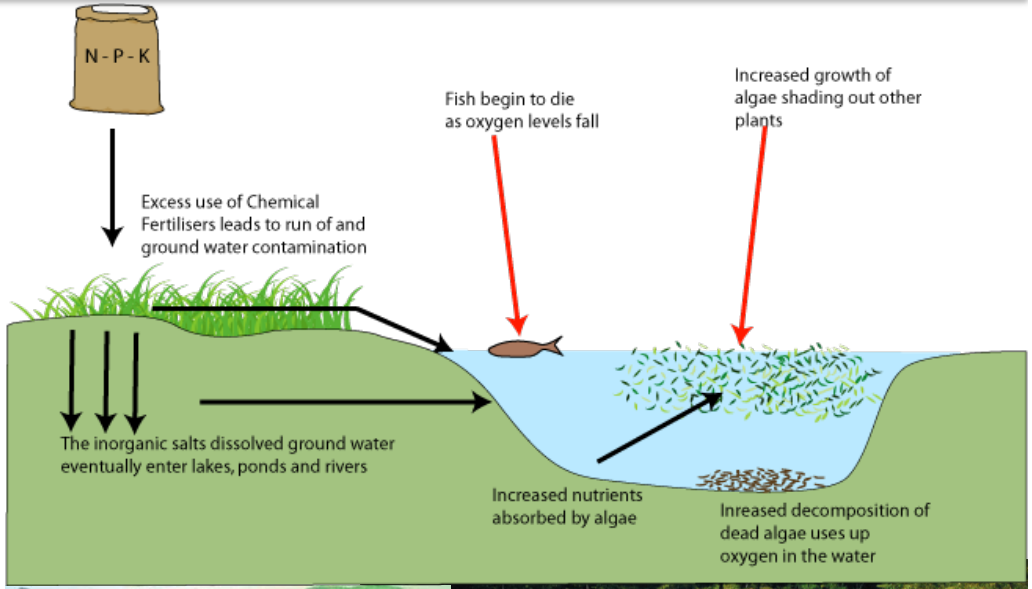
Coastal Pollution | Erosion | Eutrophication



Marine Pollution | Protection of m. environment | Sustained Fisheries

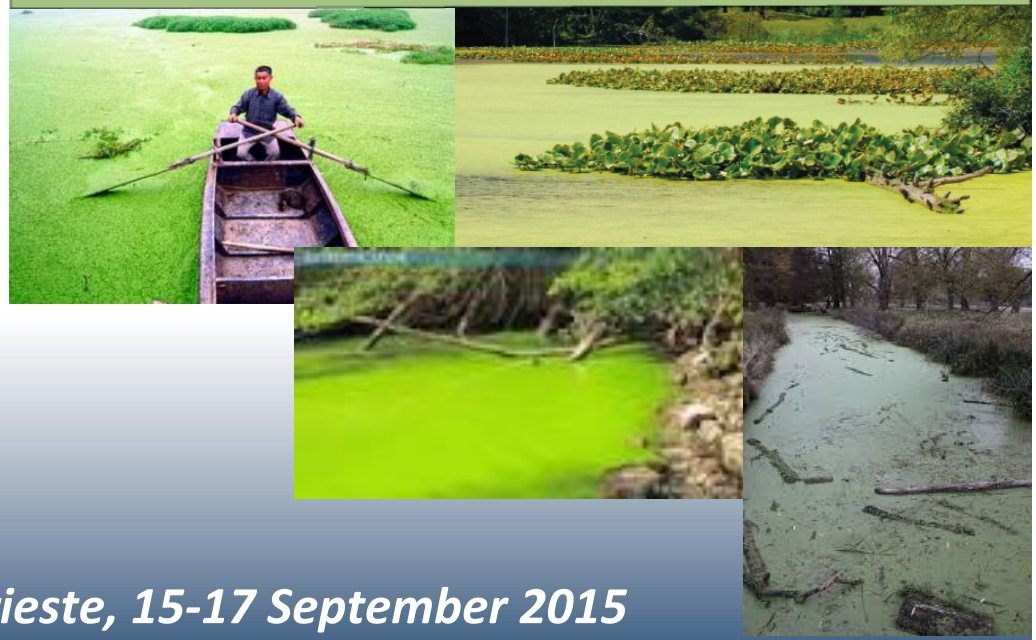
Eutrophication

The process by which a body of water acquires a high concentration of nutrients, especially phosphates and nitrates



Effects

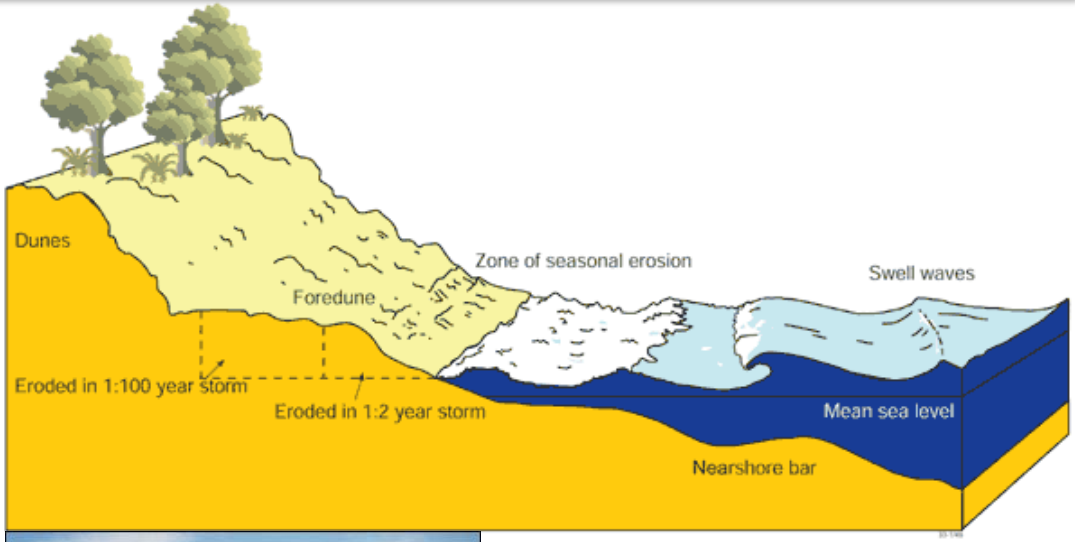
Eutrophication can have serious, long-term effects. The most noticeable effect of eutrophication is algal blooms. When a bloom occurs, the stream, river, lake, or ocean becomes covered with algae, which is usually bright green.



Coastal Erosion

Coastal erosion is the wearing away of land and the removal of beach or dune sediments by wave action, tidal currents, wave currents, drainage or high winds (see also beach evolution).

On non-rocky coasts, coastal erosion results in dramatic (or non-dramatic) rock formations In areas where the coastline contains rock layers or fracture zones with varying resistance to erosion.







Fixed point Infrastructures within the European operational oceanography

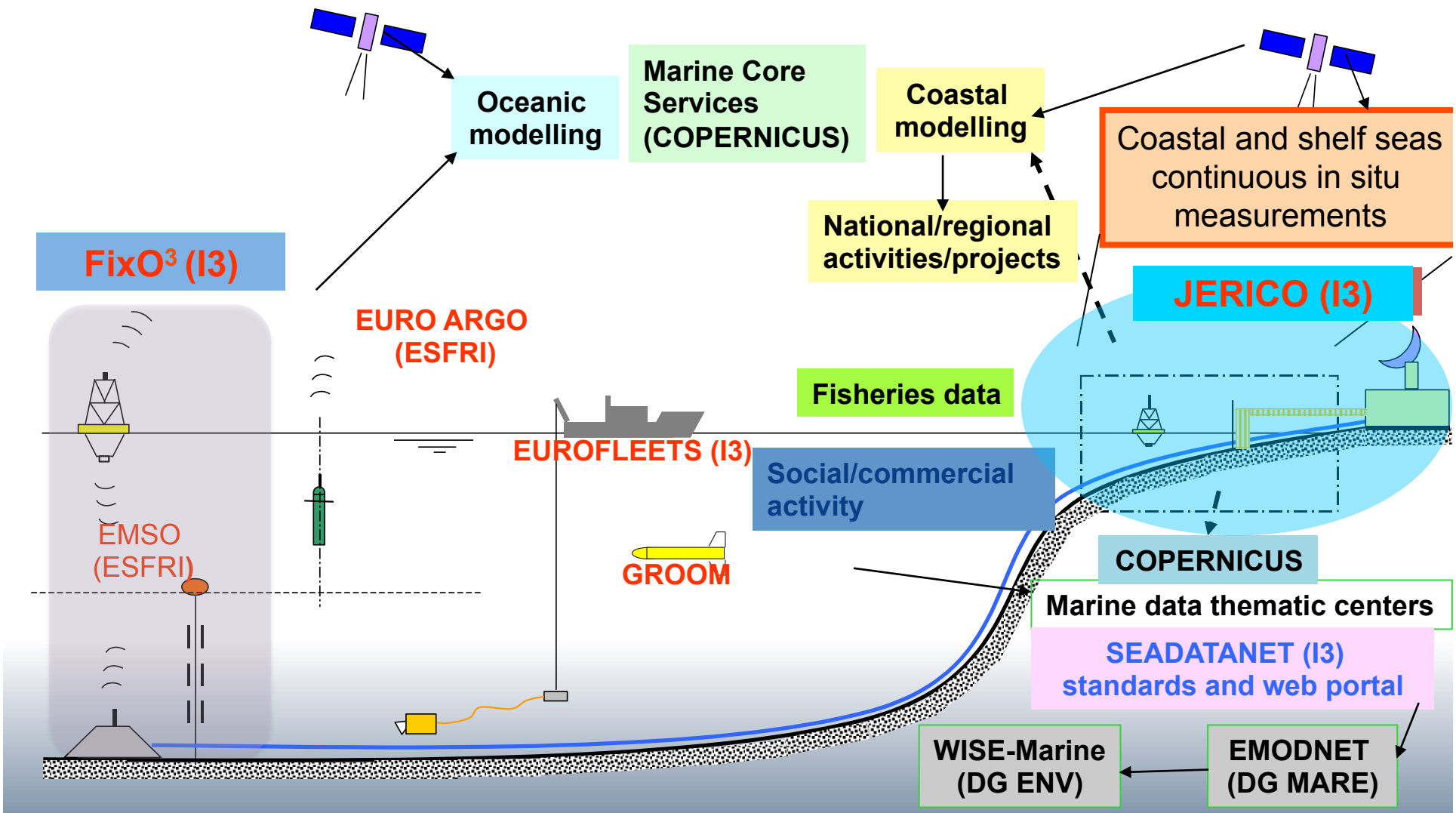
- 89.000 km of coast along two oceans and four seas: the Atlantic and Artic Ocean, the Baltic, the North Sea, the Mediterranean and the Black Sea





- Sustained observation of the seas and oceans is currently a high priority for European marine and maritime activities

Towards a long-term and sustained European Network of observatories



Why do we need sustained observations and for how long do we need them?

Episodic events profoundly affect ecosystem function and probably have long term consequences. Their significance is impossible to asses without sustained observations.

Continuous monitoring is required for a variety of key properties

Watch

Deep ocean observatories are fixed at one point in the ocean, far away from coastal influence. They continuously measure properties of the seawater such as temperature, salinity and carbon dioxide, but also biological activity such as algal growth.

Record

Without the help of man, data are recorded and captured continuously every few hours for weeks, months and even years at a time. The data are then transmitted by satellite to the research centres around the world or stored inside the sensors until they are picked up by scientists venturing out to sea.

Understand

This continuous flow of data enables scientists to understand natural patterns and fluctuations such as seasonal cycles. It also allows them to follow everyday variation, to detects episodic events (such as algal blooms) and long-term changes (such as increasing seawater temperatures).

Predict

These important amounts of data collected over long periods of time are also used to produce more accurate computer models to predict future changes.

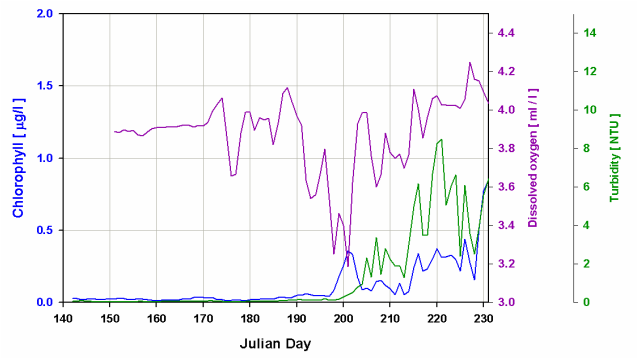


Technology

Observatories are typically made of a single column of strong wire stretching from the sea surface to the sea floor. Several scientific instruments and sensors are attached in clusters like mini constellations all the way down. Some equipment including landers can also be positioned on the seafloor.

Biological Monitoring (W1-M3A) in the Ligurian Sea

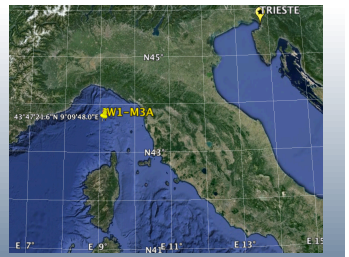
The W1-M3A surface buoy acts as a Fish Aggregating Device (F.A.D.), attracting several species of fishes and marine mammals





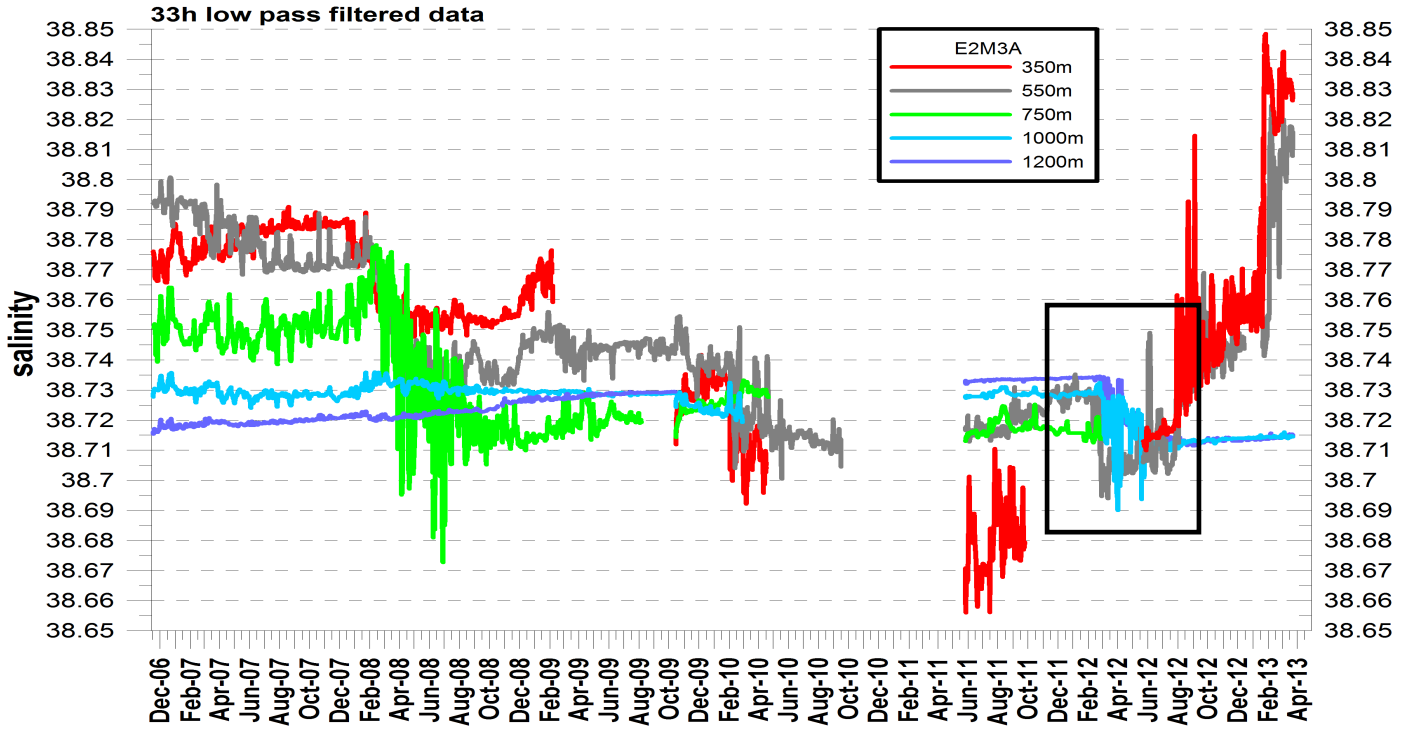


- ✓ dissolved oxygen: quite stable dynamics in winter period and high variability during late spring-summer season



- ✓ fluorescence: low values in winter, and bloom in spring or summer

Salinity variability (E2M3A) in the Southern Adriatic



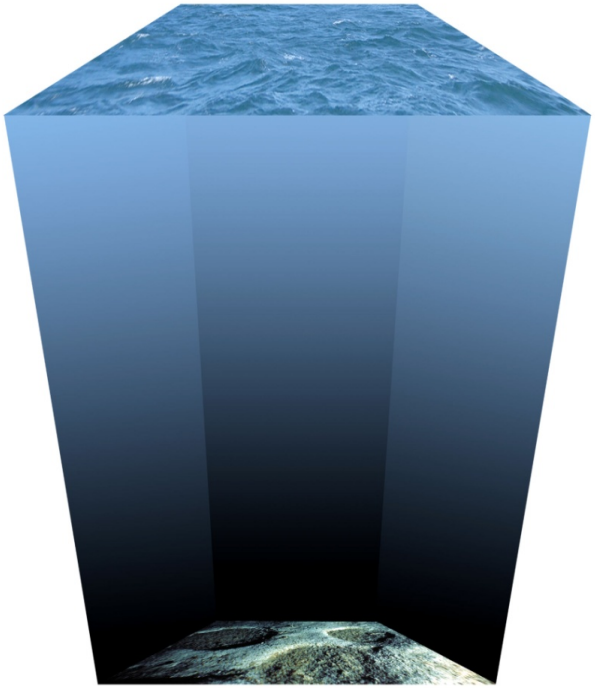


- Detection of dense water cascading
- Increase of bottom salinity

High frequency sampling is essential

Criteria for Fixed Observatories

- Coastal and Open Ocean
- Multidisciplinary
- Existing at fixed locations
- Build on former programs and networks
- Data Sharing:



- Freely available to all immediately after collection and Quality Control (QC)
- Using internationally Associated metadata
- agreed protocols and format

Integrated Infrastructures Initiative (I3)

Two projects funded by the 7th Framework Program for Research and Technological Development within the Integrated Infrastructures Initiative:

- JERICO (Joint European Research Infrastructure network for Coastal Observatories)
- FixO^3 (Fixed point Open Ocean Observatories Network)

Structure of Fixed Point Programs

COORDINATION ACTIVITIES:

Networking activity

- aim to foster the culture of cooperation between the partners
- target at spreading good practice, promoting common protocols and interoperability

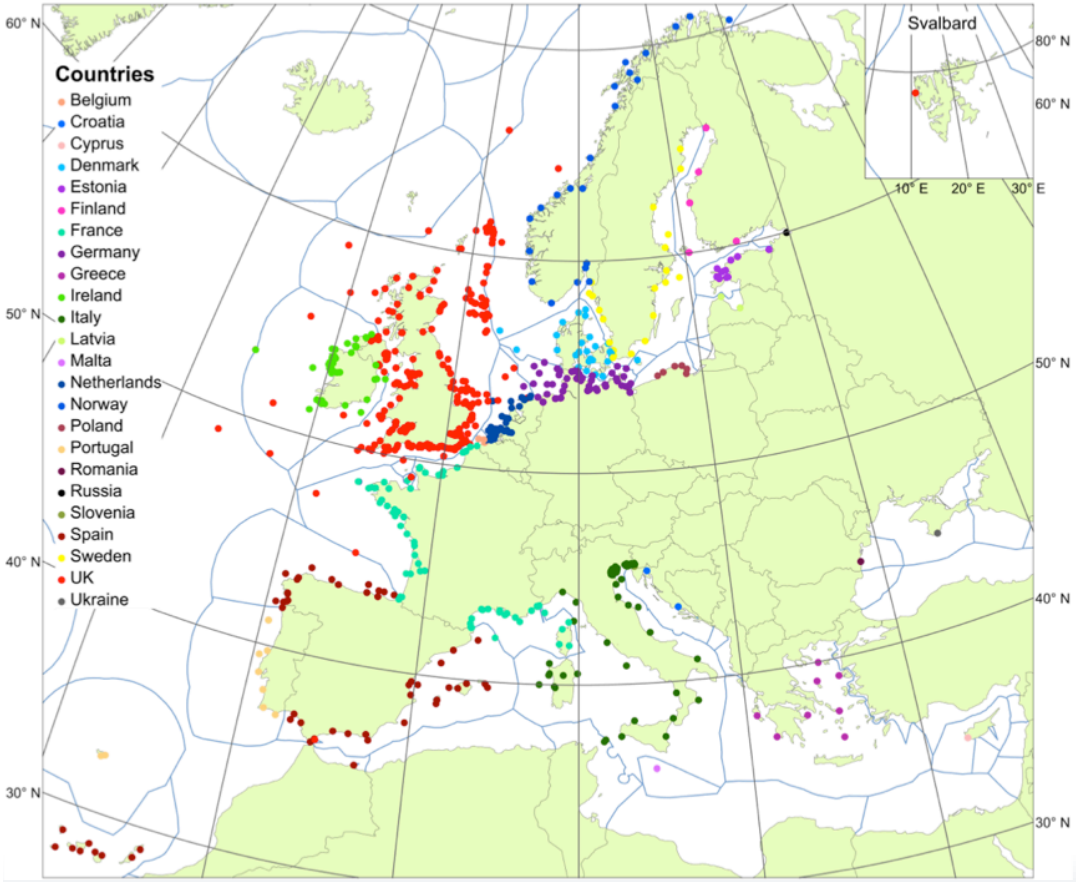
SUPPORT ACTIONS:
Service Activity and Transnational Access

- offer international access to observatory infrastructures and the data services and products obtained from them

RTD: Joint Research activities

- Innovate and enhance the current capability for multidisciplinary in situ ocean observation from the sea floor to the air-sea interface

Jerico Coastal Network



Main Objective:

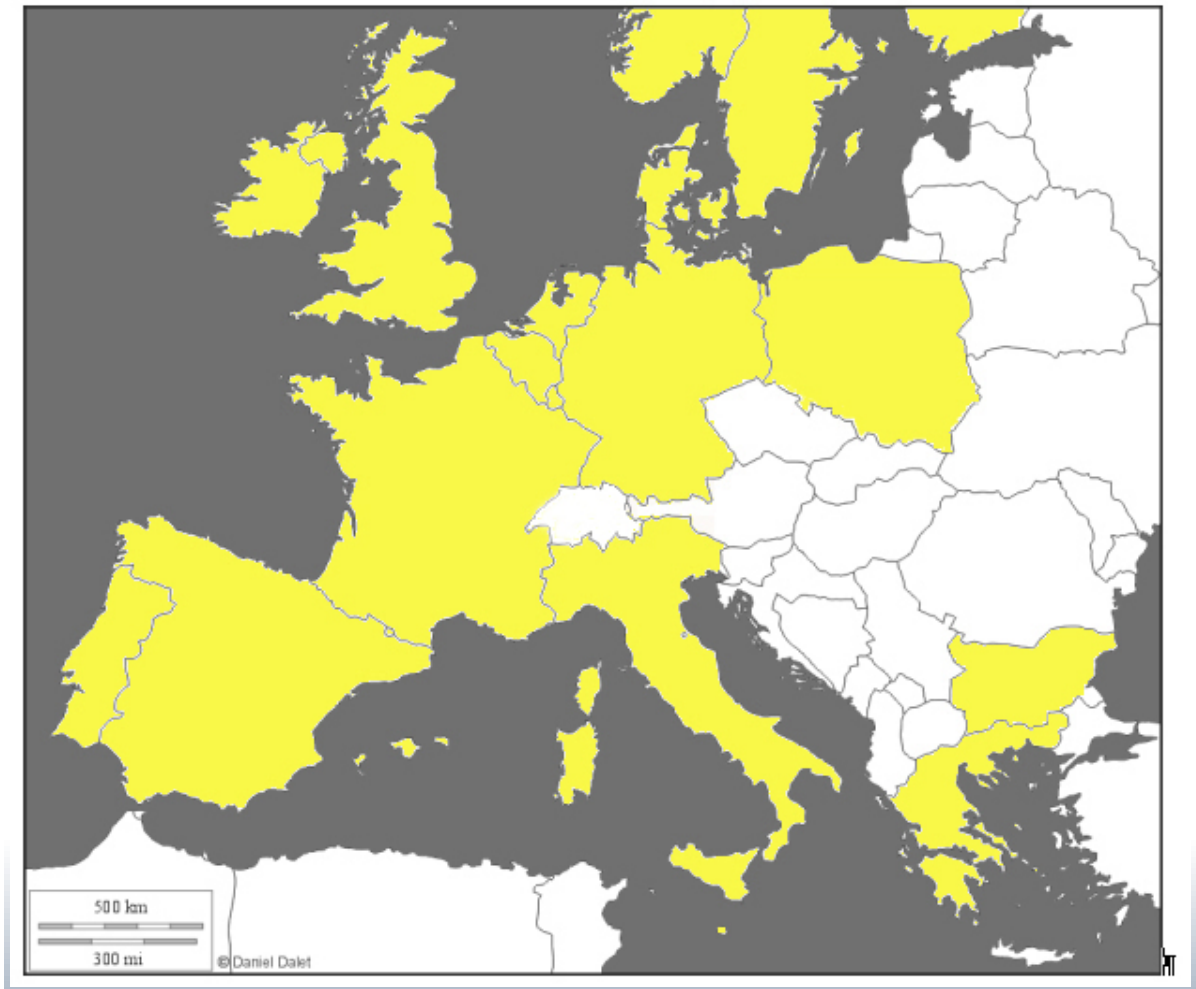
Prepare for the future European Network of operational coastal observatories (OCO)

3 observation systems:

- Glider
- Ferryboxes
- fixed coastal platforms

www.jerico-fp7.eu

Jerico Partners



The JERICO consortium is composed of 27 partners representing 17 European countries.

- 7 millions euro
- Start on 2011
- 4 years project
- International Steering Committee

Coordination: IFREMER
DR. P. Farcy

Jerico Results

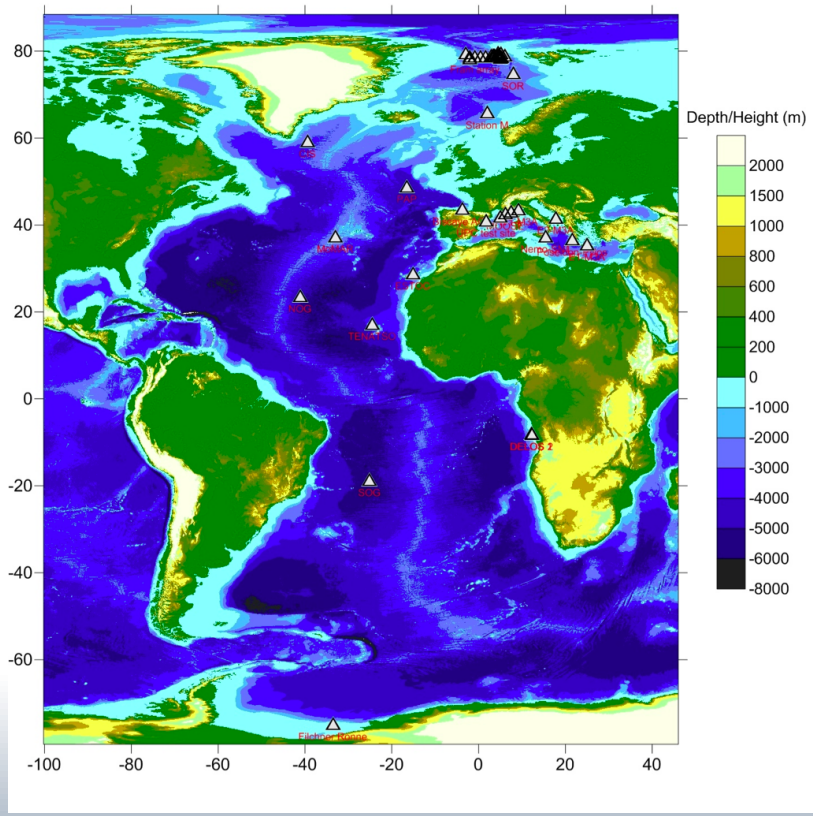
* Increased harmonisation of existing infrastructures
* Exchange of know-how and definition of Best Practices
* Promote coastal oceanography through TNA
* Agreed on deployment needs and gaps
* Promote innovation in technology (FCT and WP10)
* Propose a future strategy for coastal oceanography

Best Practice

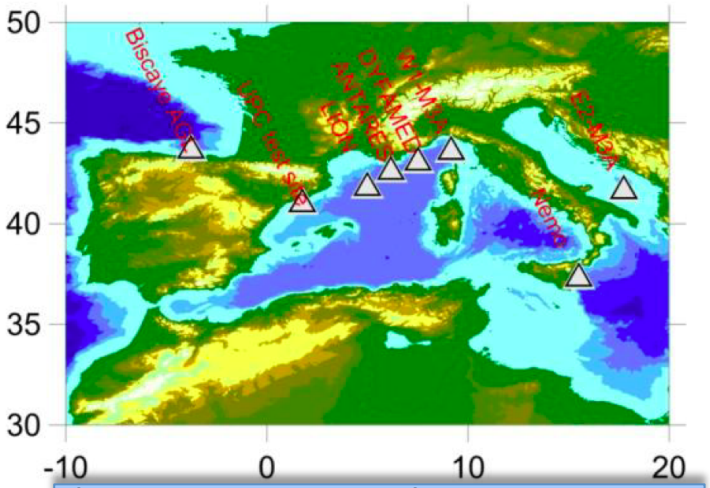
- Best practices and the available technologies for protection against fouling
- Best practices in calibration of oceanographic sensors.
- End-to-End Quality Assurance (Best Practices on Sensors, Housings, Pre & Post deployment procedures, Data processing) for Fixed Platforms

FixO³ Network

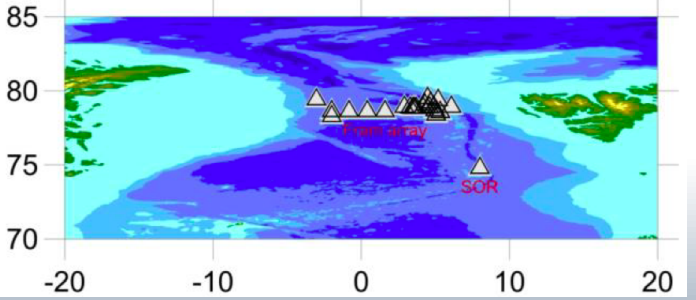
It covers all part of the oceans: in the Atlantic from the Artic to the Antarctic throughout the Mediterranean

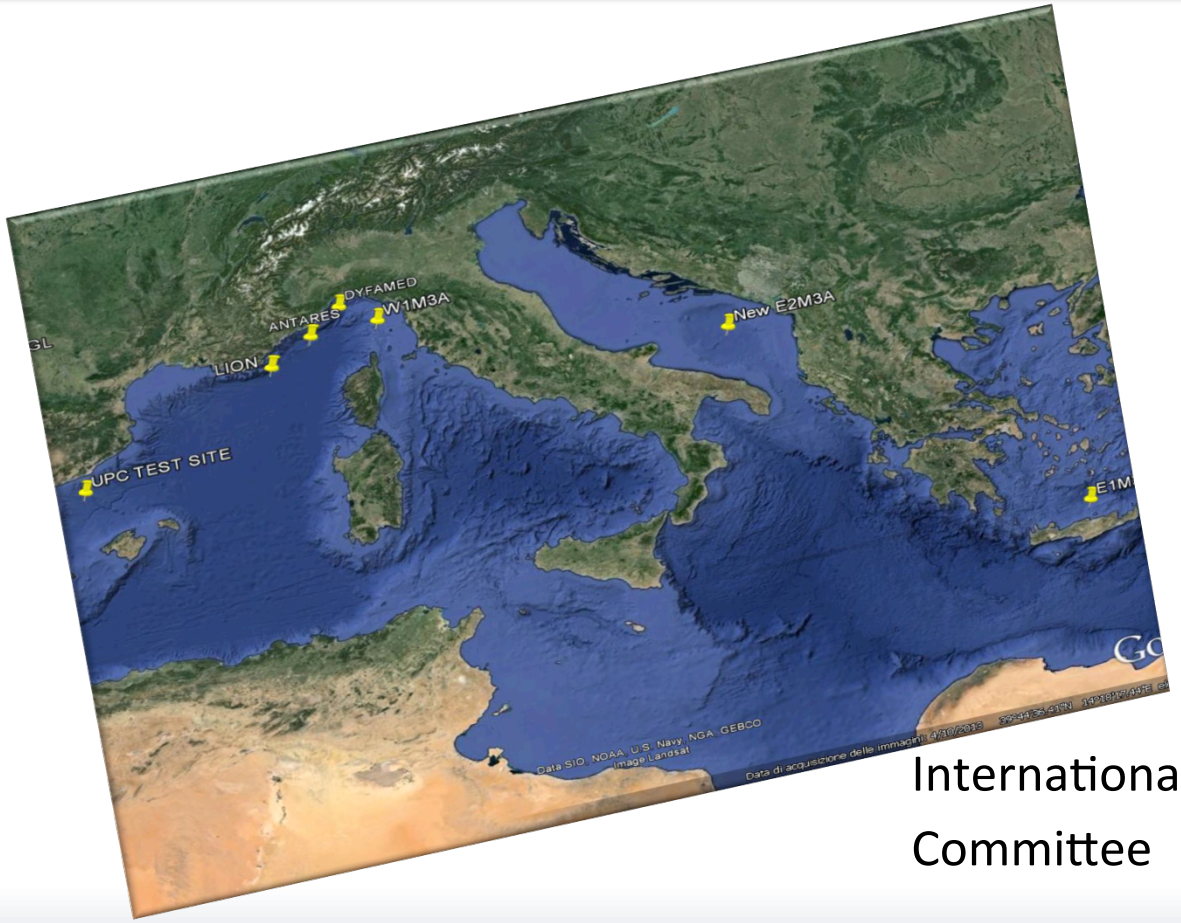


locations within the Med Sea



locations across the Fram Strait





- 29 European Partners
- 22 Open Ocean Observatories (7 in the Med Sea)
- 1 test site
- 7 millions euro
- 4 years project

International advisory board & Steering Committee

www.fixo3.eu

Coordinated: NOC, UK

Started: 1st September 2013

- Different type of observatories

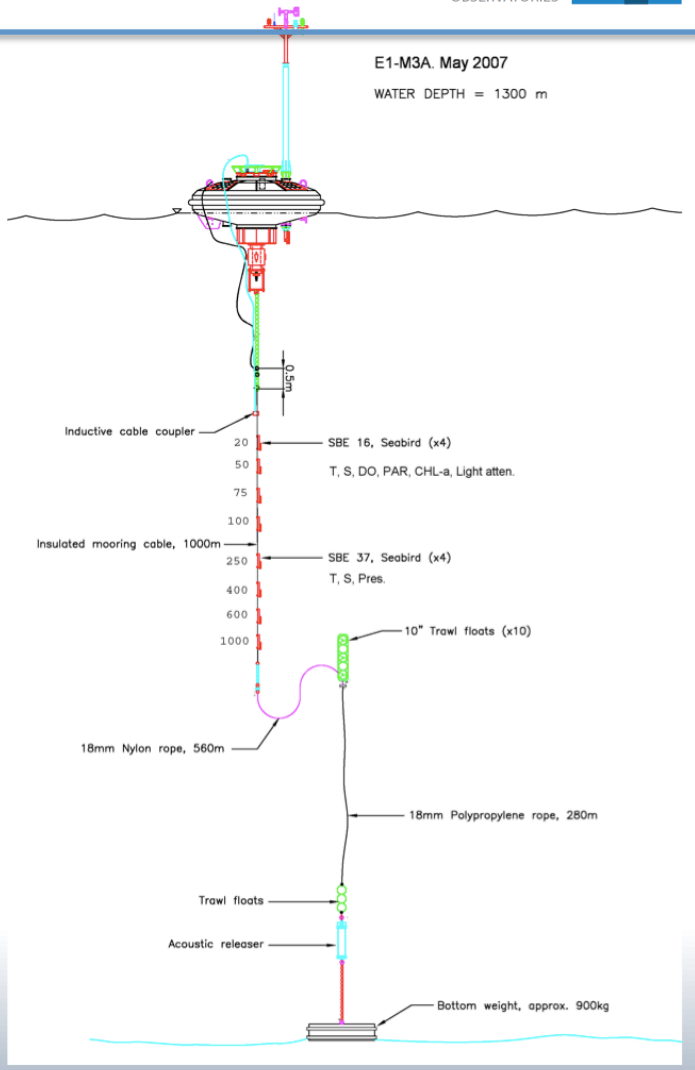
Observatories





Single mooring

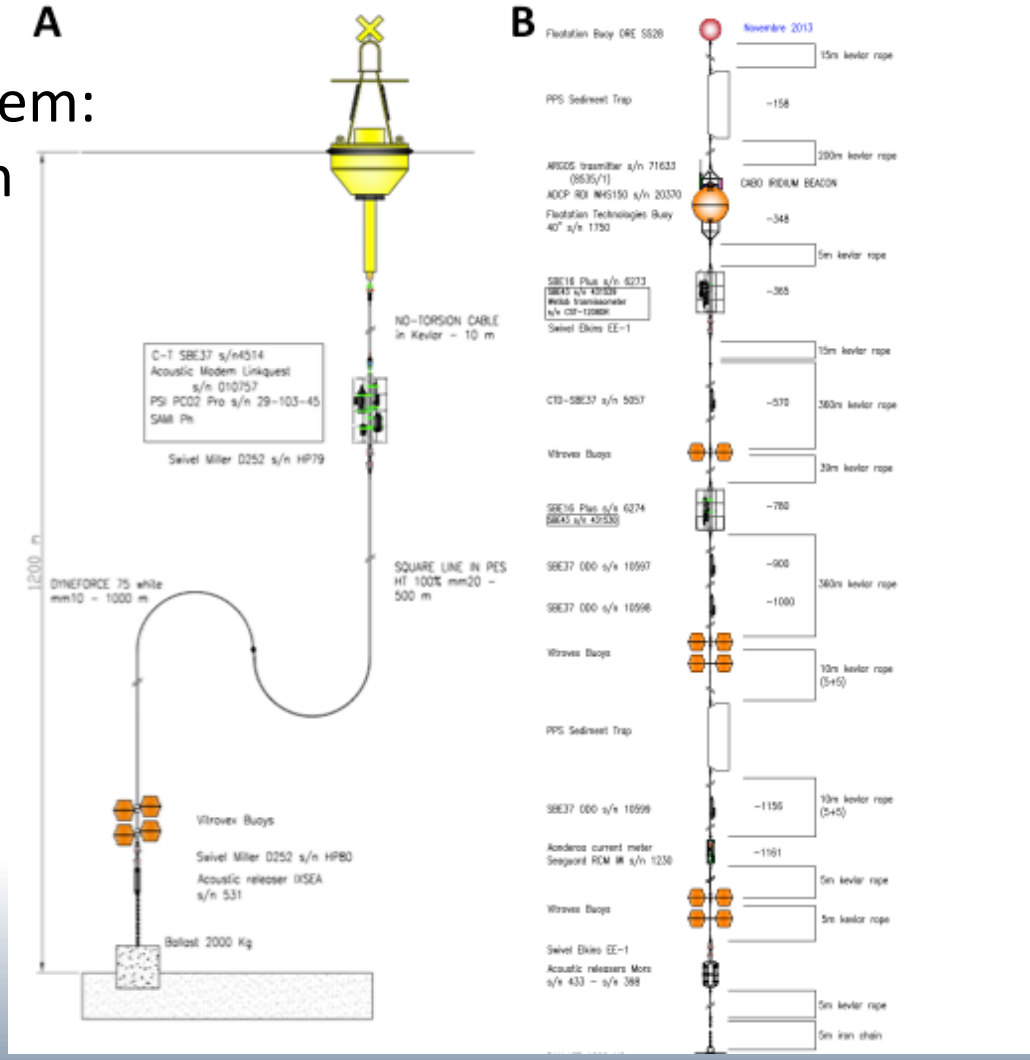
E1-M3A, Cretan Sea

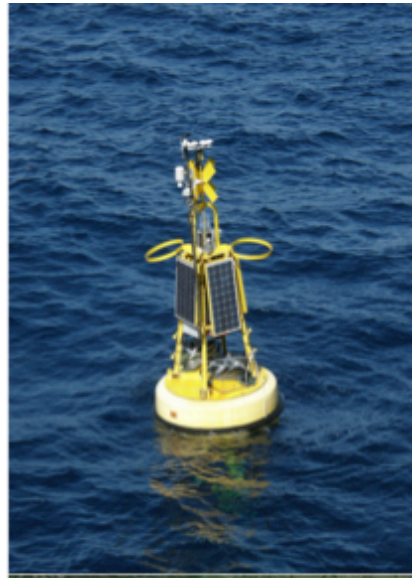


Observatories

Two mooring system:
E2-M3A, Southern Adriatic Sea







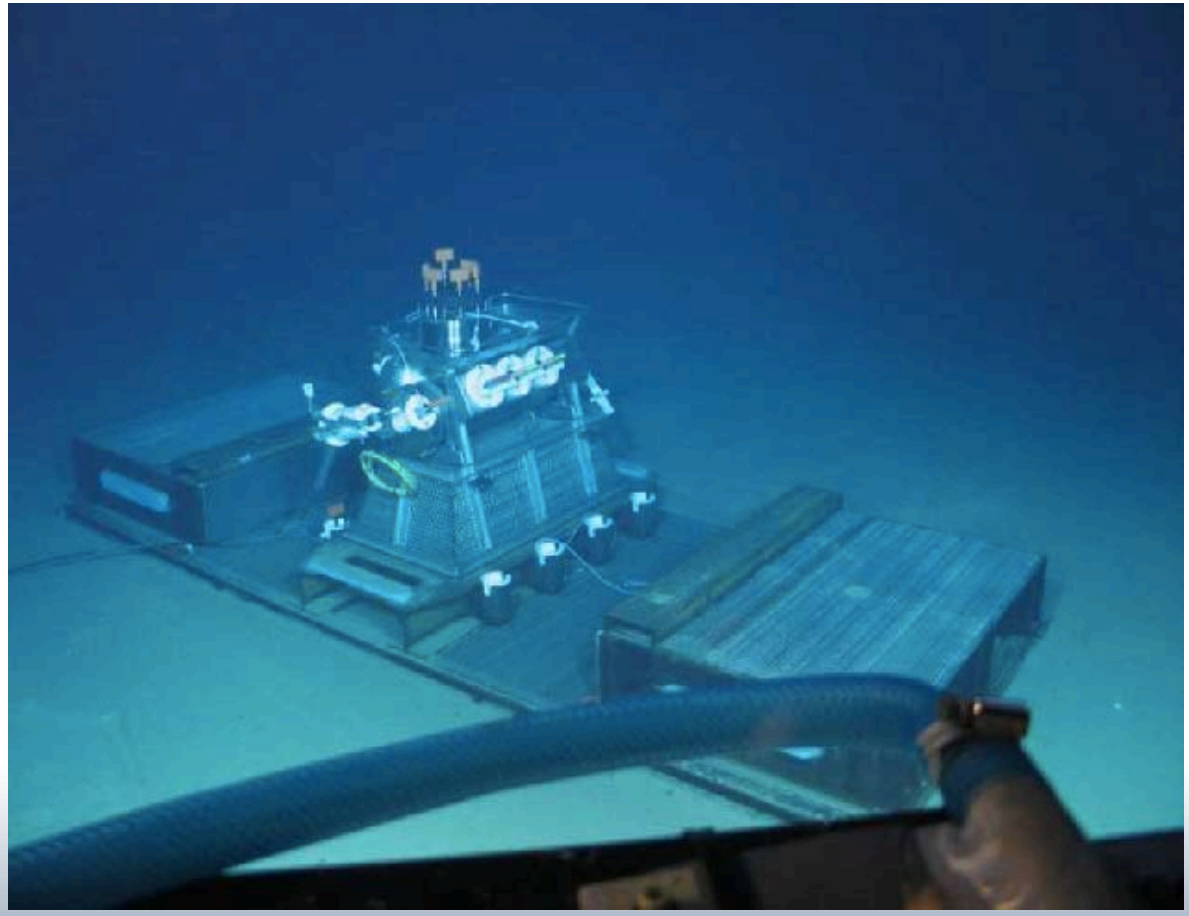


Observatories

Antares - Cable observatory

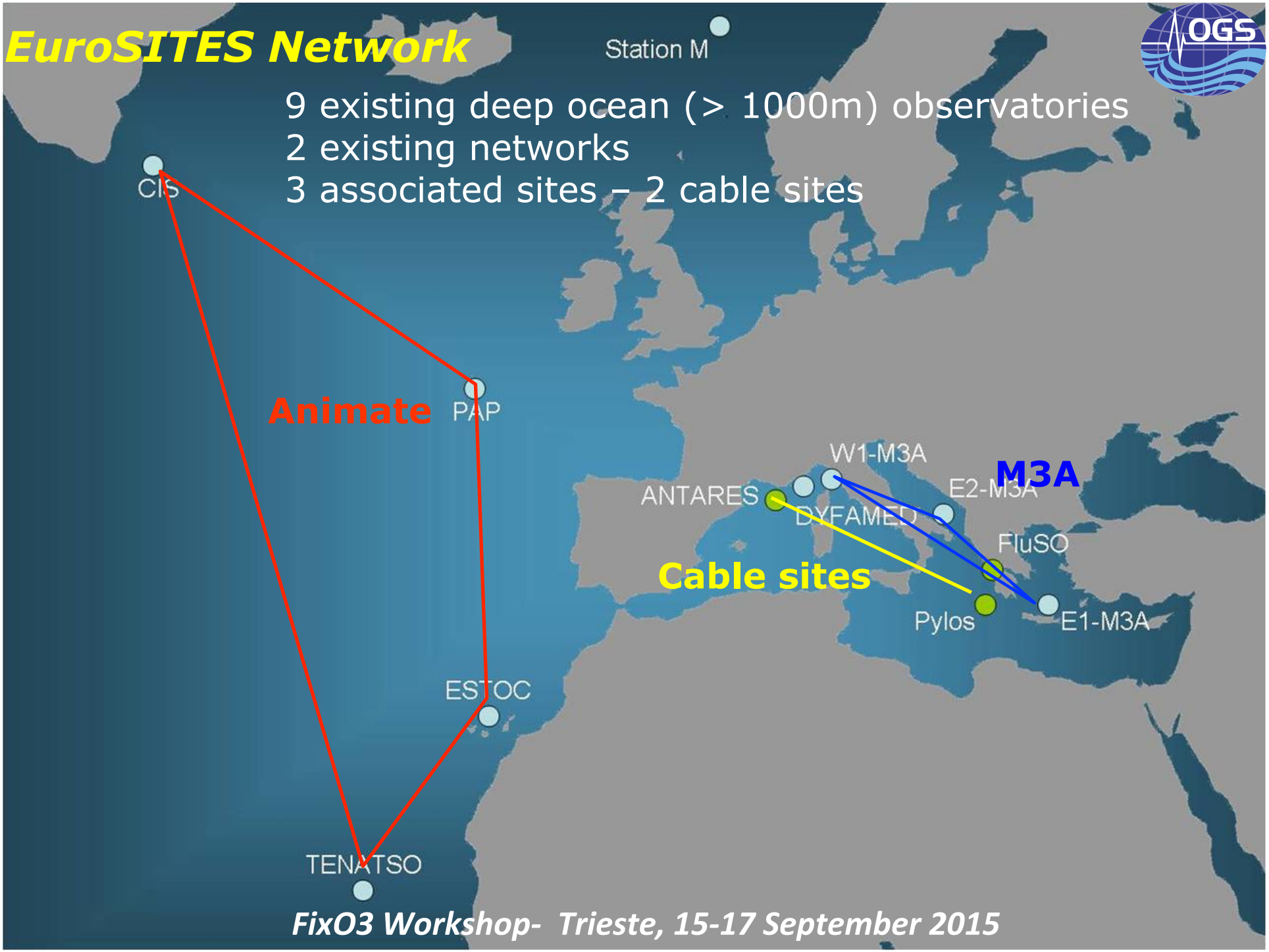
North Western
Mediterranean Sea



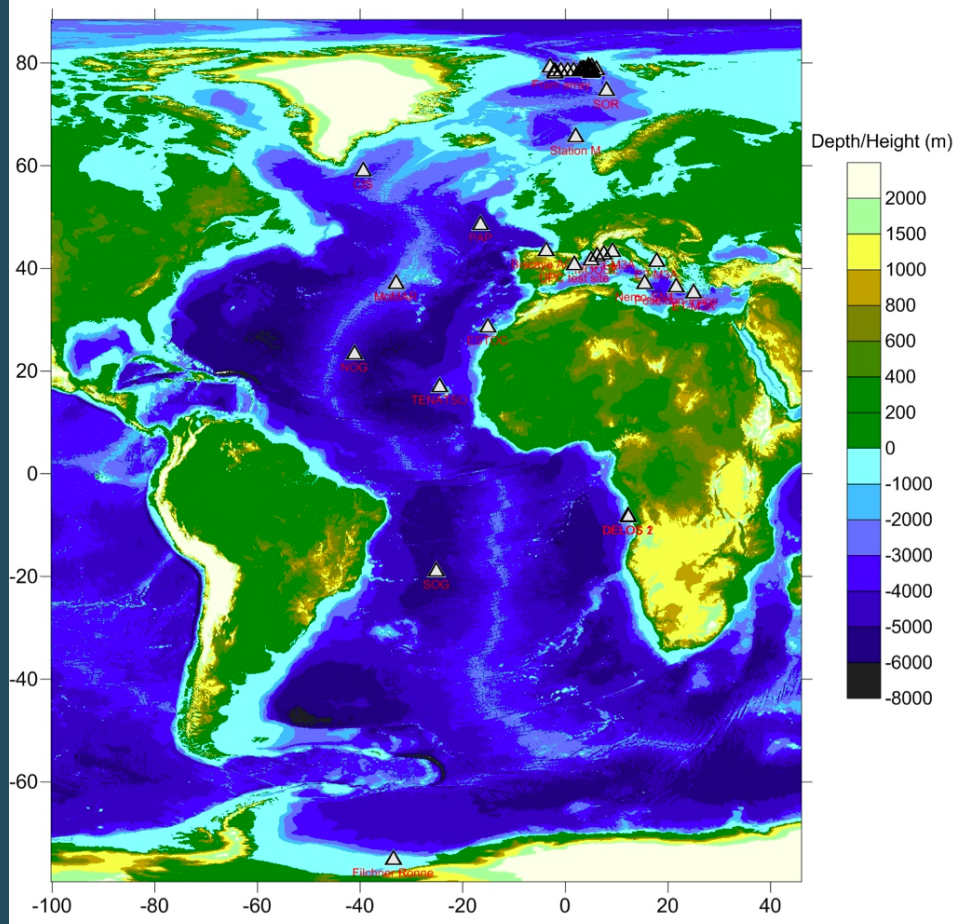


Different type of observatories

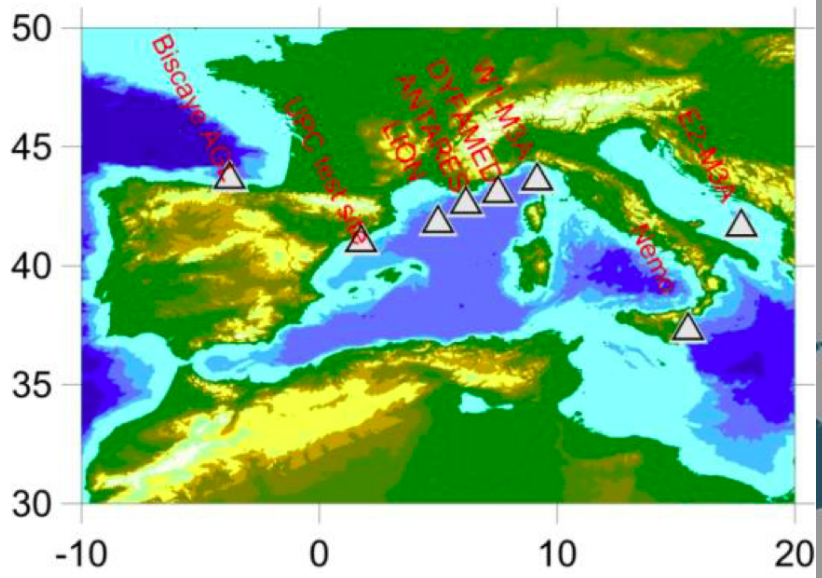
- Wide range of disciplines: biology, biogeochemistry, chemistry, physics, geology
- Surface to seafloor / air-sea interaction
- Build on former projects and networks:
  - EuroSITES
  - CarboOCEAN
  - ESONET
- "glue" with ESFRI programs:
  - EMSO (European Multidisciplinary Seafloor& Water column Observatory)
  - ICOS (Integrated Carbon Observing System)


EuroSITES Network
Station M
9 existing deep ocean (> 1000m) observatories
2 existing networks
3 associated sites – 2 cable sites
CIS
Animate
PAP
W1-M3A
M3A
ANTARES
E2-M3A
DYFAMED
FluSO
Cable sites
Pylos
E1-M3A
ESTOC
TENATSO
FixO3 Workshop- Trieste, 15-17 September 2015

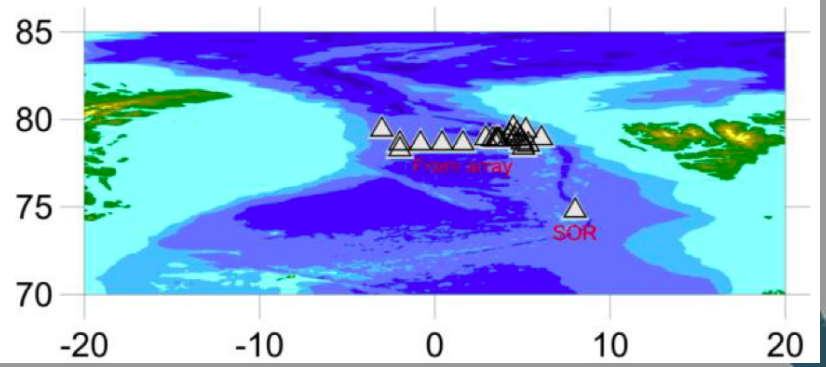
Station M



FixO3 locations within the Mediterranean



FixO3 locations across the Fram Strait



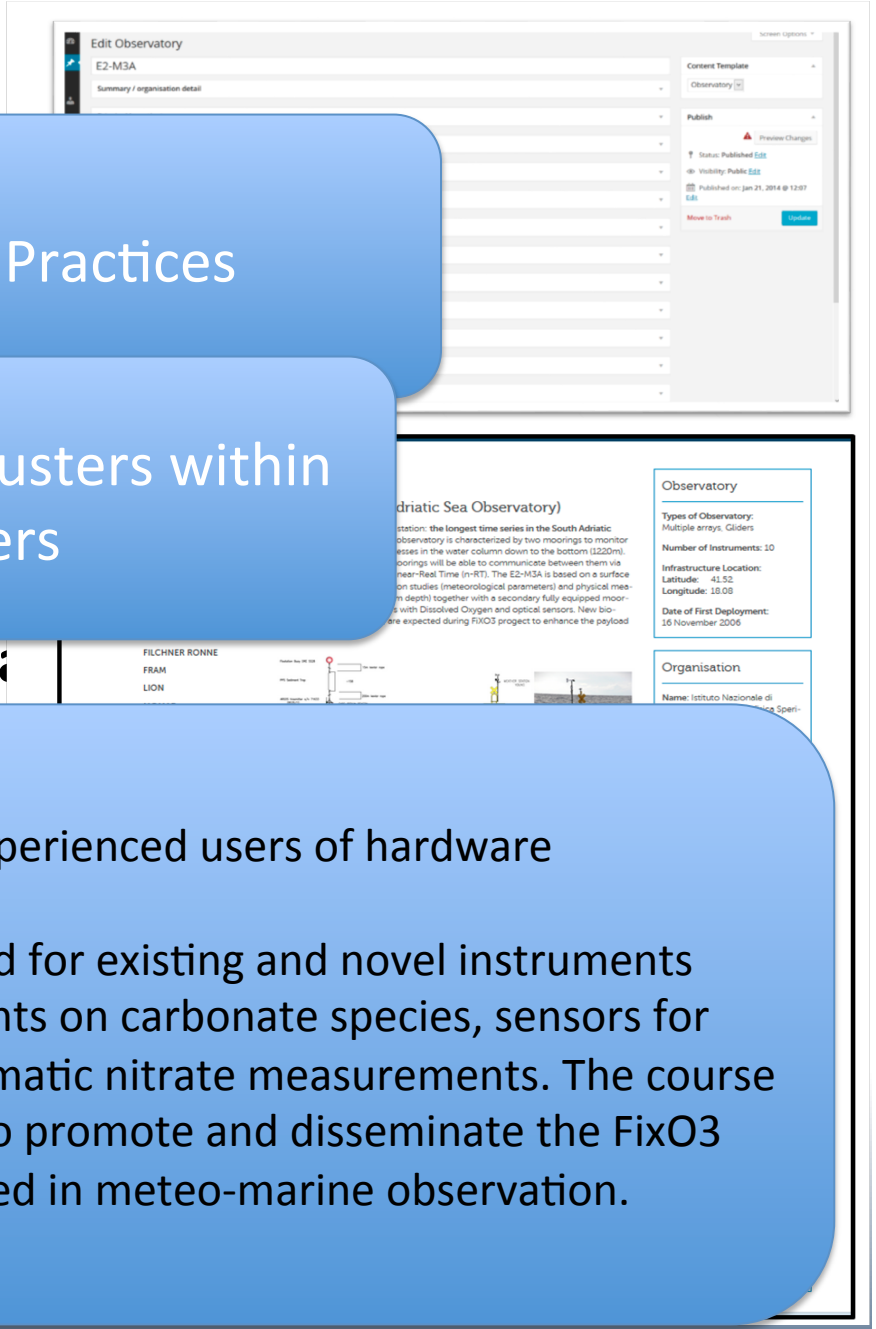
TENATSO

Networking activities

- Technological and procedural harmonization
- Data management and harmonization
- Innovation through industry
- Interface with policy and intergovernmental bodies
- Outreach and training

Workshop on Best Practices

Developing Technology Clusters within Industry Partners



- **Technological and procedura**

Task 8.5 Organisation of training for less experienced users of hardware
OGS (Lead)
A three-day training course will be organised for existing and novel instruments mainly focusing on biochemicalmeasurements on carbonate species, sensors for ocean acidification, fluorometers, and automatic nitrate measurements. The course will accommodate 15 delegates and serve to promote and disseminate the FixO3 label to a wider group of responsible engaged in meteo-marine observation.

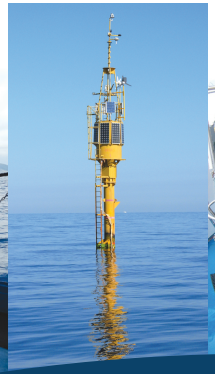
- Free of charge access to research teams to 16 infrastructures operated by 14 European institutions

(first call June 2014 – Second call May 2015)

FixO3 FIXED-POINT OPEN OCEAN OBSERVATORIES

Are you a European marine enterprise or research organisation interested in open ocean facilities, e.g., for instrument tests or research projects but are short of budget?



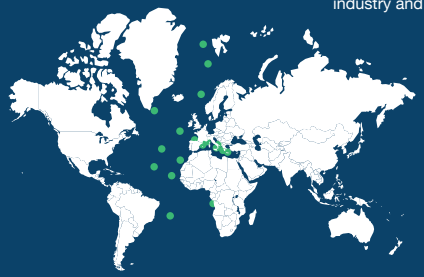




Transnational Access

FREE access to open ocean infrastructures

14 open ocean observatories and **1** shallow-water test-site of the FixO^3 fixed point ocean observatory network are open to projects from industry and science



Find out more on **www.fixo3.eu/TNA**

E2M3A

Eastern Mediterranean Multidisciplinary Moored Array

The E2-M3A observatory is located in the center of the Southern Adriatic, where deep convection and cascading of dense water take place, involving both the atmosphere and the ocean dynamics, and triggering the solubility and the biological pumps. The E2-M3A observatory is particularly devoted towards studies that characterize the long-term changes of Adriatic Sea in response to local climatic forcing.

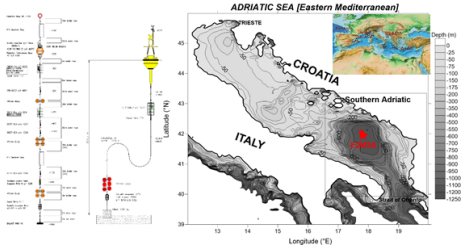
Operated by
Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS)

Infrastructure Location
South Adriatic (Eastern Mediterranean Sea)
Latitude: 41.52 N
Longitude: 18.08 E

Maximum Depth
1250 m

Preferred time period for TNA
Simultaneously to the scheduled maintenance

Services Available
- Calibration facilities
- Maintenance on the installation
- Resources sharing
- Data intercomparison
- Data delivery (near-real-time, delayed-mode)
- Glider surveys



TNA Information

The observatory has worked continuously **since 2006**. The E2M3A system is characterized by a surface buoy and a subsurface single mooring line.

1. A **surface buoy** equipped for air/sea interaction studies (meteorological parameters), physical and biochemical (CO2 and pH) measurements of the surface layer (15 m depth).
2. **A secondary** fully equipped **mooring line** with current meters, CTD's with Dissolved Oxygen and optical sensors.

The surface buoy hull of welded steel construction has a discus shape (diameter 2 m), which provides three main compartments, provision for installation of sensors, ballast compartments and provision for the attachment of the superstructure. Inside there is a Control Panel that manages the acquisition and system electronics (power management, solar panels, GPS, battery voltage and current, internal temperature, orientation, etc.). The position of the buoy is controlled with GPS and monitored by Argos beacon (ARGOS 1-way comm) that transmit the position if the anchor line is accidentally severed. A Globalstar satellite link in turn enables the real-time transmission from the platform to the ground station.
The secondary mooring line houses a chain of instruments with sensors at different depths to measure physical and chemical charachteristics from intermediate layer to the bottom.

An Iridium SBD beacon is installed to transmit the position during the recovery operations and in case of breakage of the mooring rope. Each anchor line is equipped with double releasers to allow easy retrieval of the system.

Surface buoy

Hosting: the Electronic Control Panel can accommodate up to 6 communication ports. Currently there are no available ports. It is however always possible to accommodate self-powered and self-recording instruments both in air (on the superstructure) than in water (on the cage). Data: Atmosphere- Wind speed and direction, Relative humidity, Air temperature, Sea temperature, Atmospheric pressure, Solar radiation. Water column: Salinity, Temperature, pCO2, Dissolved oxygen, pH.

Sub-surface mooring

Hosting: compatibly with the installation limits is possible to host several self-powered and self-recording instruments. Data: Temperature, Salinity, Trasmittance, Dissolved oxygen, Currents, Turbidity.

TNA Support offered

- Ship opportunities
- Logistics
- Party chief
- Engineer
- Technicians
- Oceanographic Calibration Center

Further information is available at:

http://www.fixO3.eu/observatory/e2-m3a



Joint Research Activities

- Free of charge access to research teams to 16 infrastructures operated by 14 European institutions

  (first call June 2014 – Second call May 2015)

  * Enhancement of CO2 and pH measurements
  * Enhancement of marine sound
  * Development of non cabled platform for high data volume sensors


ESONET YELLOW PAGES
A Tool for Interoperability and Standardization
LOGIN / REGISTER
FixO3
FIXED-POINT OPEN OCEAN OBSERVATORIES
HOME
FIND A SENSOR
FIND A HARDWARE COMPONENT
FIND A DEEP SEA SERVICE
FIND A MANUFACTURER
MY EYP
AOV
Data processing
Diving
ROV
Software suppliers
Esonet Yellow Pages » Deep sea observatory related services
Select a deep sea obervatory related service
Please select a deep sea service type from the menu above.
Use your mouse over the yellow area to scroll through the items.
RANDOM MANUFACTURERS (MORE)
SonTek
YSI incorporated
OCEAN SENSORS
ASL
BROWSE SENSORS (190)
ADCPs
CO2 Analysers
Conductivity
CTDs
Current meters
Depth
DO sensors
Flow meters
Fluorometers
Geophones
Hydrophones
Magnetometers
Multiparameters
PAH (Oil-In-Water)
PAR sensors
Particle sizers
pH sensors
Pressure sensors
Redox
Salinometers
Sediment traps
Temperature
Tiltmeters
Transmisiometers
Turbidity
Water samplers
BROWSE HARDWARE COMPONENTS (195)
Acoustic Modems
Acoustic releases
Cameras
Connectors
Data loggers
Floats
Housings
Lasers

CLOSE LINKS WITH:

1. EuroGOOS (European Global Ocean Observation System)
2. OceanSITES
3. Copernicus and EEA (European Environmental Agency)
4. EuroArgo and EuroFleets
5. ICOS (Integrated Carbon Observing System)
6. EMSO (European Multidisciplinary Seafloor and water column observatory
7. EMODNET (European Marine Observation and Data Network) & SeaDataNet
8. Industry