ESONET
A NETWORK NOT ONLY FOR FOR SCIENTISTS

ITU Green Standards week
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Jean-François Rolin – IFREMER

Grateful to all the active participants to ESONET NoE

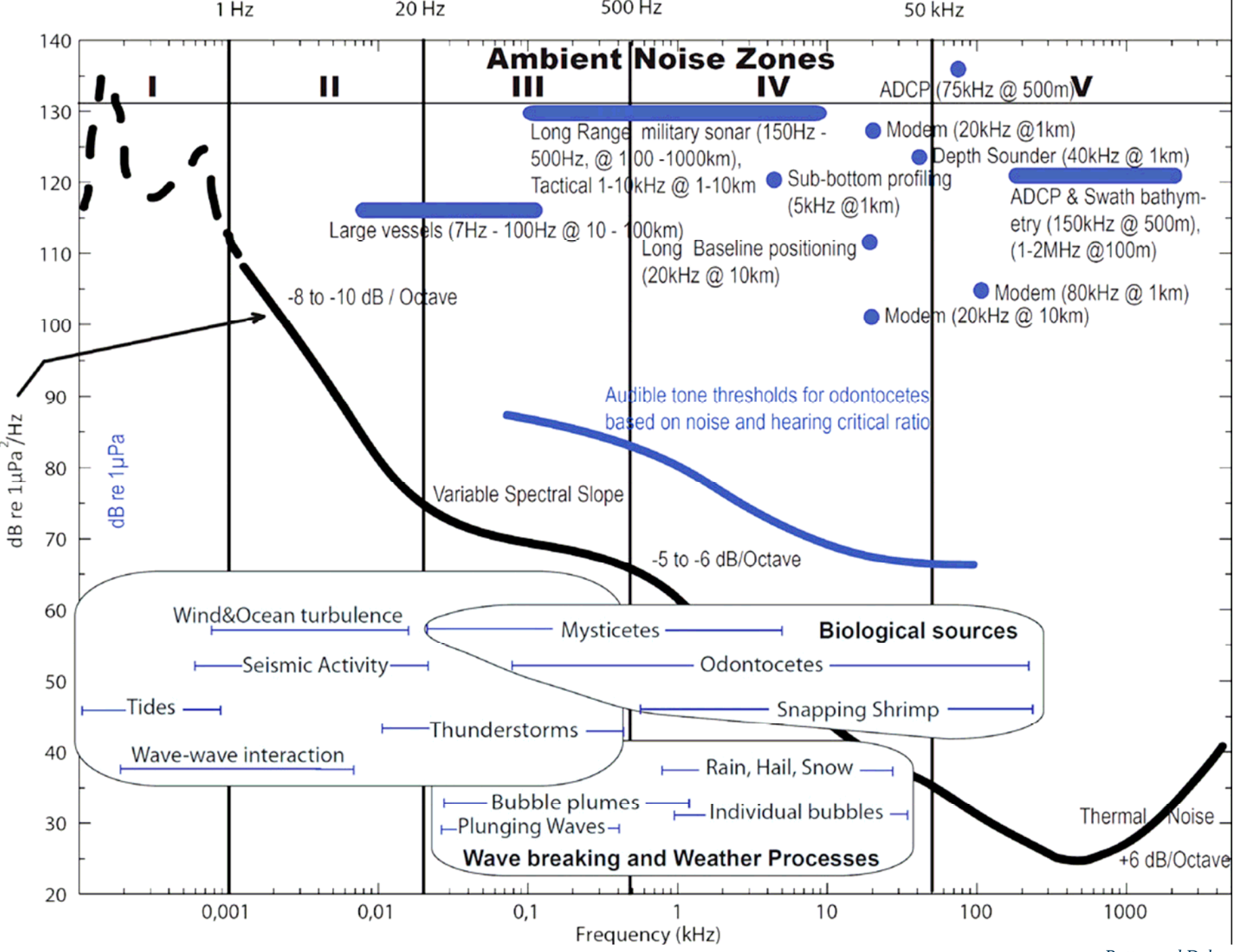
Societal need for improved understanding of climate change, anthropogenic impacts, and geo-hazard warning drive development of ocean observatories in European Seas

Progress in Oceanography running header:

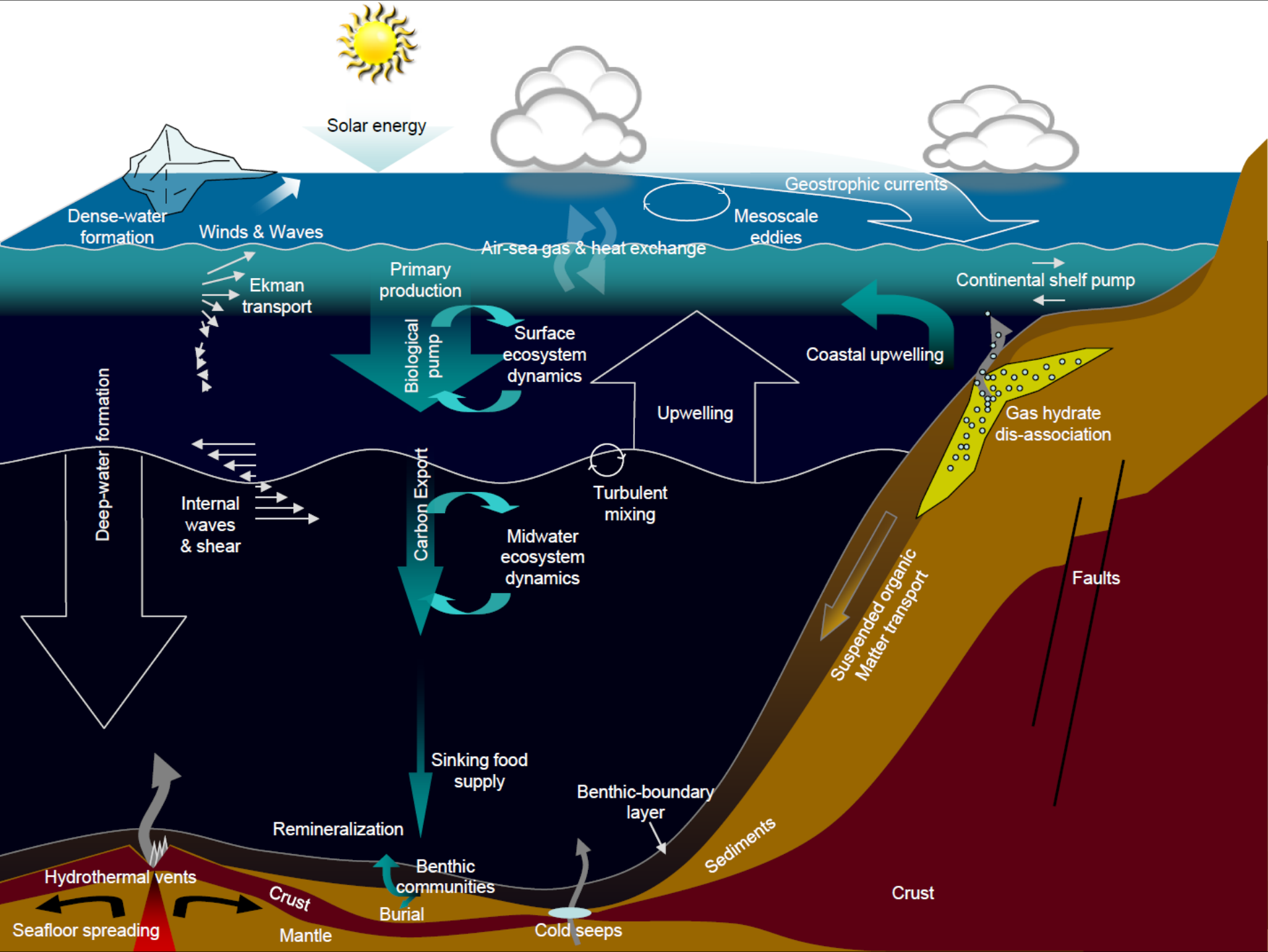
Open-Ocean Observatories in Europe

Henry A. Ruhl[a,*], Michel André[b],Laura Beranzoli[c], M. Namik Çağatay[d], Ana Colaço[e], Mathilde Cannat[f], Juanjo J. Dañobeitia[g], Paolo Favali[c], Louis Géli[h], Michael Gillooly[i], Jens Greinert[j], Per O.J. Hall[k], Robert Huber[l], Johannes Karstensen[m], Richard S. Lampitt[a],Vasilios Lykousis[n], Jürgen Mienert[o], J. Miguel Miranda[p], Roland Person[h], Imants G. Priede[q], Ingrid Puillat[h], Laurenz Thomsen[r], Christoph Waldmann[l]

Prog. Oceanogr. (2011), doi:10.1016/j.pocean.2011.05.001



Potter and Delory


Solar energy
Dense-water formation
Winds & Waves
Geostrophic currents
Mesoscale eddies
Air-sea gas & heat exchange
Ekman transport
Primary production
Biological pump
Surface ecosystem dynamics
Continental shelf pump
Coastal upwelling
Upwelling
Deep-water formation
Internal waves & shear
Carbon Export
Turbulent mixing
Midwater ecosystem dynamics
Gas hydrate dis-association
Faults
Suspended organic Matter transport
Sinking food supply
Benthic-boundary layer
Remineralization
Sediments
Hydrothermal vents
Benthic communities
Crust
Burial
Seafloor spreading
Mantle
Cold seeps
Crust

Research Questions

- *How can monitoring of factors such as seismic activity, fluid pore chemistry and pressure, and gas-hydrate stability improve seismic, slope failure, and tsunami warning?*
- *To what extent do seabed processes influence ocean physics, biogeochemistry, and marine ecosystems?*
- *How are physical and biogeochemical processes that occur at differing spatial and temporal scales related?*
- *What aspects of physical oceanography, biogeochemical cycling, and ecosystem function will be most sensitive to climatic and anthropogenic change?*
- *What are the factors that control the distribution and abundance of marine life and what will the influence of anthropogenic change be?*
- *Will there be important feedbacks of potential ecological change on biogeochemical cycling and ecosystem function which require policy intervention to avoid costly outcomes?*
- *How can industries using marine resources work in a more sustainable way and better respond to accidents?*

Transformative Ocean and Earth Science

Socio-economically important topics which cross-cut the outlined science areas include themes spanning numerous spatial and temporal scales such as:

- ***Natural and anthropogenic change***
- ***Interactions between ecosystem services, biodiversity, biogeochemistry, physics and climate***
- ***Impacts of exploration and extraction of energy, minerals, and living resources***
- ***Geo-hazard early warning capability for earthquakes, tsunamis, gas hydrate release, and slope instability and failure***
- ***Connecting scientific outcomes to stakeholders and policy makers***

We recommend that regulations be considered which require *in situ* monitoring in areas of industry activity. Fishing, mineral and hydrocarbon exploration and extraction can have long-term impacts on the seabed and in the water column, especially in the case of accidents.

Policies to enable sustainable industrial activity are maturing and here we highlight both need and potential for improved monitoring related to the hydrocarbon industry.

- Industrial operations in the deep sea lack independent human witnesses.
- Open access observing systems to monitor industrial activity provide a means to increase the ability to understand and verify impacts.
- It is now feasible for future industrial operators to install real-time observing and sensing systems at appropriate locations around the area of potential impact.

Scientists developped this idea, supported by the ESONET assembly

« Any country which can afford it should invest in observi the ocean for the long term » (John Delaney)

Let's start with generic sensor packages

Variable	Geosciences	Physical Oceanography	Biogeochemistry	Marine Ecology
Temperature	X	X	X	X
Conductivity	X	X	X	X
Pressure	X	X	X	X
Dissolved O_2	X	X	X	X
Turbidity	X	X	X	X
Ocean currents	X	X	X	X
Passive acoustics	X			X

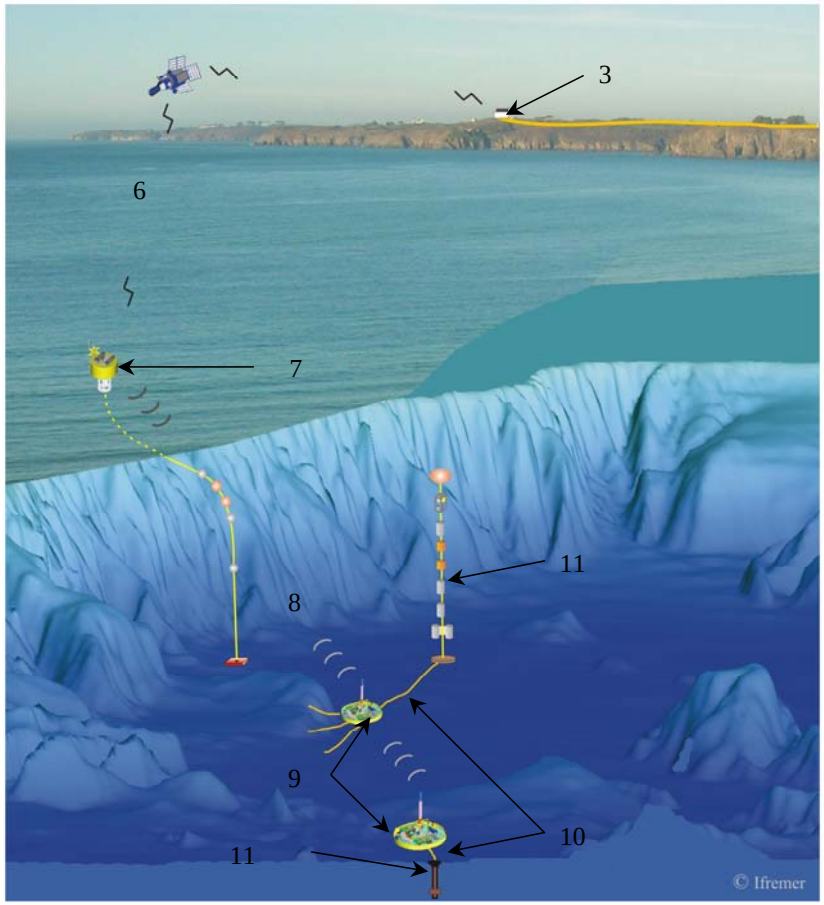
Type of sensor	Range†	Accuracy†
Conductivity	0 to 9 S/m	0.001 S/m
Temperature	-5 to +35°C	0.01 K
Pressure	0 to 600 bar	0.1 % FSR
Dissolved oxygen	0 to 500µM	5%
Turbidity	0 to 150 NTU	10%
Currents	0 to 2 m/s	2%
Passive acoustics	50 - 180 dB re 1 µPa	+/-3dB

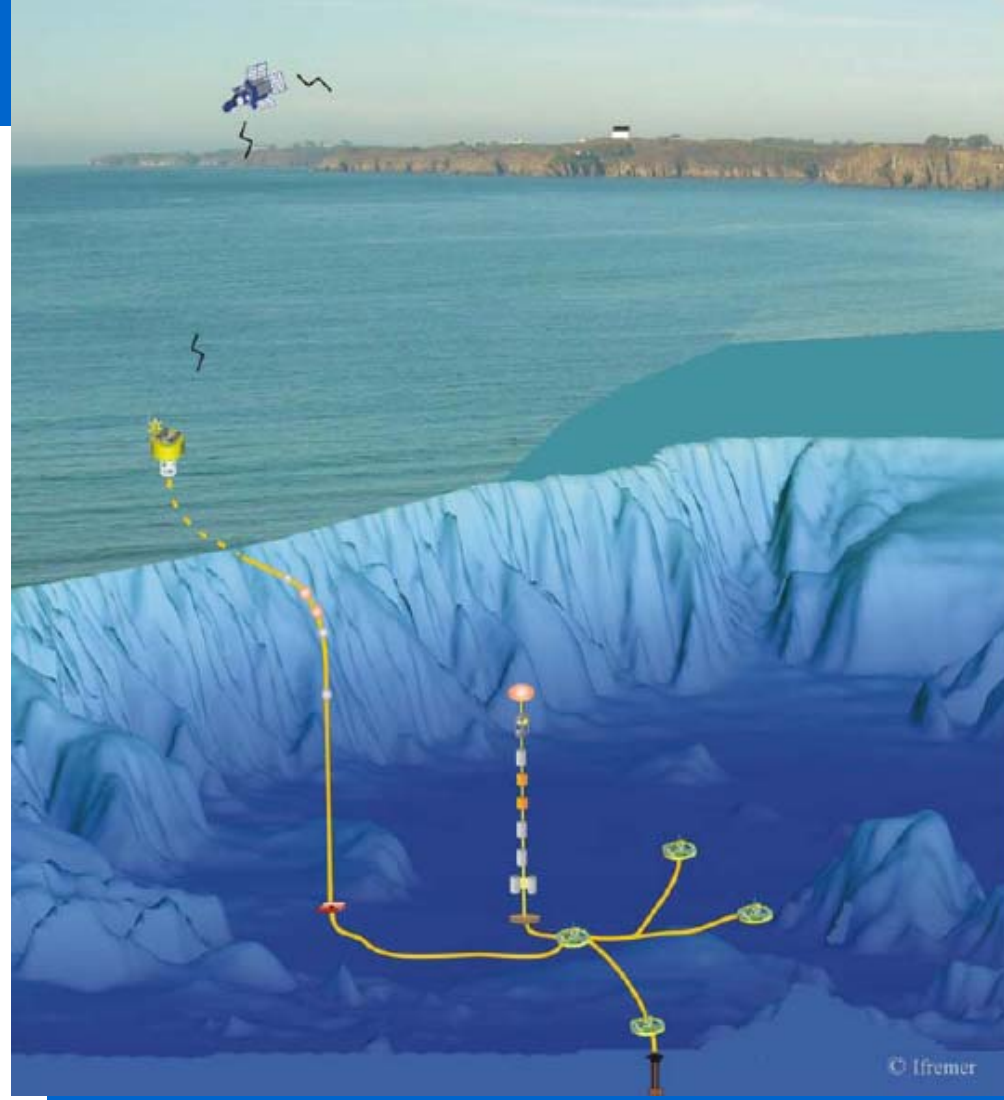
Specific Sensors/Parameters/Instruments

Seismic motion
Geodesy and Seafloor deformation
Gravity
Magnetism
Fluid related processes monitoring
Chemical and aqueous Transport (CAT)
Pore pressure
FluSO
Gas hydrate monitoring
Dissolved Fe, Mn and sulfide species
Particle flux
Acoustic tomography
Photosynthetically active radiation (PAR)
Specialized hydrothermal vent CTs
Methane
Hydrocarbons

pH, Eh, and alkalinity
Nutrient analyzers
Particle flux
Image based particle flux
Pigments
In situ Mass spectrometer
Osmosampler
Deep biosphere
Line-scan imaging
Holographic imaging
Video
Planar lasers and thin light sheets
Active acoustics
Zooplankton sampling
Flow imaging of particles &plankton
Molecular probes
In-situ respiration

Stand Alone Acoustic

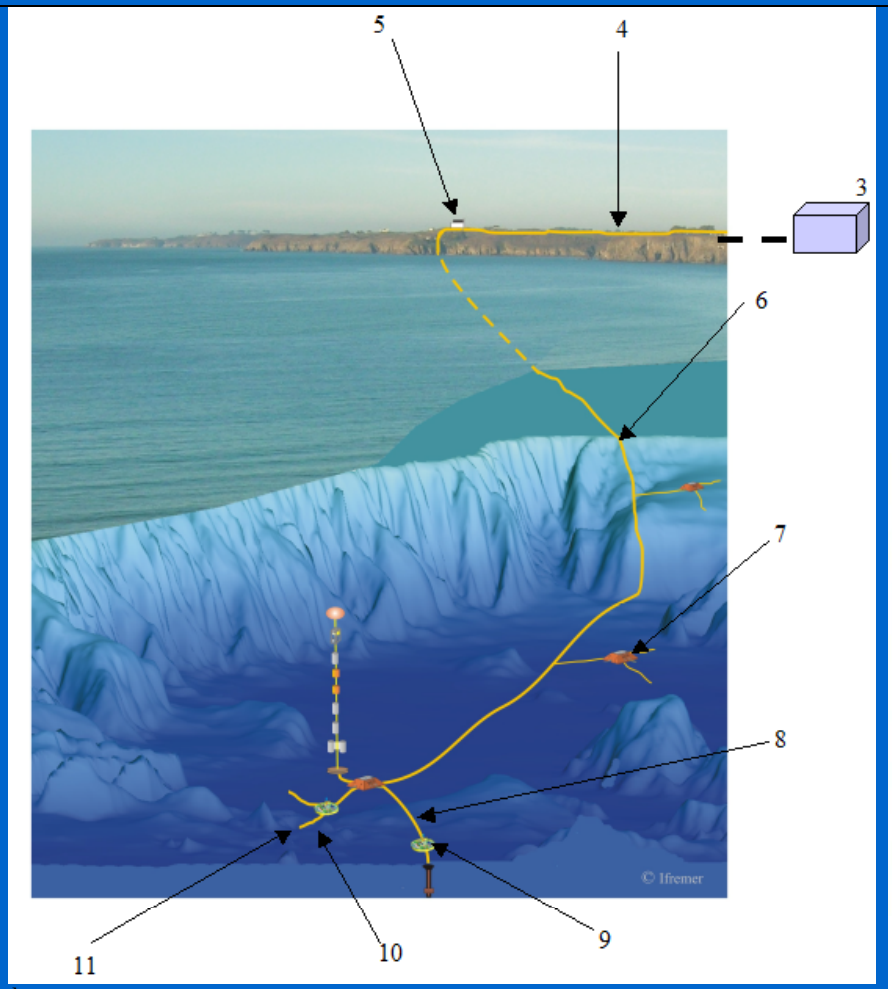




Stand Alone Umbilical Observatory (design phase only)

Legend:
3 - Technical supervision infrastructure
6 - Land sea communication segment – Satellite communication
7 – Buoy (node)
8 – Acoustic telemetry - Branch extension of the network
9 - Junction box
10 - Link to instruments
11 - Individual instrument

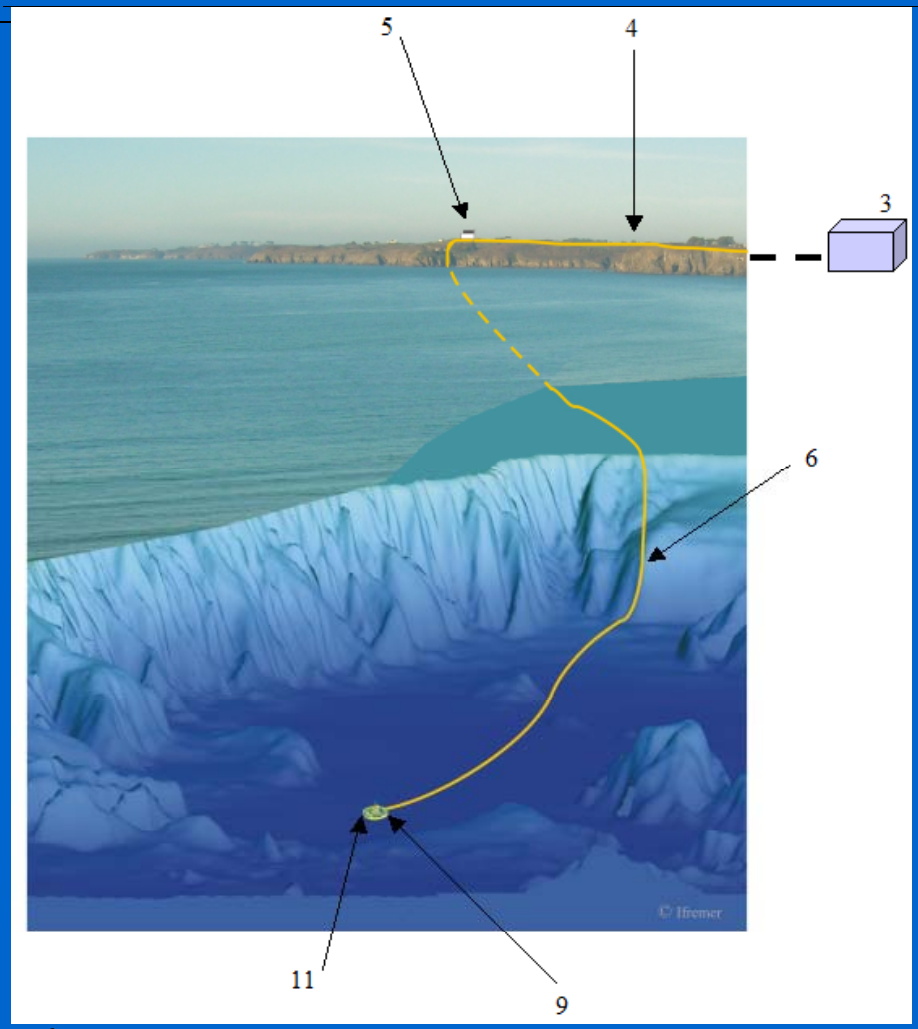
Multinode cabled observatory



egend:
- Technical supervision infrastructure
- Onshore network
- Land Base termination of sea infrastructure
- Land sea communication segment
- Node from branching unit to node/extension xx
- Branch extension of the network
- Junction box

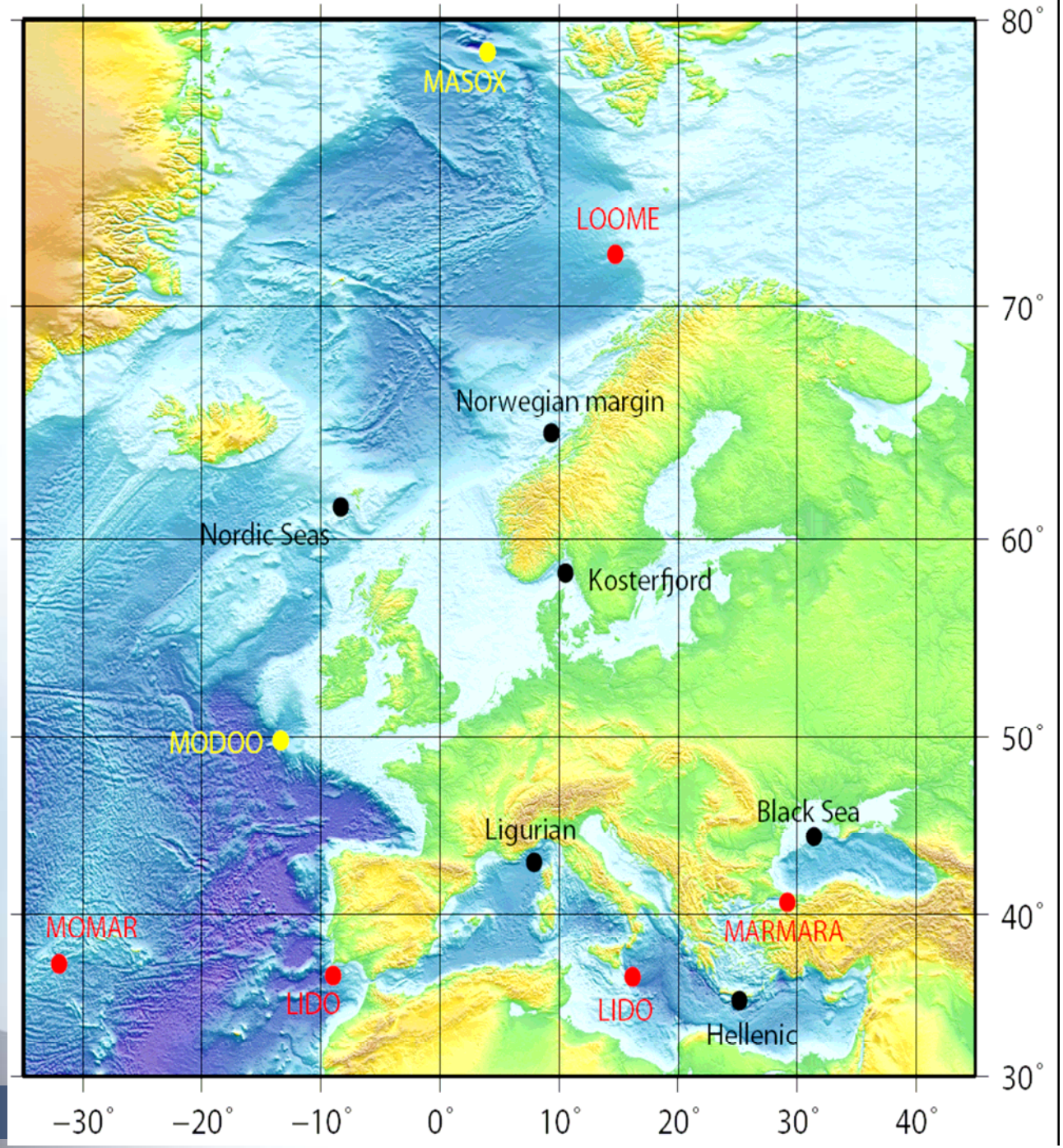
0 - Link to instruments

Simplified cabled observatory



egend:
- Technical supervision infrastructure
- Onshore network
- Land Base termination of sea infrastructure
- Land sea communication segment
- Junction box

1 - Individual instrument


MASOX
LOOME
Norwegian margin
Nordic Seas
Kosterfjord
MODOO
Ligurian
Black Sea
MOMAR
LIDO
LIDO
MARMARA
Hellenic
80°
70°
60°
50°
40°
30°
−30°
−20°
−10°
0°
10°
20°
30°
40°

The research infrastructure case

- *ESONET was successful in supporting the ESFRI project EMSO for a Preparatory Phase.*
- *Whereas ESONET prepares the community and the technical specifications of ESONET-EMSO observatories, EMSO works at implementing them, preparing the legal context of the infrastructure and legal bodies and looking for funding at national and international levels.*
- *From 2008, the two projects were coordinated. The two agendas has been synchronised and ESONET NoE has produced deliverables to EMSO (such as implementation plan).*
- *The difference between an infrastructure (EMSO) and "science as usual" is now well understood and promoted.*

ESONET Label

ESONET Label – data policy

ESONET is recommending the following points concerning data policy access:

1.0 Free and open access according to Aarhus Convention on environmental data as expressed by IOC Data Policy (International oceanographic Commission UNESCO) programmes is applied for basic data, especially the data requested for risk assessment in real time and delayed mode (mandatory).

2.0 Registration of users is highly recommended for downloading taking into account the protection of individuals as defined by Directive 95/46/EC and Regulation No 45/200 (optional).

3.0 Experimental data should follow classical scientific confidentiality rules : no more than 2 years restriction. A low resolution data set such as a display of images is proposed to the public in the meantime (recommended).

4.0 Data classified for security and environment protection reason, and other exceptions as defined by the INSPIRE directive and the Directive 2003/4/EC (on public access to environmental information), must at least be stored and be available as soon as they fied data will be granted on request to agreed

Free and open access

5.0 Access to citizens is facilitated by implementation of specific tools (recommended).

6.0 Long term archiving (more than 20 years) policy and implementation has to be performed for all types of data, including classified data. Archived datasets should be citable with a mention of the observatory network (mandatory).

7.0 This archiving is assumed by data centres complying with Esonet data management plan and standards (recommended).

8.0 Training should be provided to the various levels of staff handling subsea observatory data (recommendation).

The use of a sensor registry is recommended (mandatory for a new infrastructure). It means the registration of sensors in an open standard[1] machine -and human- readable format

data management council

certify data centres and observatories

services

standards

other projects

interoperability : geoss

users

emso data portal

pangea , ifremer ,ingv

example

Data wharehouse (sensor registry)

discovery

viewing

download

including sub sampling, formatting

data centre

archiving

data centre

Marmara Sea EMSO

QC policy

Define data domains

In-situ time series, profiles

Bio samples

Picture

Video

Acoustics

Geo -physical

Fluxes

SeadataNet

QC manuel

local centres

processing

Civil protection authorities , population warning

local centres

AFAD and ITU

data capture

monitoring

Conversion to physical units

Communication

SensorML

observatory

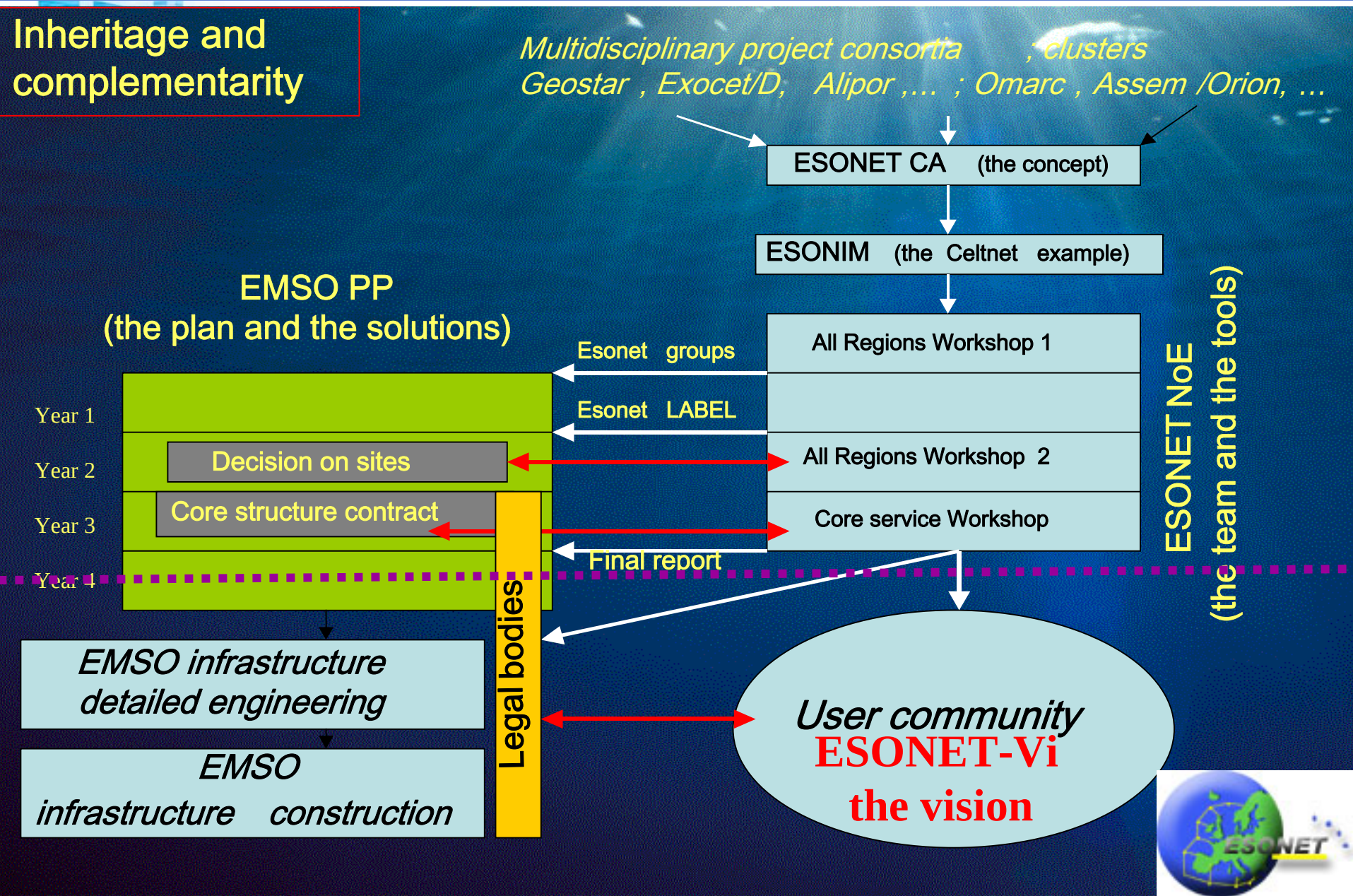
data logging

Autonomous Instruments time series

observatory

SB0x, P1, ...

The complexity of European Commission Research programming may give birth to an enthusiastic achievement



ESONET Vi

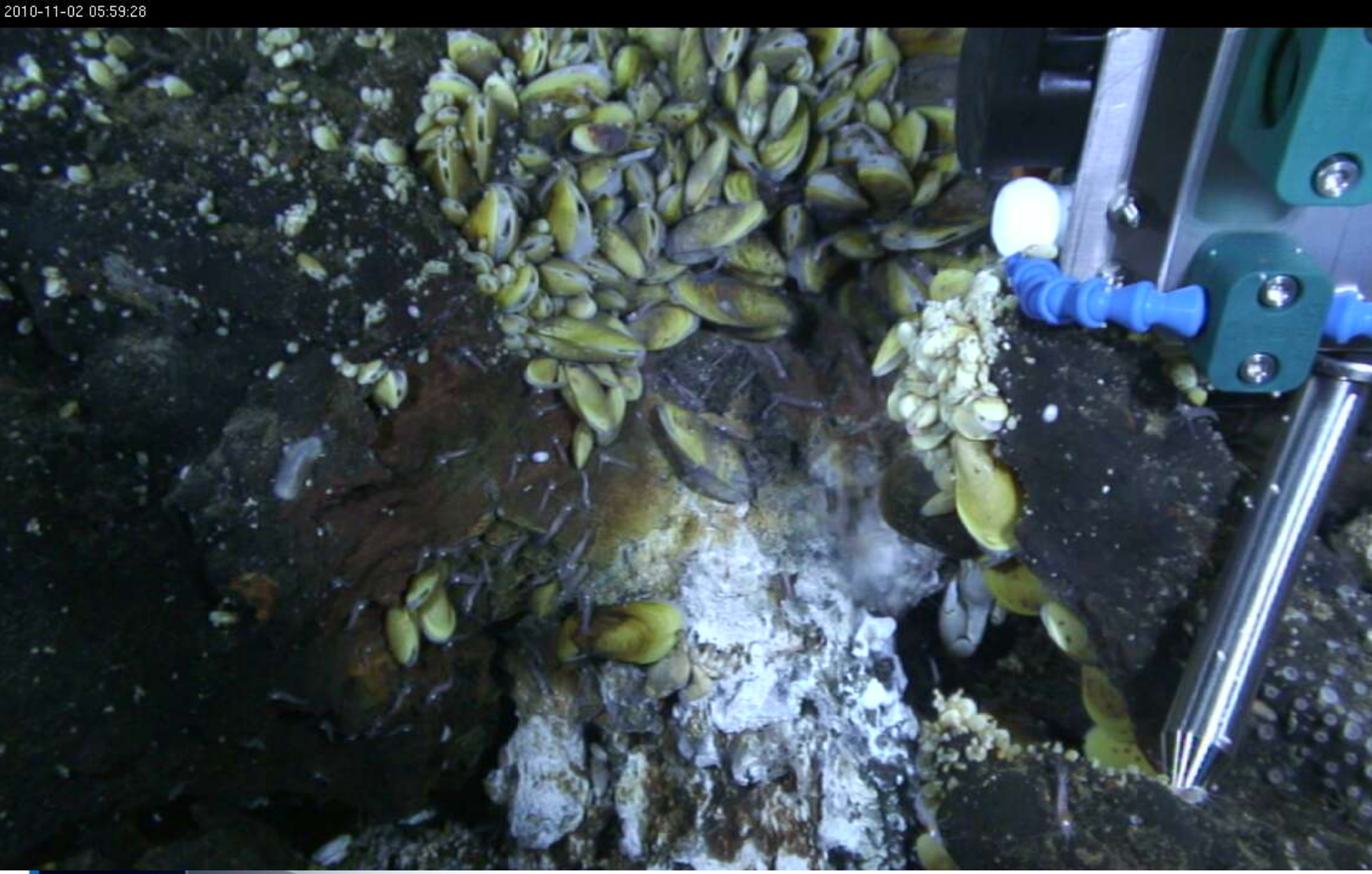
A meeting “After ESONET NoE” held in December 16th 2010 defined an ESONET-Vi (Vi standing for “vision”).

The consortium agreement includes 4 working boards:

1- ESONET label
2- Scientific Council
3- Data management
4- Animation including website, Yellow Pages and Outreach

A steering committee will be formed with representative (s) from each board.

Esonet Vi is open to users, owners, stakeholders of fixed point subsea observatories



Thank you for your attention