



EuroSITES
European Ocean
Observatory Network



<http://www.eurosites.info/>

European network of marine observatories.



<http://www.esonet-emso.org/>

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NOC, Southampton
UK

In order to monitor and understand the marine system we need to make sustained multidisciplinary observations at appropriate temporal resolution.

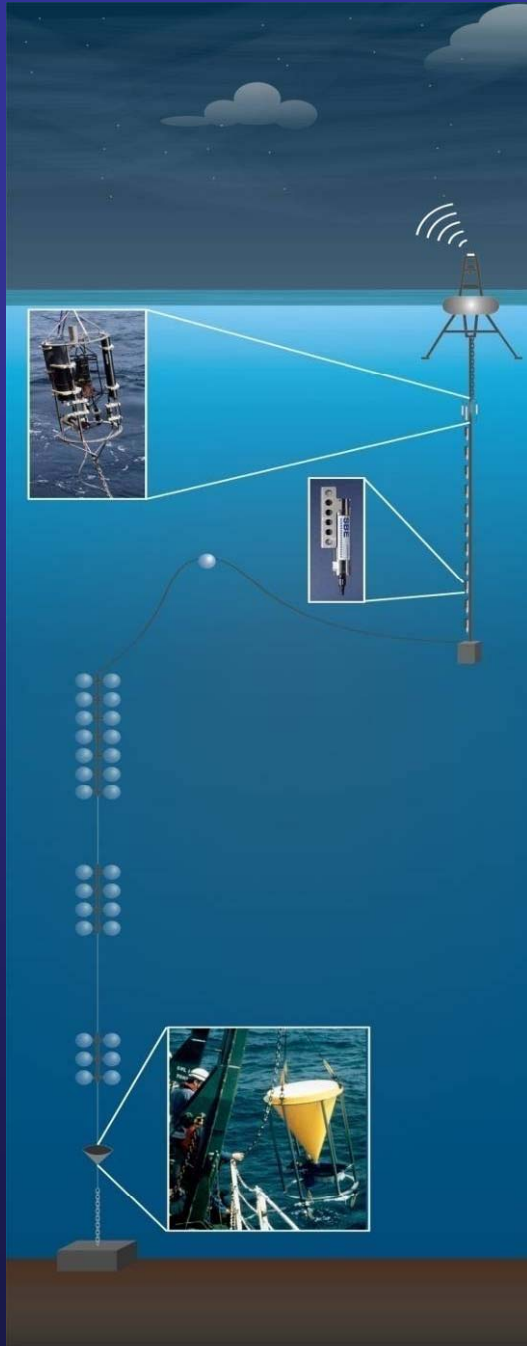
Importance of episodic events

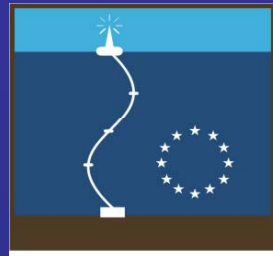
Operational and research

1. Satellite remote sensing
2. Gliders
3. Floats
4. Ships of Opportunity
5. Research cruises
6. Eulerian observatories ←
7. Computational models

All approaches have strengths and weaknesses

EuroSITES integrates and enhances the 9 existing deep ocean (>1000m) fixed point observatories.





EuroSITES
European Ocean
Observatory Network

- EU FP7 Collaborative Project
- 3 years: April 1st 2008 - March 31st 2011
- Coordination: NOC, UK
- 13 partners (8 countries)
- International Oversight Committee
- Open ocean (>1000m)
- Full depth, *in situ*. Ocean interior, seafloor and subseafloor

Dual function of funding:

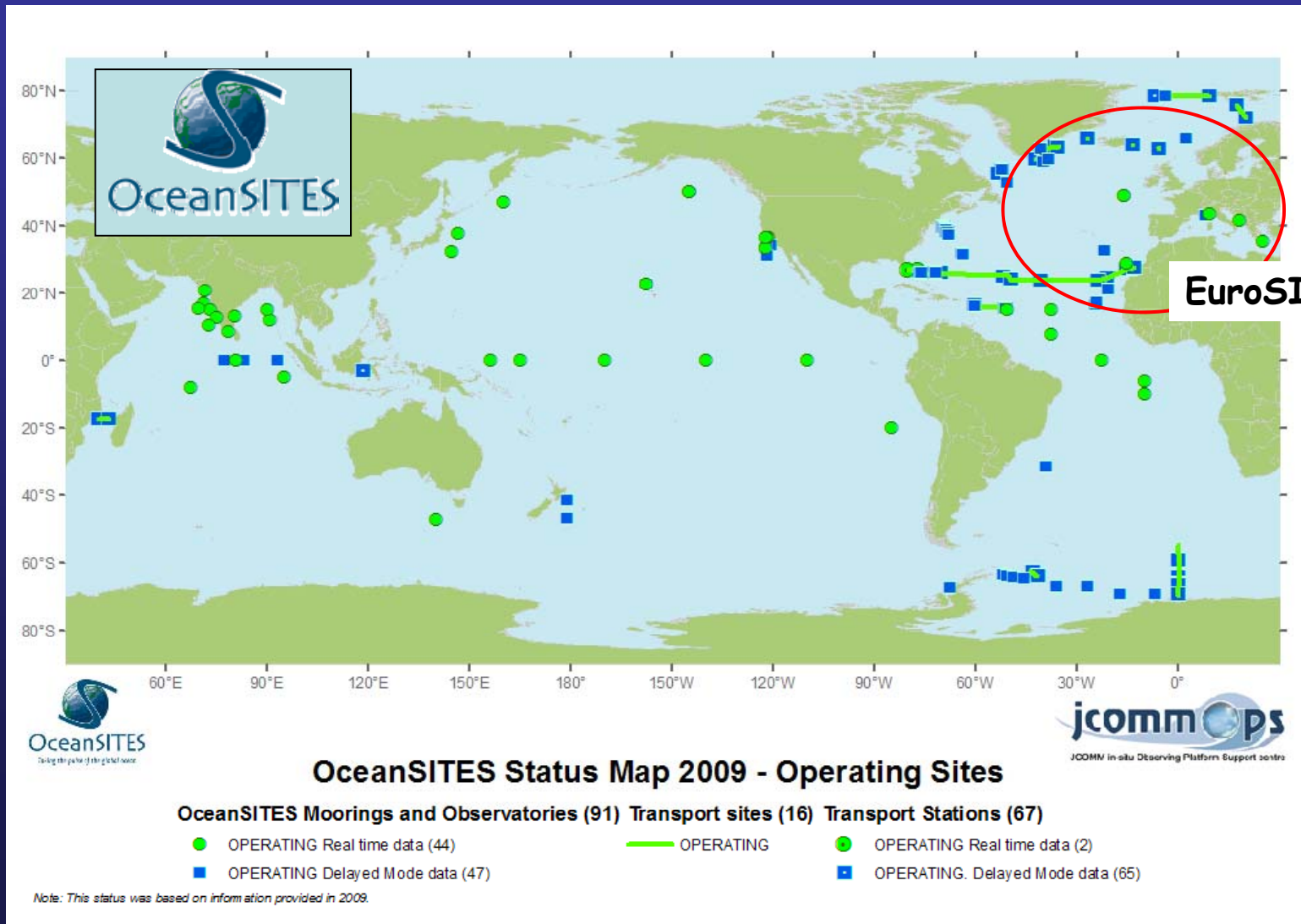
1: Observatory support

- Staff
- Equipment

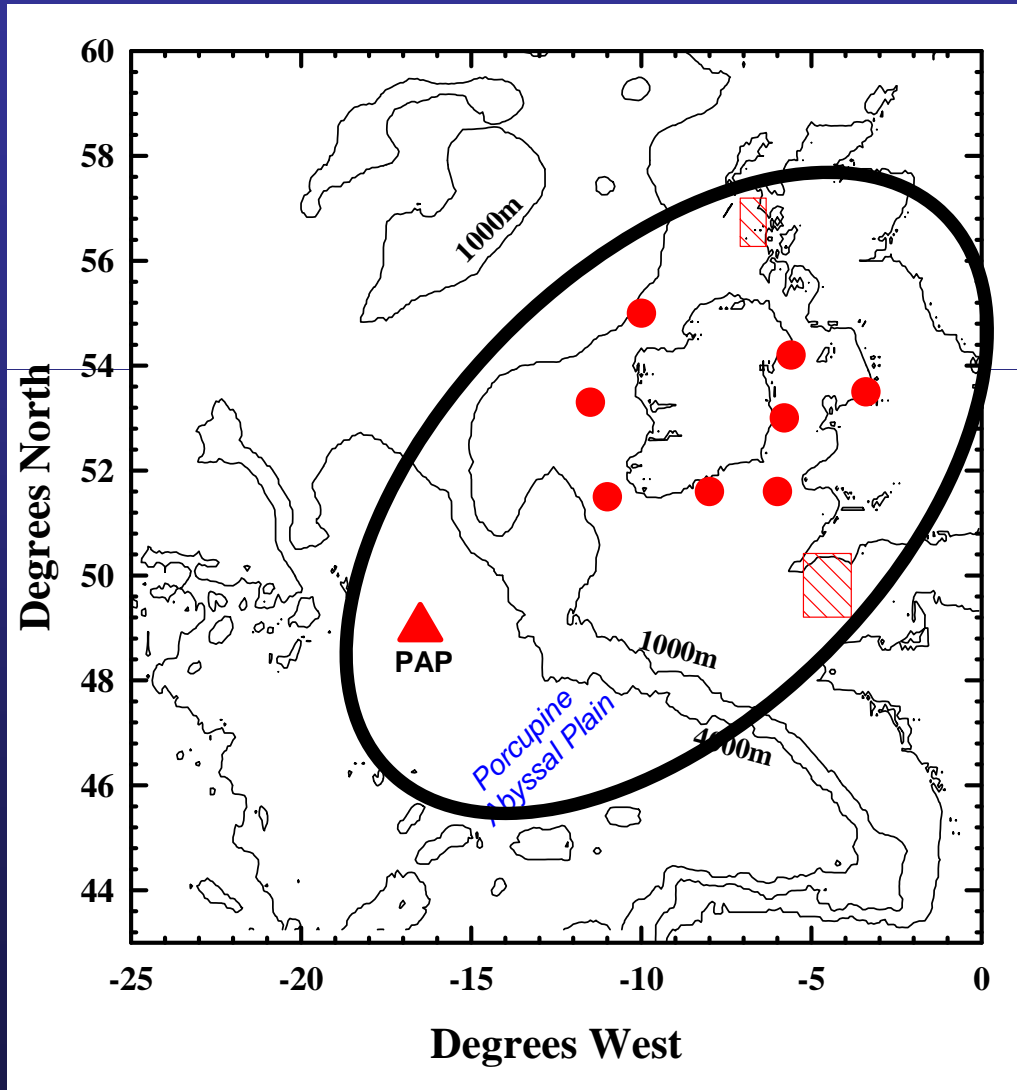
2: Glue

- Efficiency of operation
- Enhanced national funding
- Outreach & knowledge transfer
- Effectiveness

OceanSITES: Global network. An essential component of GOOS.



Links to shelf networks



The Western Shelf
Observatory

<http://www.noc.soton.ac.uk/pap/>

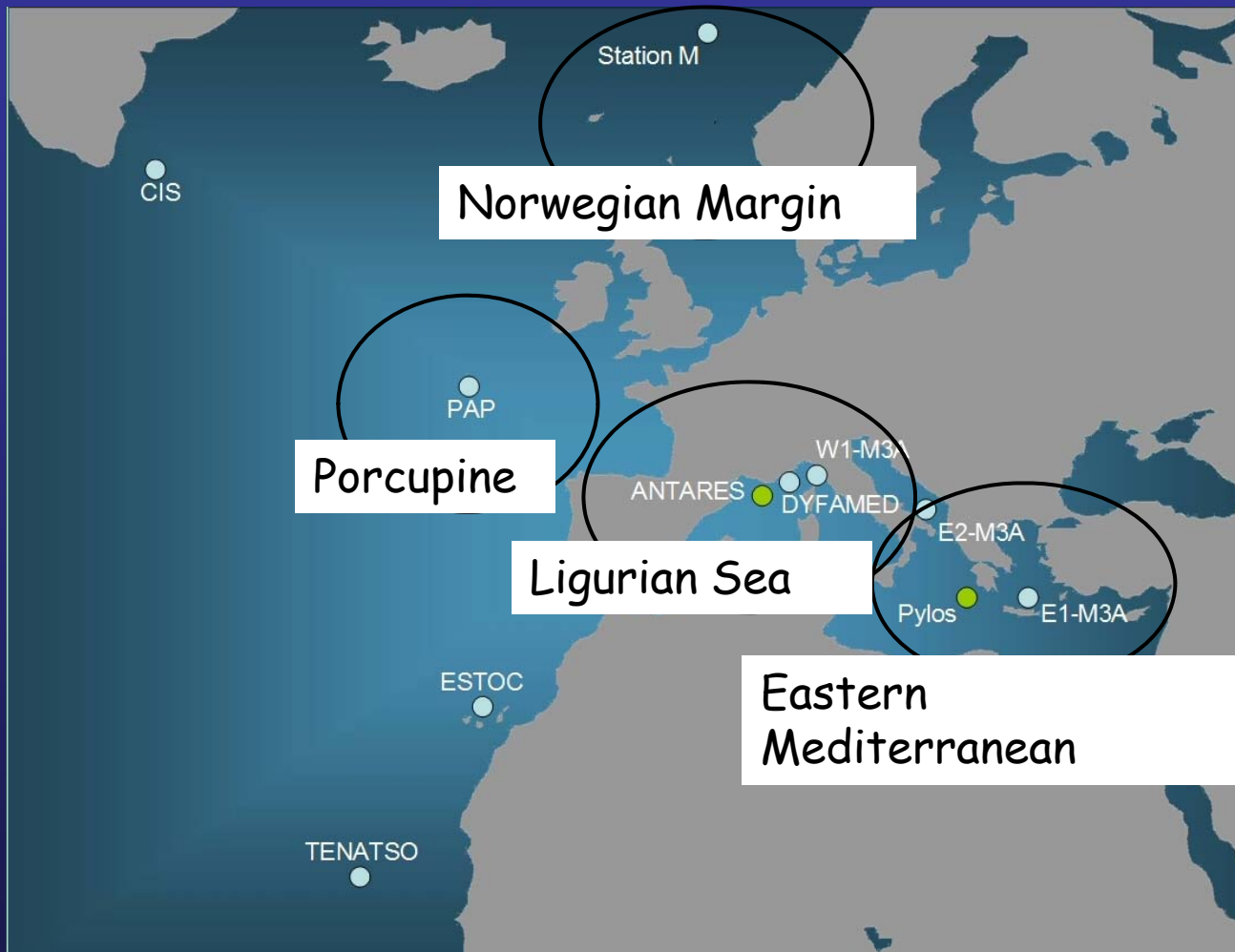
Links to shelf networks



The UK Met Office
ODAS buoy array

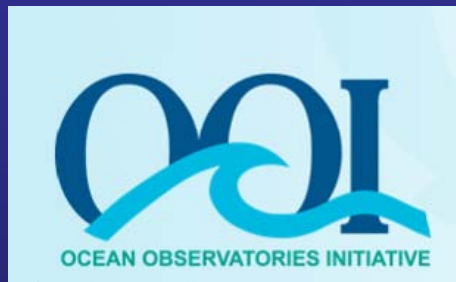
From May 2010 this
includes PAP ★

Regional, collaborative science



EuroSITES and ESONET/EMSO: 4 Common regions

Connection to other international initiatives



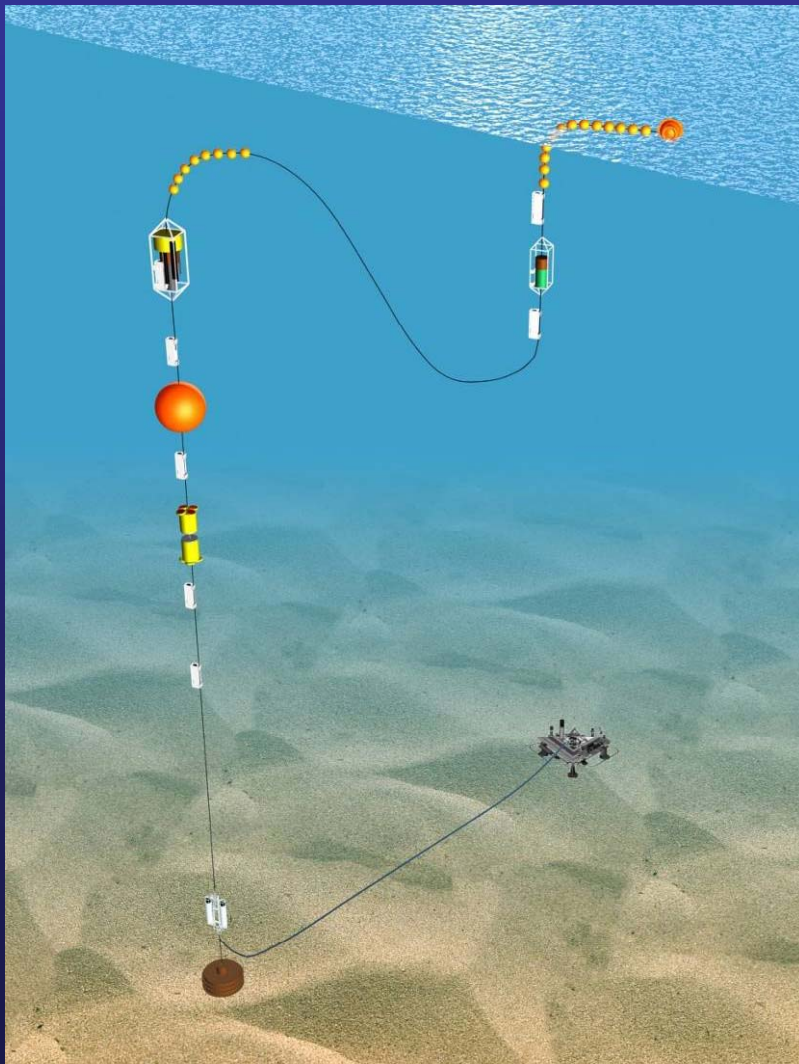
Ocean Observatories Initiative

Close links to OOI



Multidisciplinary time-series

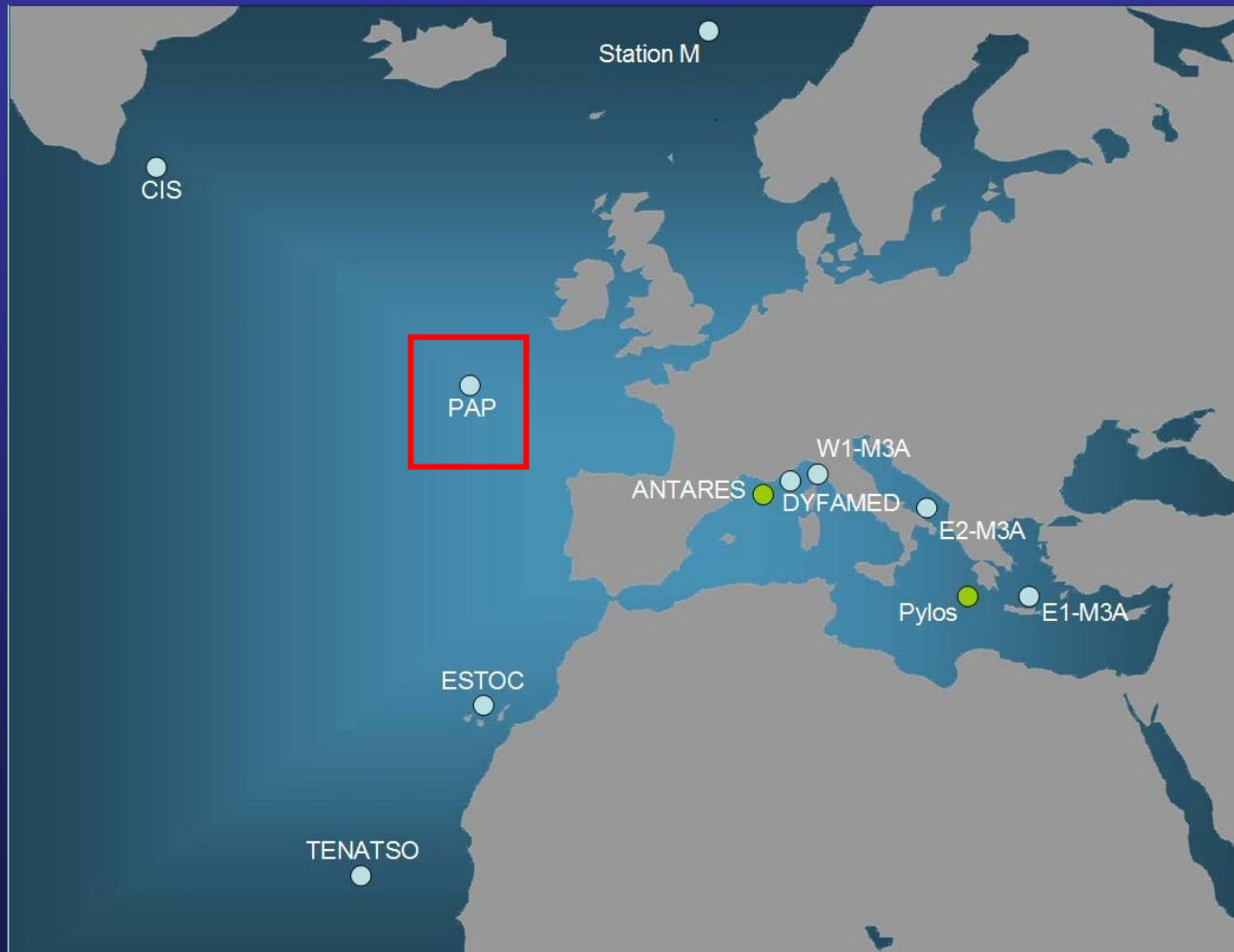
Vertical coverage: Surface to seafloor



- Temperature
- Salinity
- Currents
- Nutrients
- Chl-a
- CO₂
- O₂
- Particle flux
- Benthic components

Real-Time Telemetry

Porcupine Abyssal Plain (PAP)

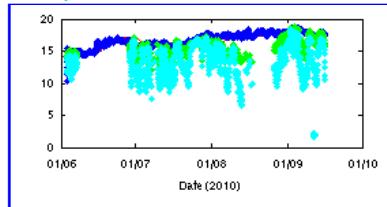


Meteorology

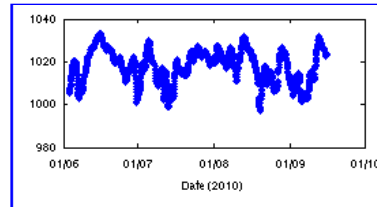


Wednesday 15th September
2010 1945h UTC

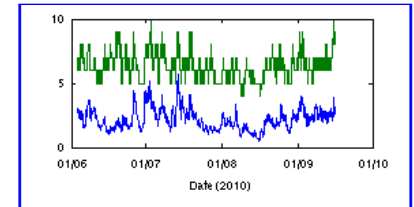
Temperatures



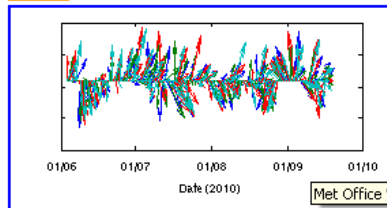
Air Pressure



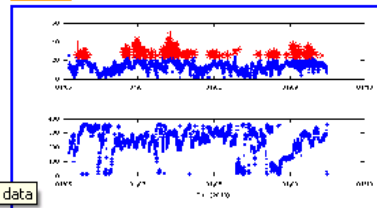
Waves



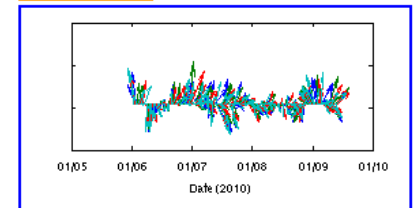
Wind



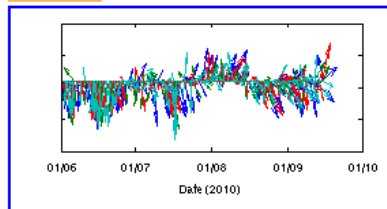
Wind



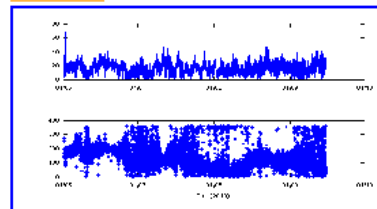
NCEP Wind



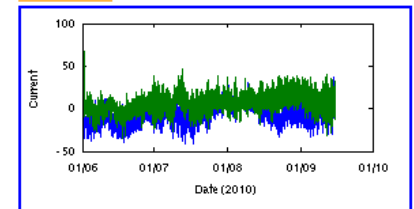
Current



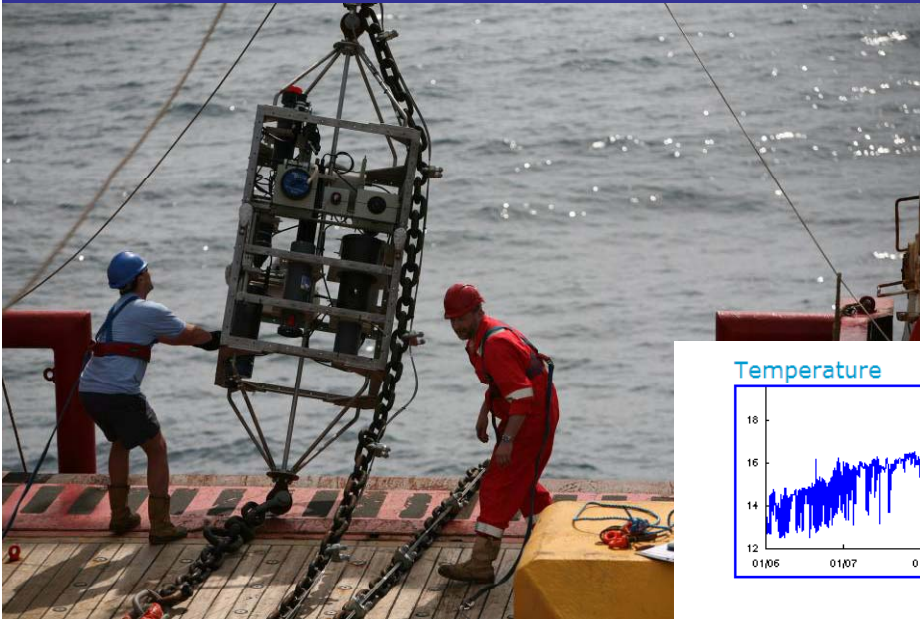
Current



Current

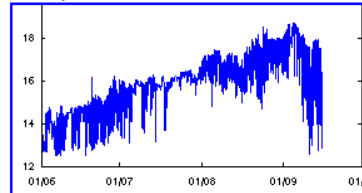


Upper Ocean biogeochemistry

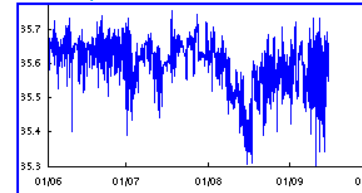


Wednesday 15th September
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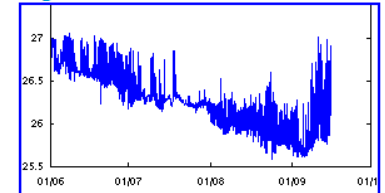
Temperature



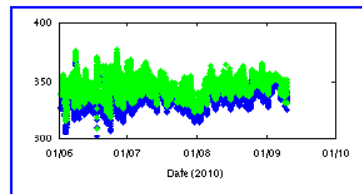
Salinity



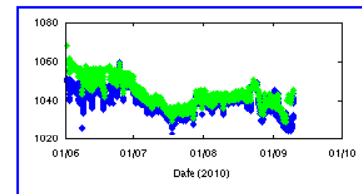
Sigma-t



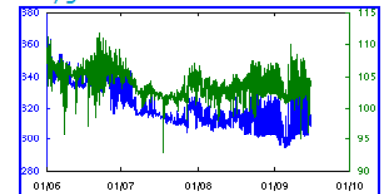
Carbon Dioxide



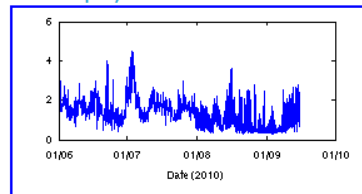
Pro-oceanus Pressures



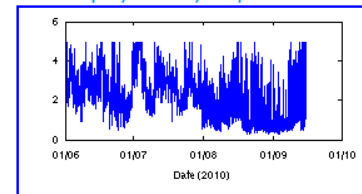
Oxygen



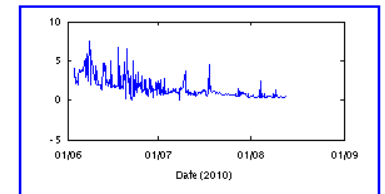
Chlorophyll-a Wetlabs



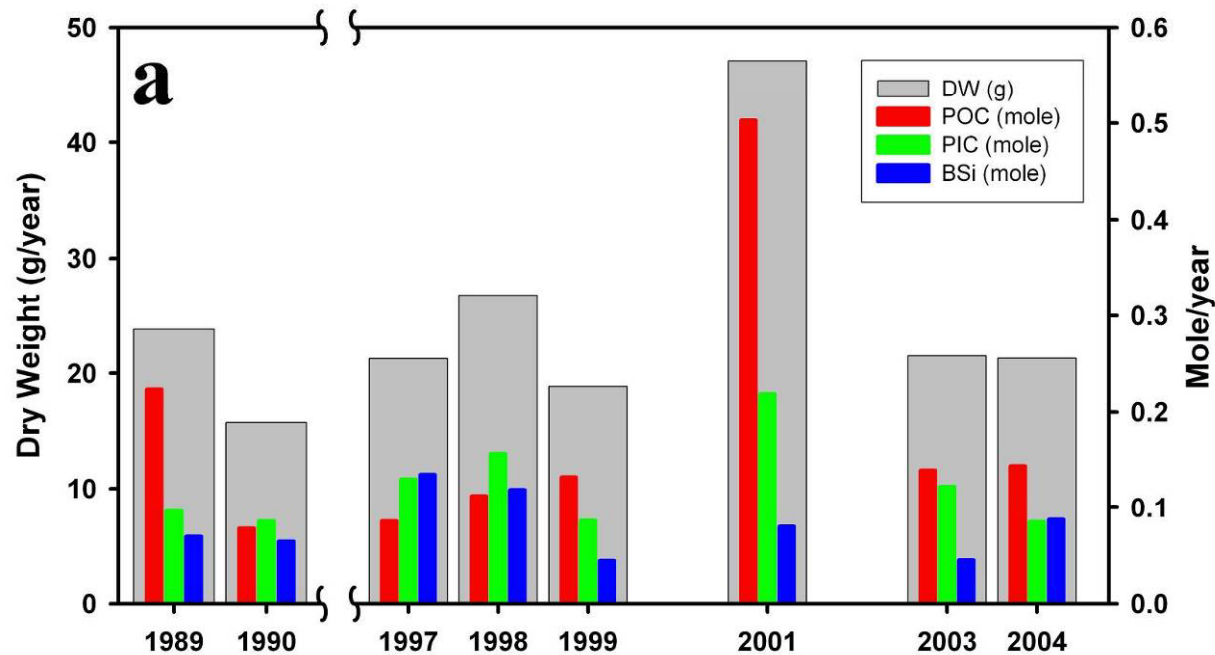
Chlorophyll-a Cyclops



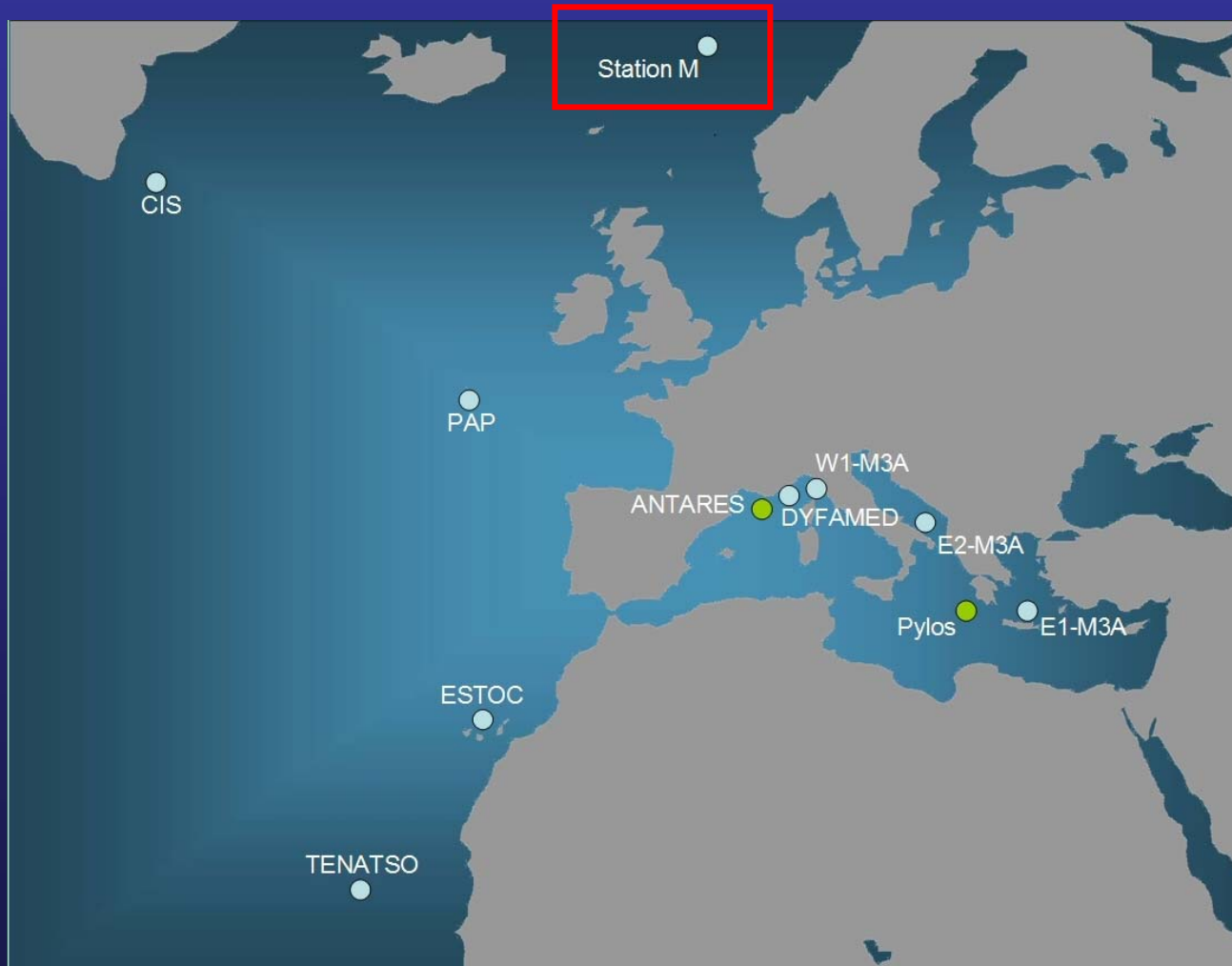
Nitrate : NAS



Downward particle flux at 3000m depth

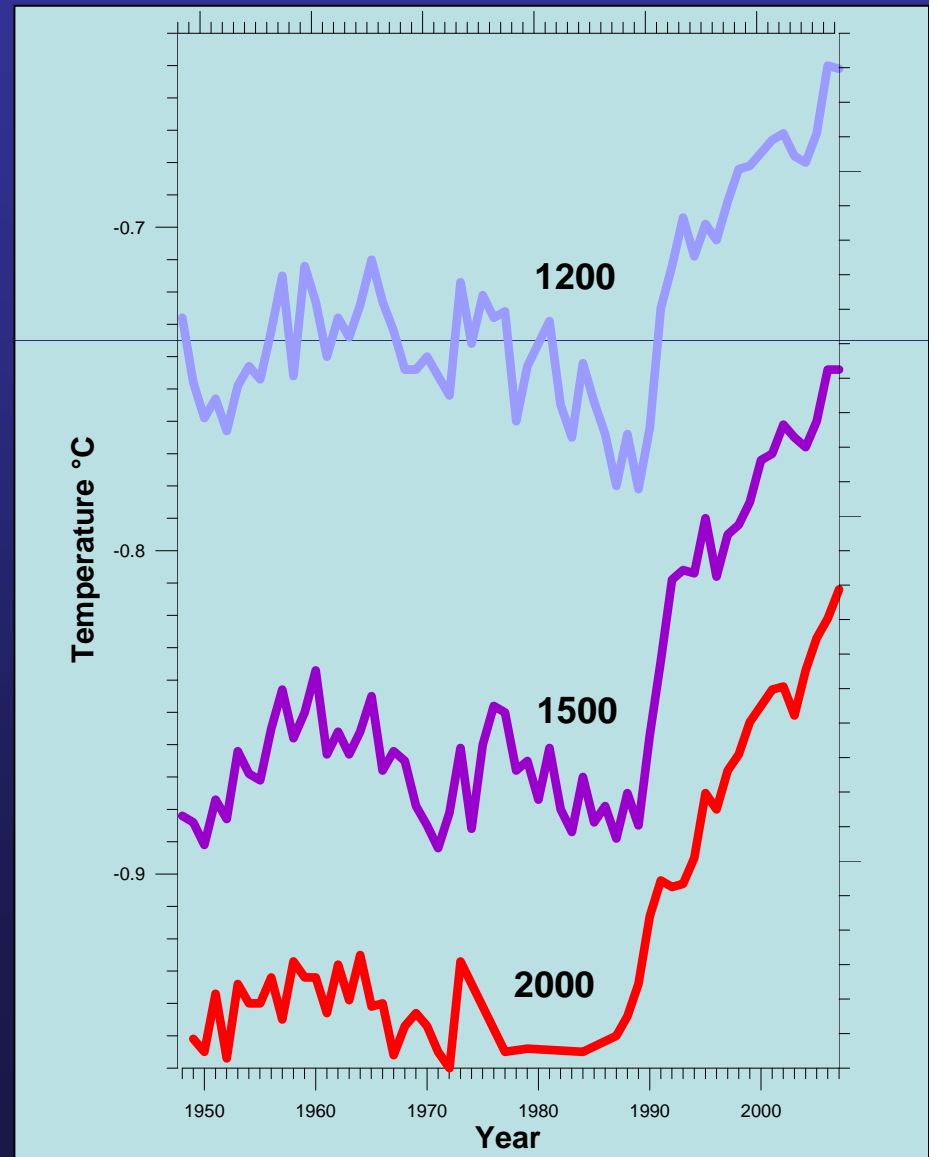


Station M, Norwegian Sea

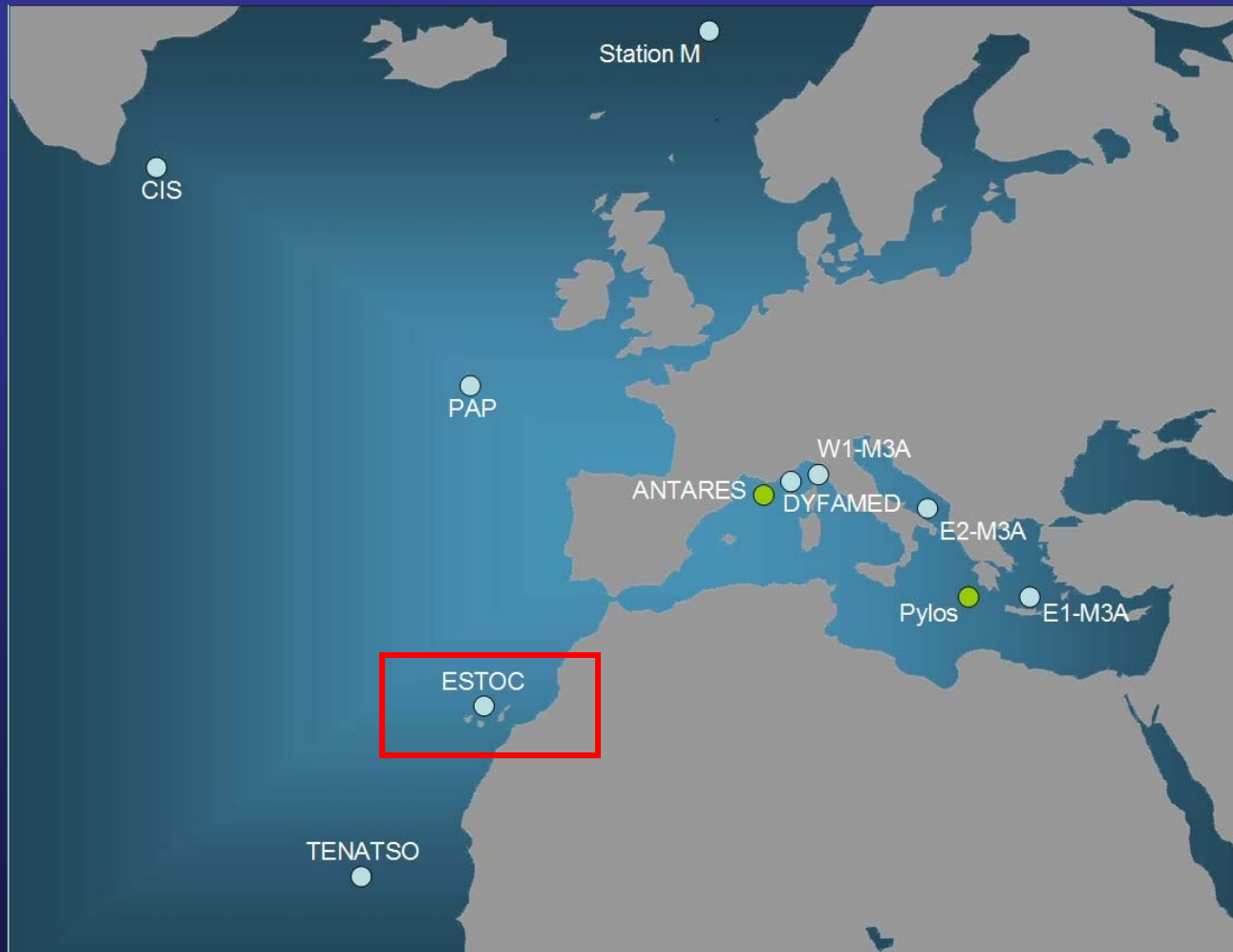


Station Mike

Dramatic deep water temperature increase



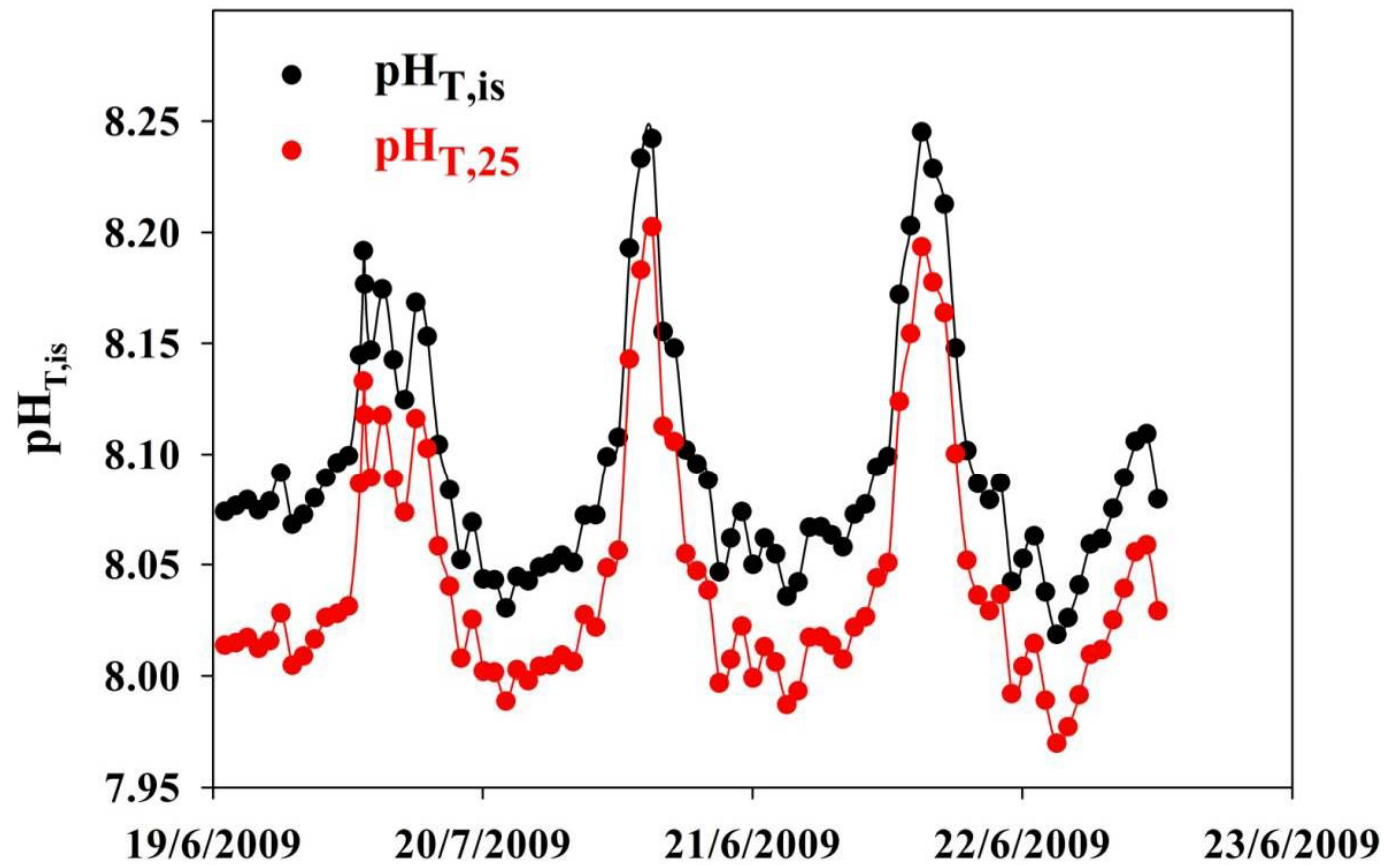
ESTOC



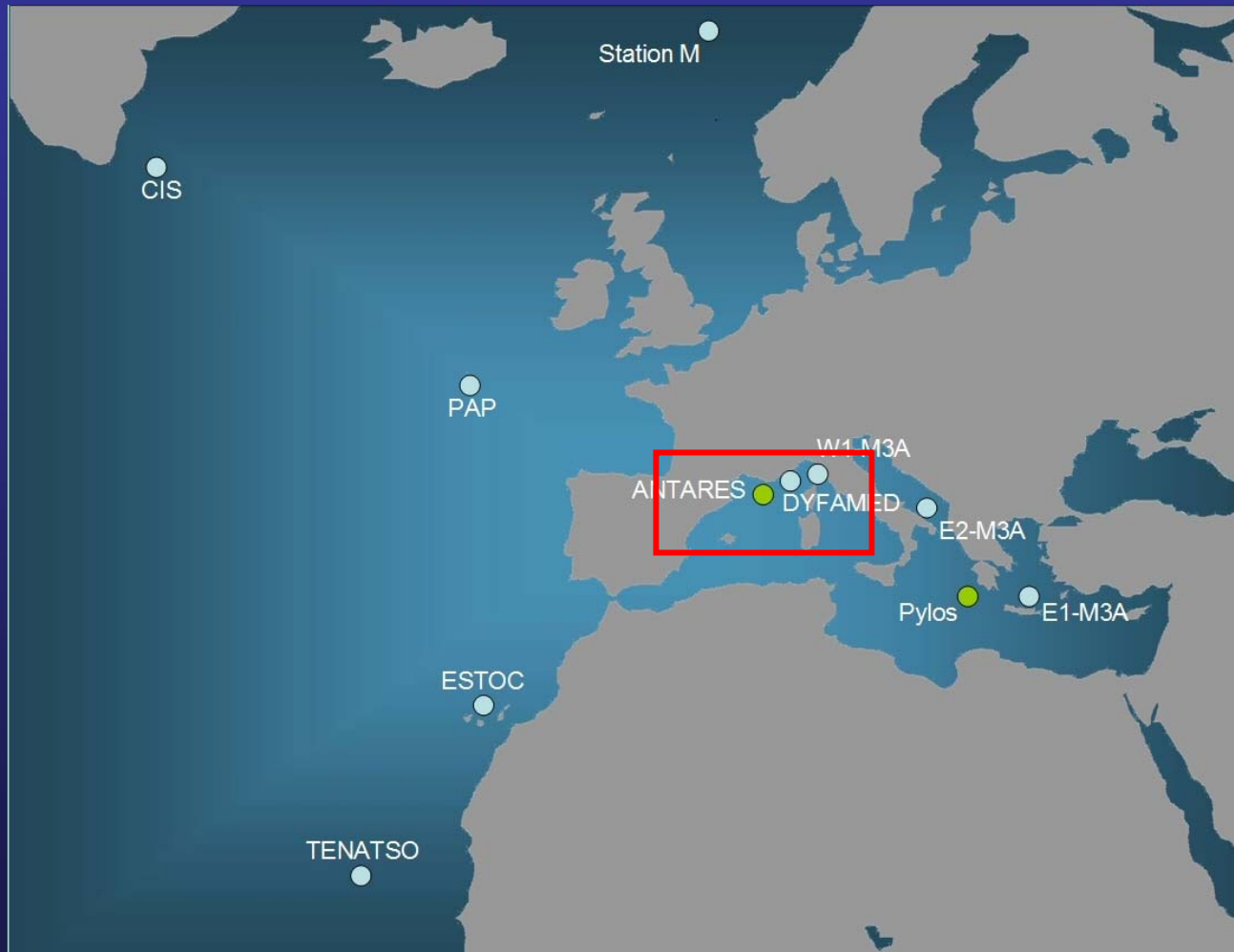
Ocean acidification

-autonomous pH time-series sensor

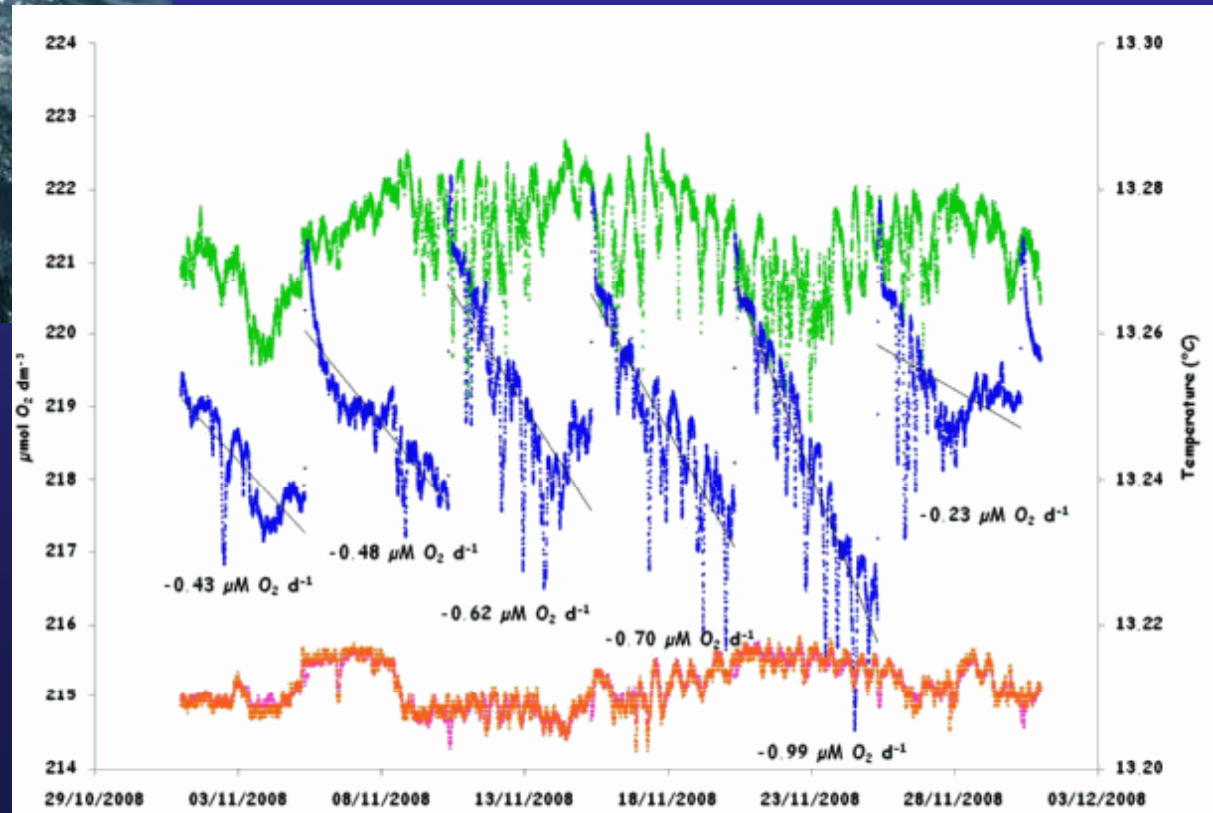
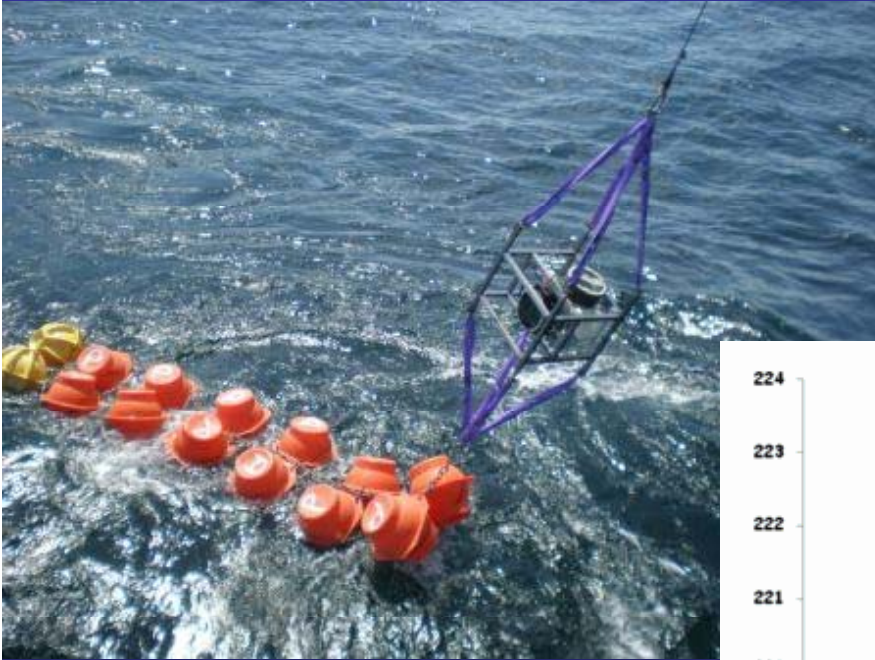
- Links with EPOCA and CARBOOCEAN



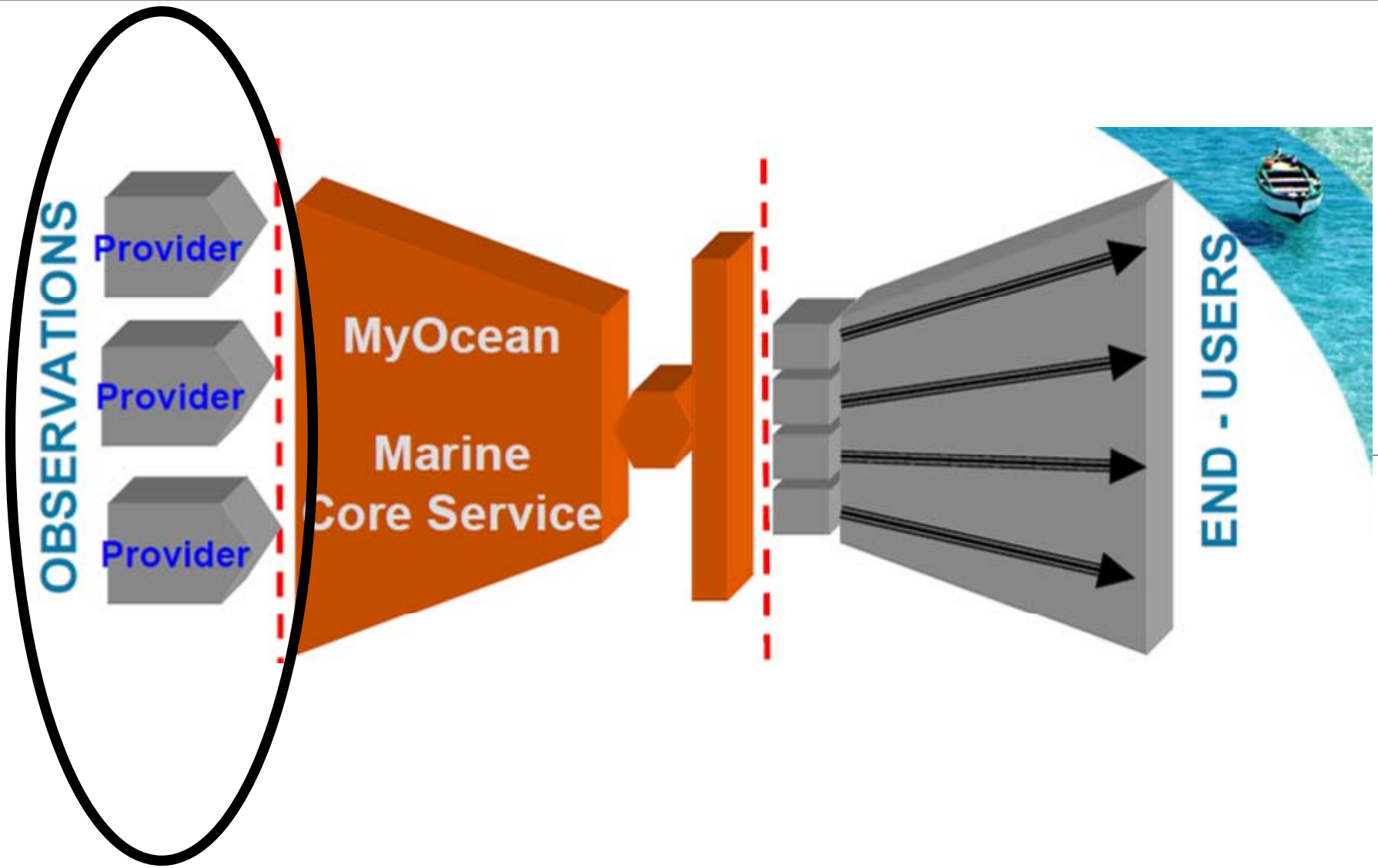
Western Mediterranean



Deep ocean oxygen consumption - *in situ* measurement



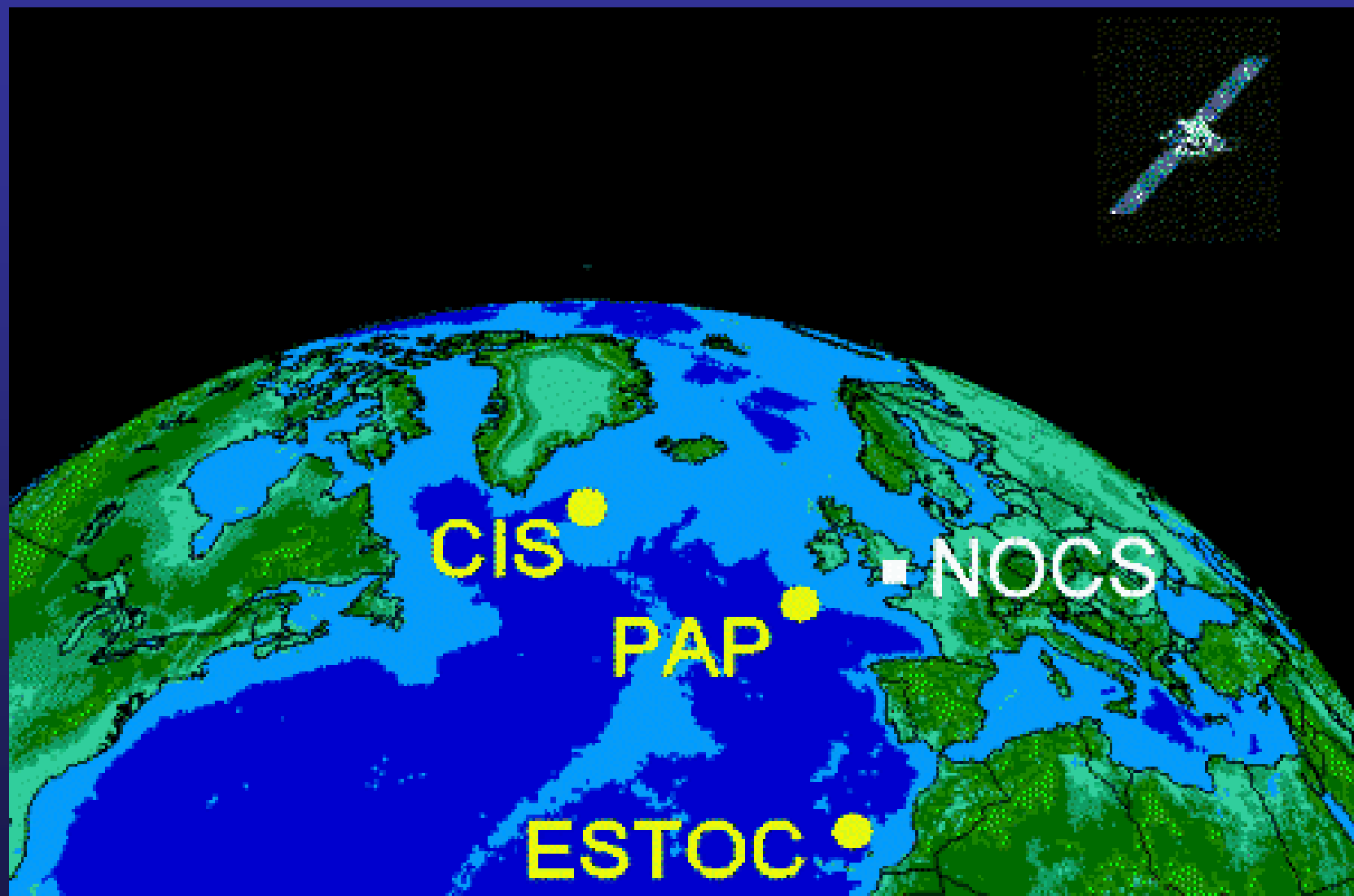
O_2 concentration inside and outside of IODA chamber



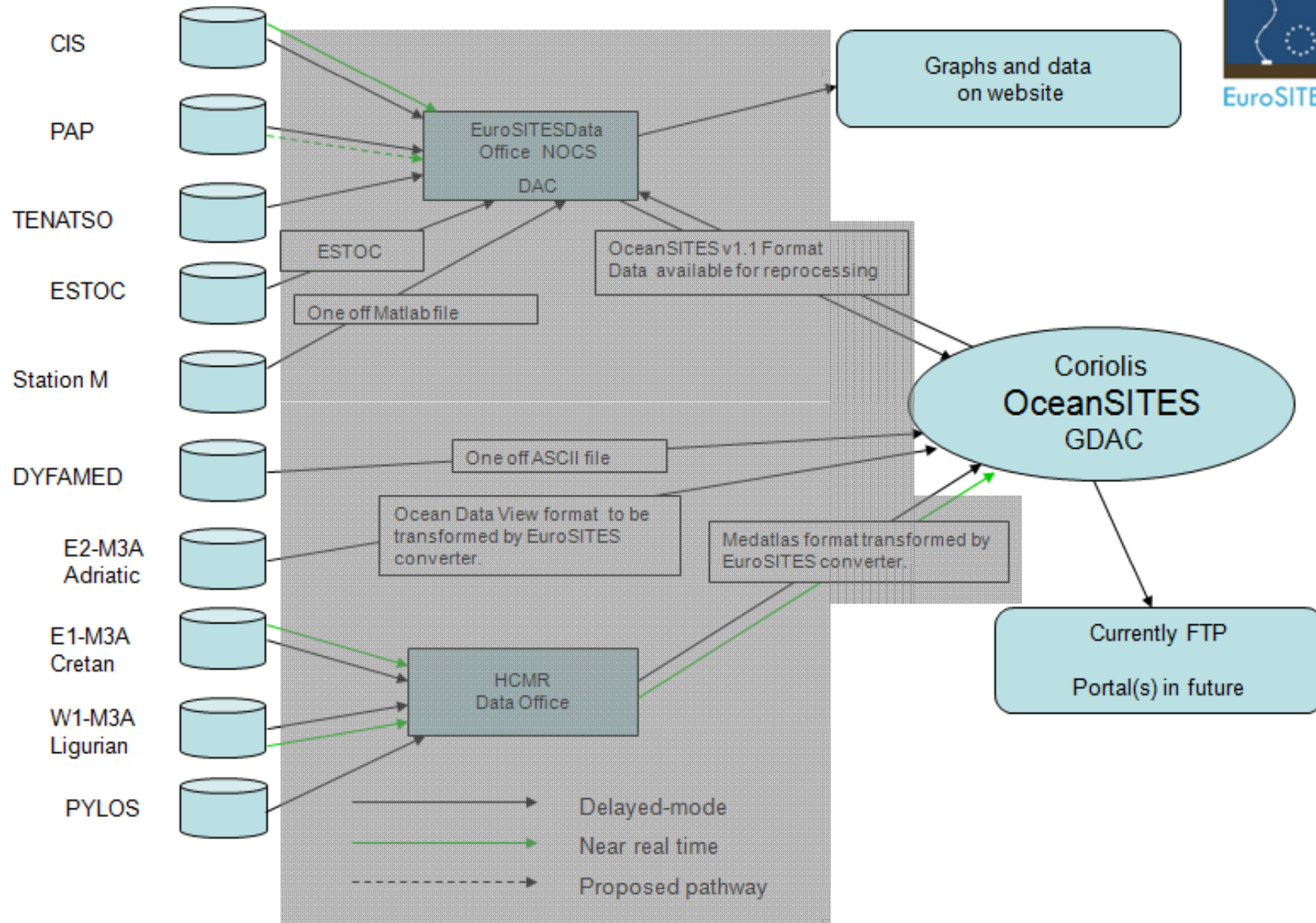
The vision of MyOcean

Data:

- freely available to all immediately after collection and QC (Website, ftp & GTS)
- Associated metadata
- Using internationally agreed protocols and formats



Real-time and delayed-mode



Data Processing

EuroSITES dissemination:

Outreach and Knowledge Transfer

- Website
- Fact Sheets
- On-line Cruise diaries
- Film

www.outreach.eurosites.info



Our global Ocean is a changing environment. Long-term monitoring provides essential data to improve our understanding of changes and trends in oceans in response to climate change.

EuroSITES is an European project integrating and enhancing 9 open ocean observatories across Europe. Moored at key locations in the ocean these observatories measure physical, chemical and biological seawater properties from the sea surface all the way down to the sea floor.

Observing the Oceans : Why?

The global Ocean is a powerful force in regulating our climate and often has a greater influence than dry land. Observing the oceans is therefore one of the most fundamental ways to understand the global climate system.

Carbon cycle
The global Ocean is an important regulator of climate change as it absorbs carbon dioxide from the atmosphere. Some of this carbon is locked away in deep sea sediments for long periods of time. Observations are vital to give us clues about how much carbon dioxide the wastes can hold, and for how long.

Ocean acidification
The amount of carbon dioxide dissolved changes the acidity of the oceans, which then affects the distribution and abundance of phytoplankton and zooplankton particularly those with calcareous exoskeletons.

Currents and circulation
Measuring the physics and chemistry of the oceans allows scientists to track individual water masses. These move both vertically and horizontally through the global Ocean forming a complex circulation system. Monitoring currents and circulation patterns is key to understanding how climate change is affecting heat (energy) and nutrient transfer around the planet.

Ecosystems
Monitoring environmental change in the oceans (e.g. temperature, salinity, pH, nutrients) is vital as this will affect the distribution and functioning of all marine organisms from phytoplankton to whales. Huge population changes can occur in deep sea animals e.g. holothurians (sea cucumbers). This is related to the availability and quality of food arriving on the seafloor (e.g. marine snow).

For more details about the EuroSITES science and outreach visit our website: <http://outreach.eurosites.info/> or contact us: education@eurosites.info



The 9 EuroSITES open ocean observatories are moored off-shore in waters deeper than 1000 metres. The locations are chosen far from the coast to reduce the influence of land (e.g. river input) and human activity (e.g. pollution). A diverse range of sensors record changes in the physical, chemical and biological properties of the oceans, such as temperature, salinity, nutrients and currents from the sea surface to seabed.

The surface buoy collects the data acquired by the ocean sensors and sends the data via satellite to scientists ashore.

Strong mooring wire extends from the sea surface down to the sea floor. Sensors are attached to monitor the ocean properties at different depths. The equipment remains submerged for months on end autonomously collecting time-series of data. Buoyancy is also attached to aid recovery.

Observing the Oceans : How ?

SUNLIT ZONE
The sunlit (euphotic) zone is an important region for the cycling and exchange of dissolved gases (e.g. oxygen and carbon dioxide) between the atmosphere and ocean. Phytoplankton use carbon dioxide and sunlight in this zone to capture energy through photosynthesis. A knowledge of how these processes and nutrient cycles are changing is crucial to understand how the atmosphere and ocean interact to regulate our climate. Sensors in this zone measure the temperature and salinity together with biological and chemical properties of the seawater (e.g. chlorophyll-a, nutrients and dissolved gases).

TWILIGHT ZONE
The twilight zone is the transition between the sunlit and the dark deep ocean, and forms a large proportion of oceanic waters. Only organisms adapted to the dark and the high pressures can survive. Food is available as marine snow particles sinking from the sunlit zone (e.g. dead organisms, shells, dust particles and faeces). Many animals also migrate upwards at night where the food is more abundant. They then retreat back to the darker twilight zone in the daytime to avoid predators. Scientists monitor this environment to study the carbon cycle and transport of carbon to the deep seafloor. This is also a key region for monitoring variations in water masses and circulation patterns. Sediment traps collect sinking marine snow particles. Physical sensors measure temperature, salinity, current speed and direction. Oxygen sensors and respiration chambers measure biological activity.

SEA FLOOR
The seafloor reaches depths of several thousands of metres. Most species living here feed on the flux of marine snow sinking from surface layers. Changes in this flux profoundly affect these species. Climate variability at the surface impacts deep-sea biological communities 5000 metres underneath! A lander deployed as the surface impacts deep-sea biological communities 5000 metres underneath! Sensors e.g. time-lapse cameras, seismometers, pressure sensors and others.

EuroSITES data sets are used to understand key ocean processes at both short-term and longer-term time-scales. EuroSITES contributes to the international Global Earth Observation System of Systems (GEOSS) which aims to understand the current climate and ocean system and to predict future change.

For more details about the EuroSITES programme and the education activities contact our website: <http://outreach.eurosites.info/> or contact us: education@eurosites.info



« PAP Cruise : Friday 17th July 2009 PAP Cruise : Monday 20th July 2009 »

PAP Cruise : Saturday 18th July 2009

Measuring Bioluminescence at the PAP site



Filtration setup and data logger

Some small plankton species are able to produce flashes of light which can be seen in the water at night. These organisms are said to be bioluminescent. As part of the scientific work happening here on the RRS Discovery we are taking measurements to estimate the amount of bioluminescence which can be stimulated in the surface water and to identify which organisms are creating it. This is done using an instrument named Glowtracka.

To make measurements with the Glowtracka we take samples of surface water collected from the niskin bottles on the CTD and because we like to take samples during the night it means staying up very late or waking up very early in the morning. The water collected is placed into a blacked out holding chamber attached to the instrument. The water sample is then left for a set amount of time in the dark before it is allowed to run from the holding chamber and through a mesh grid which stimulates any bioluminescent organism in the water to glow.



Glowtracka

The flashes of light emitted by the bioluminescent organisms are detected by a sensor called a photodiode and the signal is recorded on a computer. We then take samples of the water which can be analysed in the lab when we get back to shore and from these we hope to identify which organisms created the bioluminescent signals recorded.

From a piece of equipment called Flowcam we have already identified that there are some bioluminescent organisms called dinoflagellates present in the water column.



Example of




EuroSITES Open Ocean Observatories

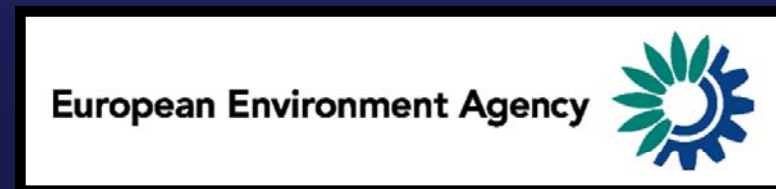
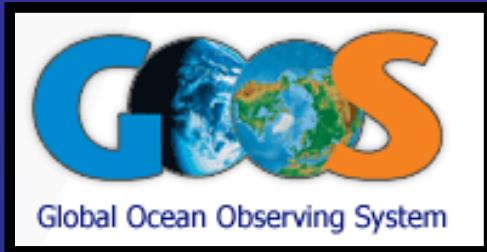
Visit the observatories and learn more about them!



OUTREACH HOME
POLICY
EDUCATION
EUROSITES OPEN OCEAN OBSERVATORIES
Station M
C18
PAP
DYFAMED
W1-M3A
E1-M3A
E2-M3A
ESTOC
TENATOS
GALLERY
NEWS
CONTACT

What are the plans?

1. Satellite remote sensing
2. Gliders
3. Floats
4. Ships of Opportunity
5. Research cruises
6. Eulerian observatories
7. Computational models





<http://gisc.ew.eea.europa.eu/>

Objective of GISCS:

To stimulate open access to in-situ data for operational GMES.

The Future

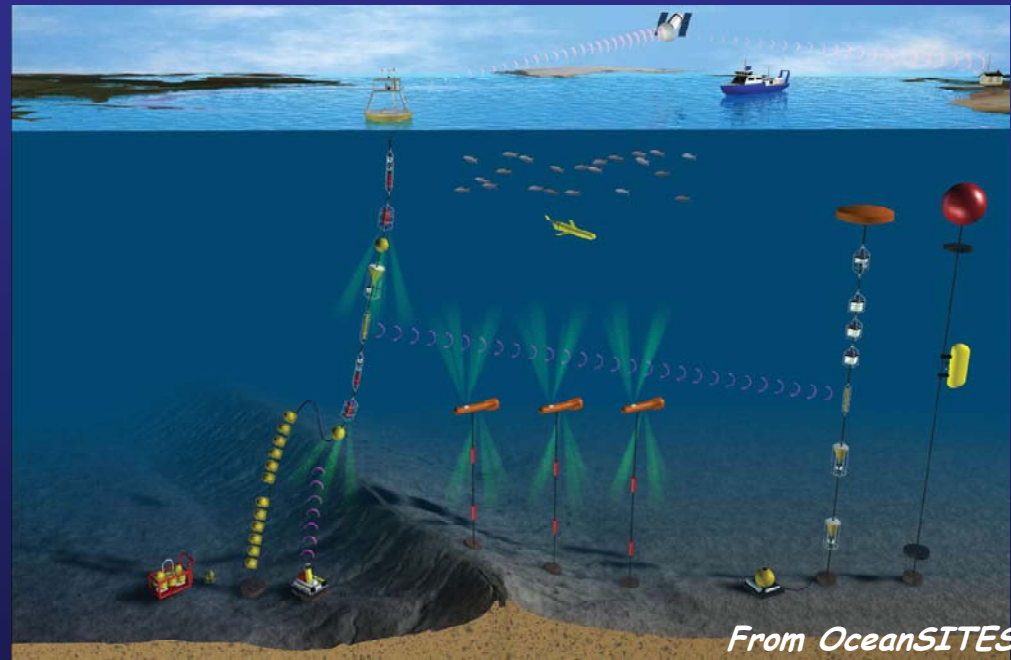


Immediate action to prevent destruction of the EuroSITES network.

Urgent requirement to develop a coordinated and sustained network from the lower atmosphere to the seafloor.

The "Sustained Open Ocean Frontier Initiative"

Requirement to expand the EMSO PP in order to develop the infrastructure for an integrated lower atmosphere, water column and seafloor observatory network.



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