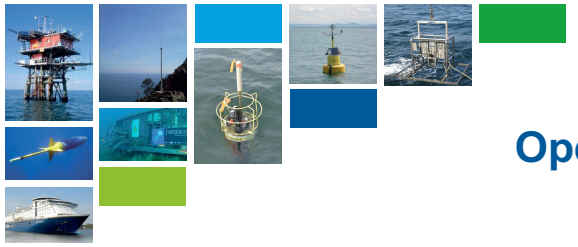


Malta Summer School 2018
Operational Oceanography for Blue Growth

2022 ?

2018

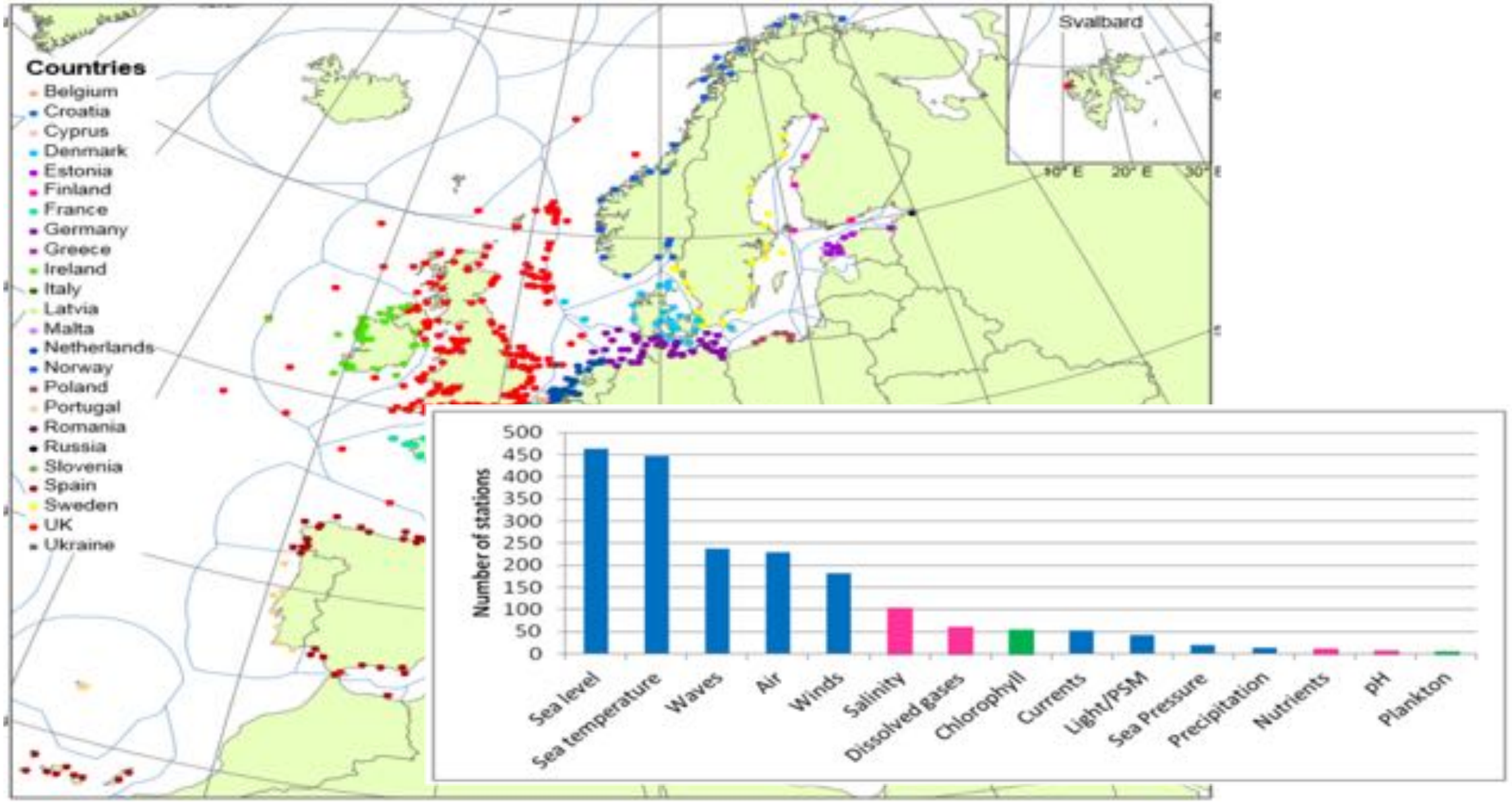
Evolution of JERICO-RI towards a sustainable RI

www.jerico-ri.eu

I. Puillat – Ifremer
ingrid.puillat@ifremer.fr

2011

PRESENT EUROPEAN COASTAL OBSERVATORIES: STATUS & CHALLENGES



A coastal specificity?

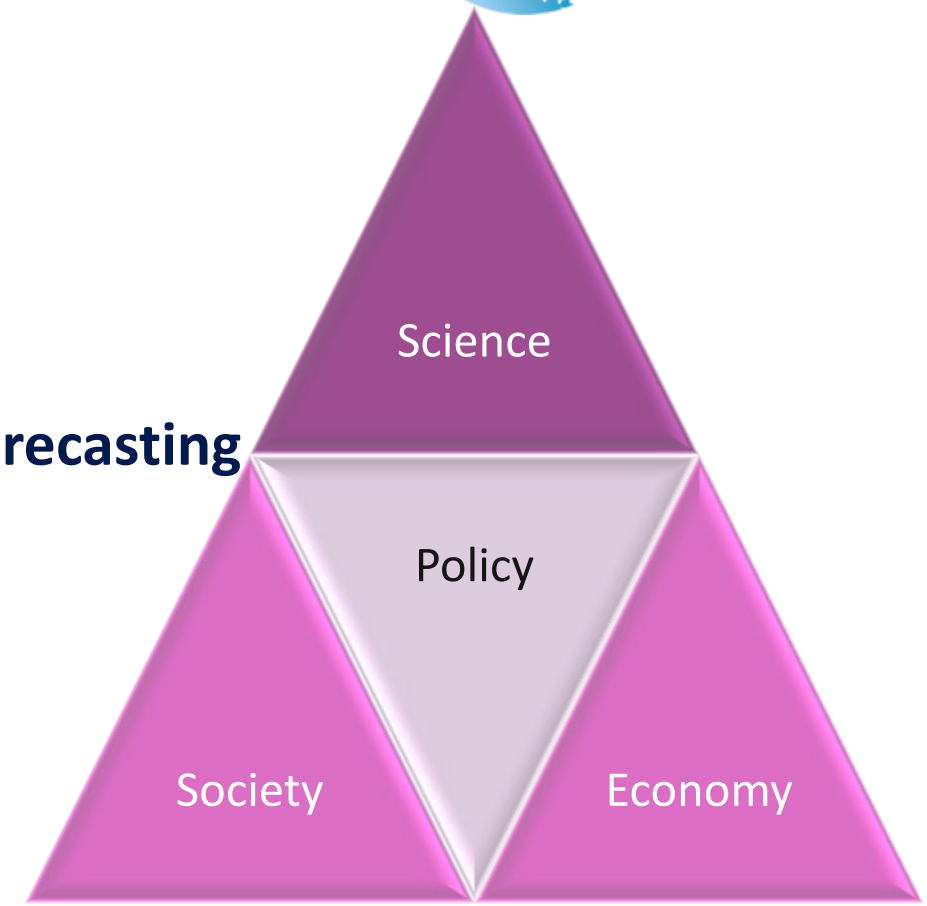
Why long term?

- Humanity and societies are changing (too) fast...

-> Impacts on economy and environment on long term

Needed answers

- Adaptability of uses & behaviors: understanding and forecasting



Why operational?

- Crisis response management
- Forecasting
- No data, no information, no modeling, no …

Operational monitoring and knowledge acquisition must be sustained… on very long term at European level…integration and harmonisation!!!!!!

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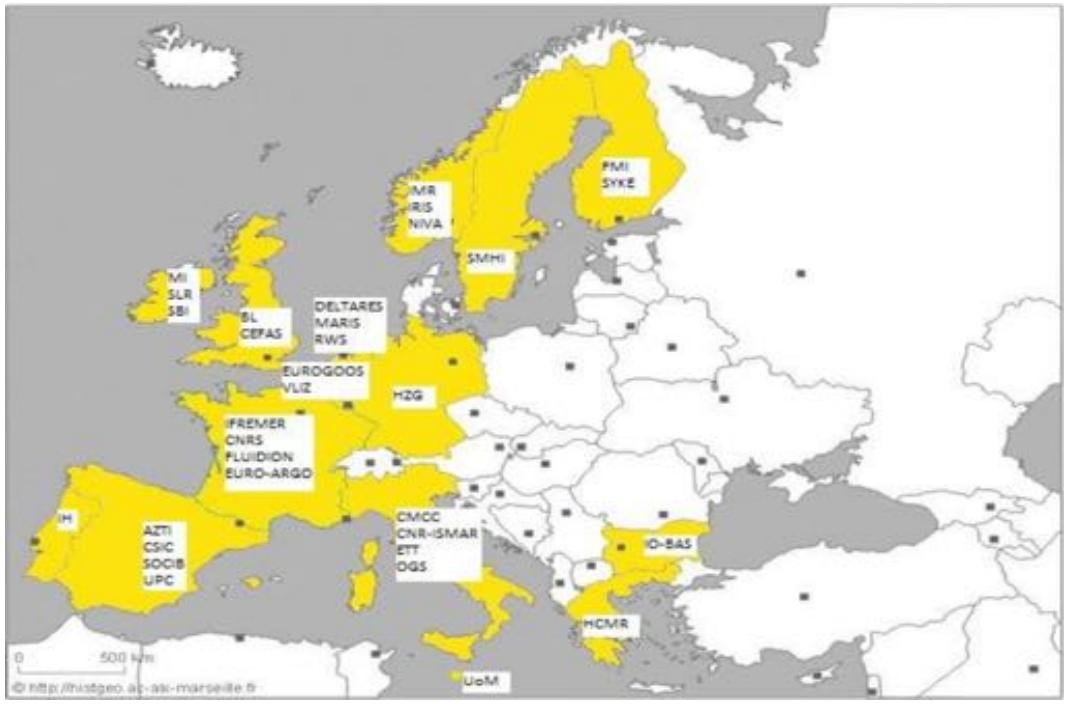
JERICO-NEXT: a summary

Important figures

- Duration: Sept. 2015- Aug. 2019, 4 years
- H2020 EU funding: 10M€
- Consortium: 34 partners, 910 MM, 15 countries
- Coordination: Ifremer: jerico@ifremer.fr
- 66 deliverables, 63 milestones



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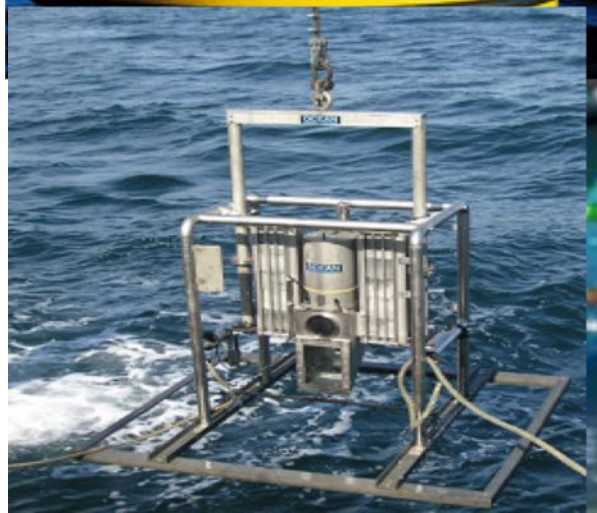
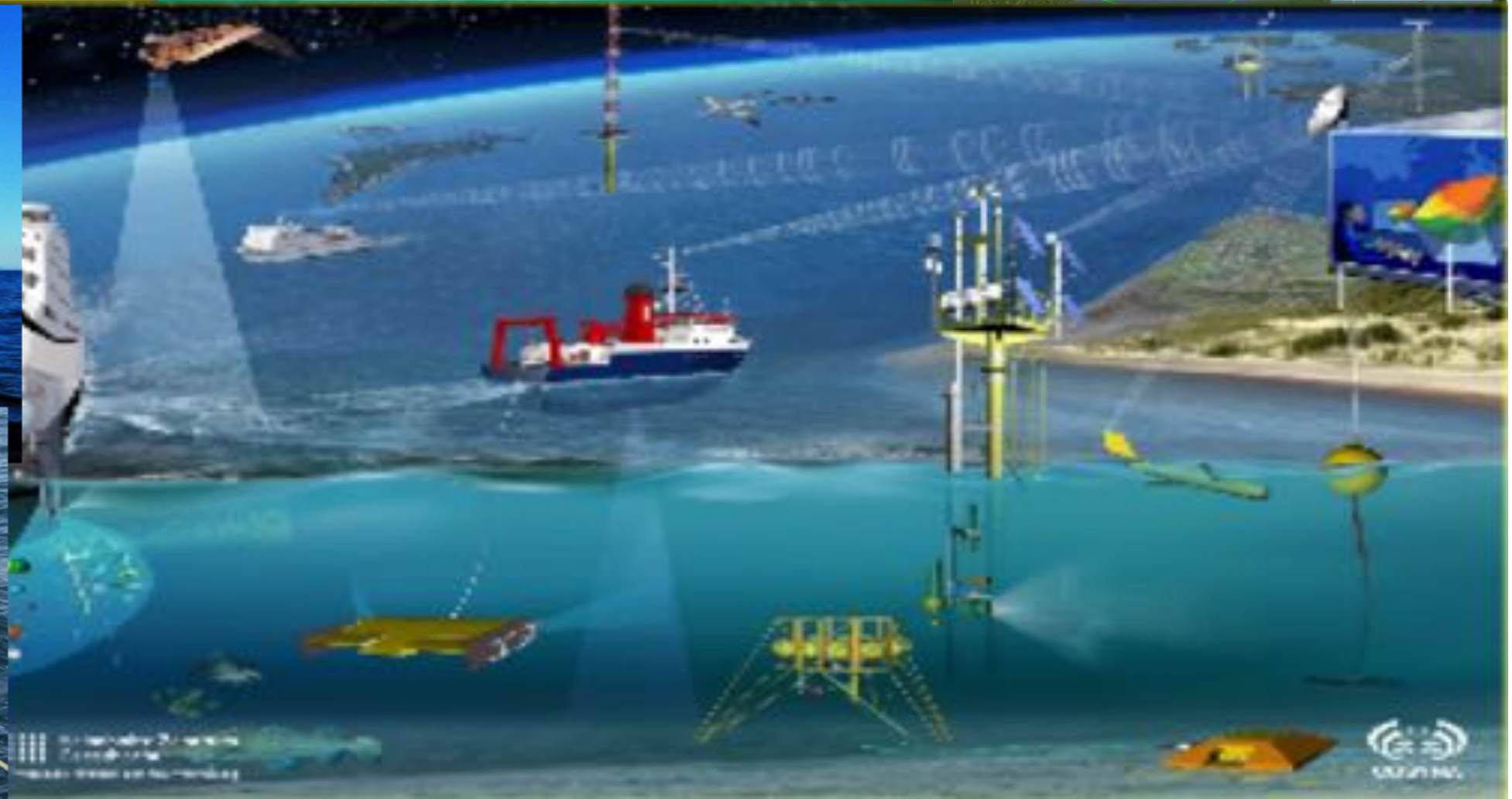
North Sea
Denmark


Wavescan





JERICO-NEXT: a summary

- **The JERICO-NEXT community**

  “ We cannot understand the complexity of the coastal ocean if we do not understand the coupling between physics, biogeochemistry and biology.”

→ **New technological developments for continuous monitoring of a larger set of parameter**

→ **A priori definition of the optimal deployment strategy**

- ✓ Delivery of **an harmonized research infrastructure for coastal observations**, compliant with EMODNET and Copernicus
- ✓ Delivery of an Harmonised data flow and application of the Inspire Directive

JERICO-NEXT: a summary

Our objectives

Delivery of **an harmonized research infrastructure for coastal observations**, compliant with EMODNET and Copernicus/CMEMS.

- Sustainable provision of high-quality coastal multidisciplinary observations ➔
  - Progress and breakthrough in marine science
  - European policies and national duties
  - The development of business activities (e.g. marine services)

To produce a **long-term strategy** for further development, integration, sustainability and relevance of **coastal observatories in Europe.**

JERICO-NEXT: a summary

Today: JERICO-NEXT Time line

From Thoughts……

Toward Implementation……

Mid-term review

- Report on data management best practices and generic and metadata models (D5.9)
- Recommendations on open and free data policy (D5.1)
- Review of sites at threat (D1.1)

Approach to monitor European Coastal seas

Mar.-Sep. 2016

GA#1 Mar. 17

Oct. 2017

GA#2 Sep. 18

Aug. 2019

-Release of JERICO-NEXT catalogue (Data Man. D5.2)

- Legal governance and financial structure (D1.3)

- Roadmap for the future (D1.4)
-The JERICO Label (D2.7)

Sep. 2015

KOM & 1st discussion on science strategy

Table of content

And after? Towards a sustainable JERICO-RI

- ✓What are the pillars for a sustainable JERICO-RI?
- ✓The processes, the organisation, the roadmap

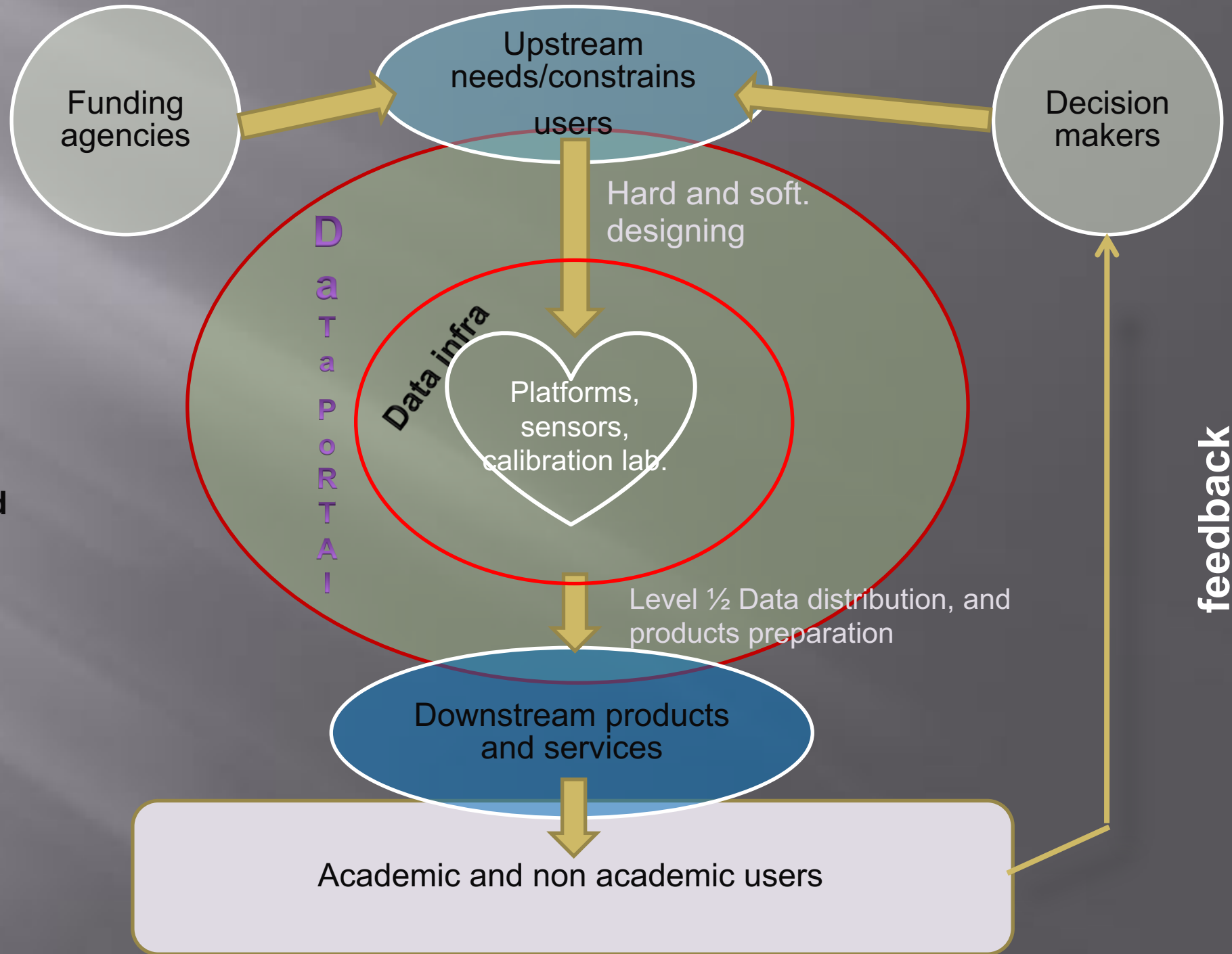
Pillars

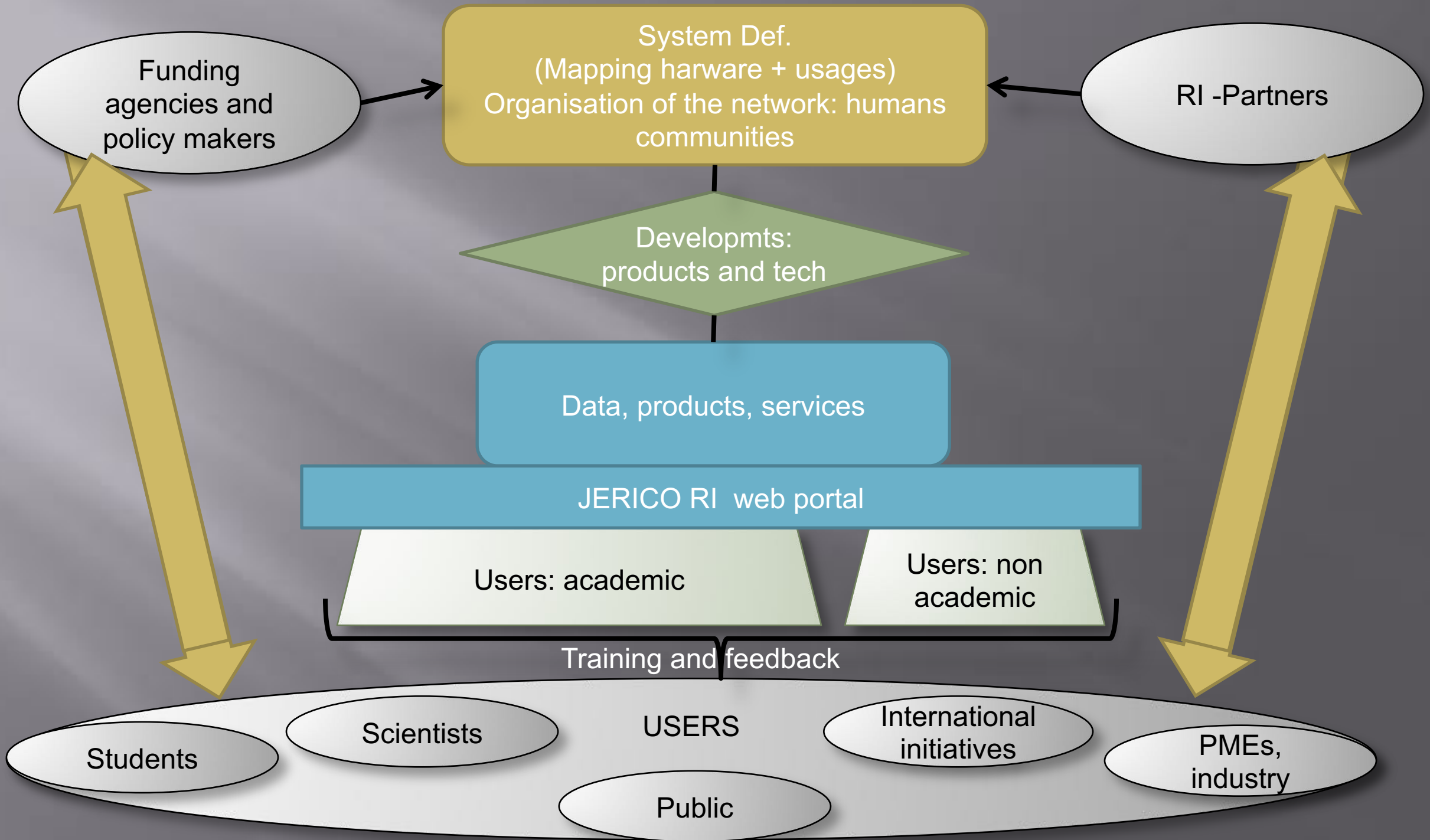
1- Hardware level: Equipments: vectors and sensors

2- Community of users, customers…

3- Software level: Data portal: delivery of processed and qualified data to env. agencies and companies that will produce products and services (some of the users)..

3- Qualification of the data….and of the hardware of the RI…




Funding agencies and policy makers
System Def.
(Mapping harware + usages)
Organisation of the network: humans communities
RI -Partners
Developmts:
products and tech
Data, products, services
JERICO RI web portal
Users: academic
Users: non academic
Training and feedback
Students
Scientists
USERS
International initiatives
PMEs, industry
Public

And after? Towards a sustainable JERICO-RI

Some of the requirements to get a sustainable JERICO-RI

- Raised and keep the quality high according to the needs!!!
  - Sensors and measurement
  - Processing
  - Quality control
  - Quality in the distribution and disseminations

- Deploy the suitable technologies and methods
  - Up to date technologies
  - Keep tracking of the emerging concepts and thoughts to be visionary
  - Keep understanding the needs and their evolution

- Raise funds = Convince the identified users and the funders!!!

And after? Towards a sustainable JERICO-RI

- Continuation after JERICO & JERICO-NEXT
  - About harmonisation: THE JERICO Label
  - About way foreward operational running:
    - (semi)automated + on demand deployments: biology!!!! + episodic event sampling

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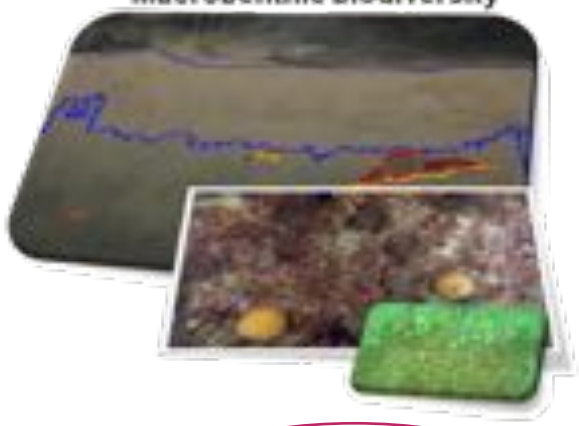
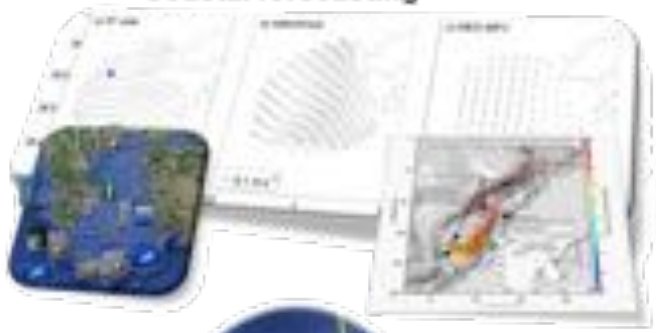
Illustration with 4 examples

Macrobenthic biodiversity

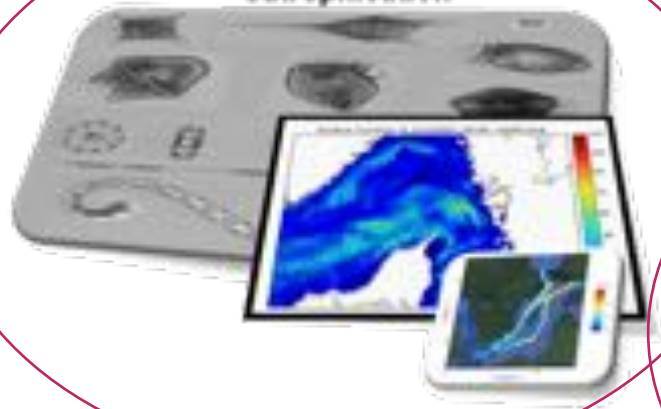


Coastal forecasting

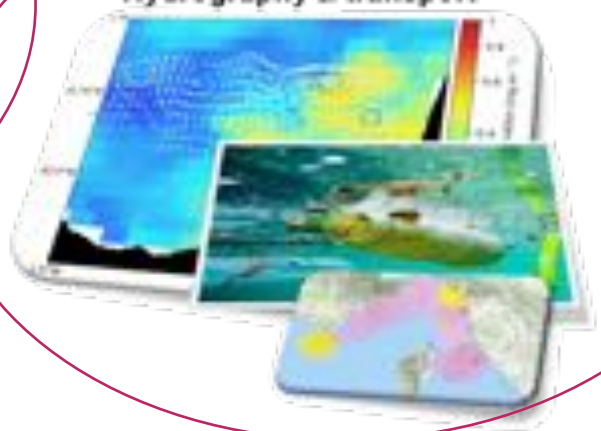


Chemical contaminants & biological responses

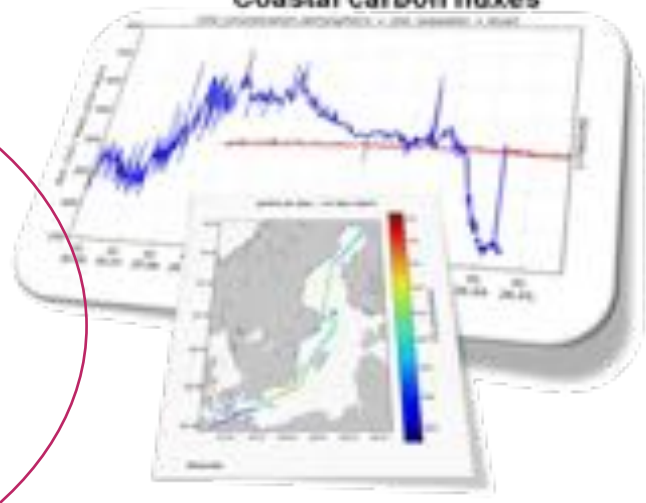
Phytoplankton, HAB & eutrophication



Hydrography & transport



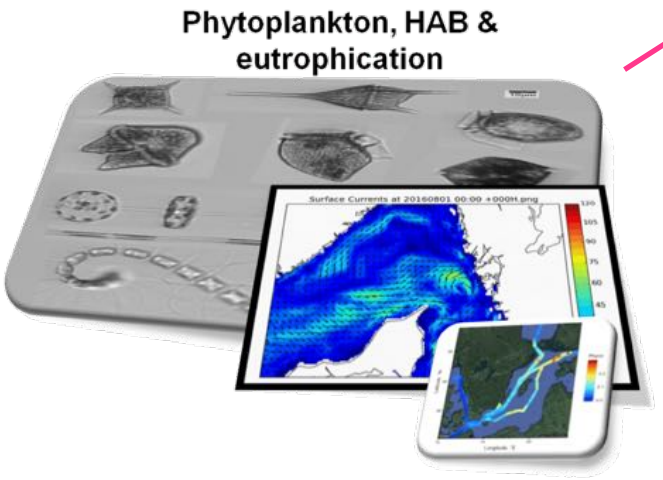
Coastal carbon fluxes



Operational monitoring of phytoplankton and HAB

Illustration with 4 examples

Example of phytoplankton monitoring



- Local, regional hydrodynamics
Transport? Physical processes: scales?
- Biological processes? Scales?
- TechnologieSSSSS?
- Data flow: technology too!
- Interpretation/analysis methods?
- Usages, users?

How to ?

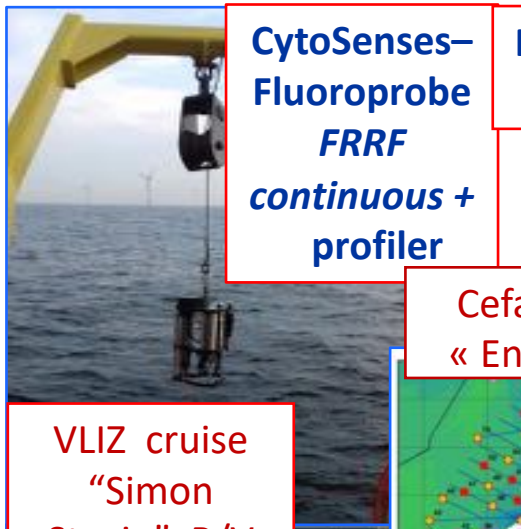
Example of need: Phytoplankton monitoring

- Pulse-shape recording flow cytometer (Cytosense)
- Imaging in-flow (imaging in-flow Cytobot)
- FlowCAM
- FastCAM
- Spectral fluorometer (AOA, Fluoroprobe, Multiexciter)
- Absorption meter (PSI-CAM)
- Pulse Amplitude Modulated Fluorometers (PAM)
- Fast Repetition Rate Fluorometer (FRRF)
- Underwater Vision Profiler (UVP5)
- (Semi-)Automated data analysis

How to ?

<u>Outcomes</u>:
Recommendations + combination of methods + complementary sensors in combined platforms.

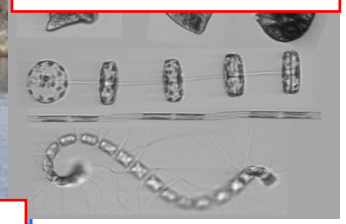
Example of need: Phytoplankton monitoring



CytoSenses–
Fluoroprobe
FRRF continuous +
profiler

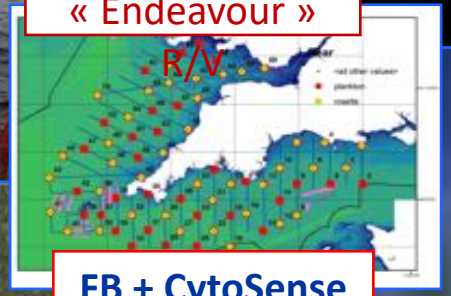
Fluorometer
+ FRRF

Ifremer/
CNRS-BOREA
Smile Buoy



Fluorometers,
Imaging
Cytobot

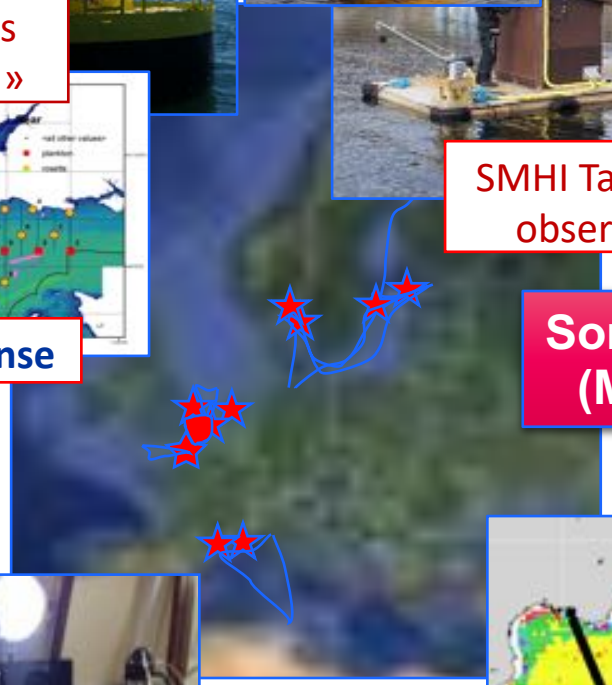
Cefas cruises
« Endeavour »
R/V



VLIZ cruise
“Simon
Stevin” R/V

FB + CytoSense

SMHI Tangesund
observatory



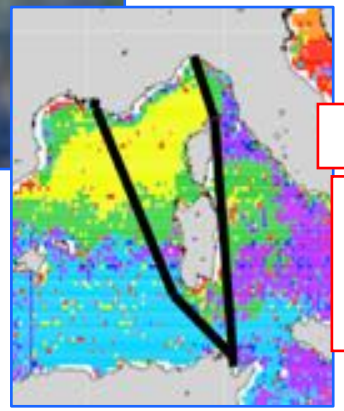
**Some field implementation
(May 2016-August 2017)**

**Fluoroprobe
CytoSense,**

ETOILE cruise
“Côtes de la
Manche” R/V

**PhytoPAM,
CytoSense,
FRRF**

CNRS-LOG cruise
PHYCO “Côtes de la
Manche” R/V

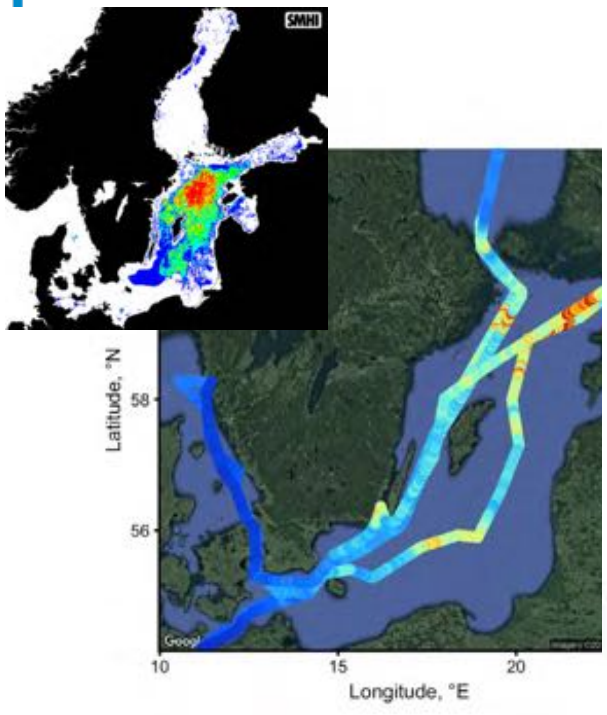


FB + CytoSense

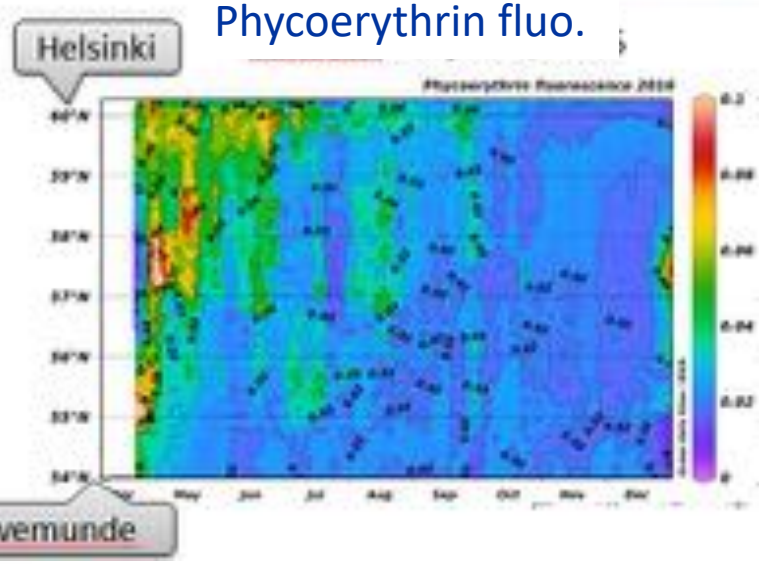
“Le Carthage”
Ferry line
CNRS-MIO

1) Case of phytoplankton monitoring in the Baltic Sea

Accumulations of cyanobacteria in the Baltic Proper near Oxelösund, 25 July 2014 Photo Swedish Coast Guard



Phycoerythrin fluo.



onboard ferry Finnmaid

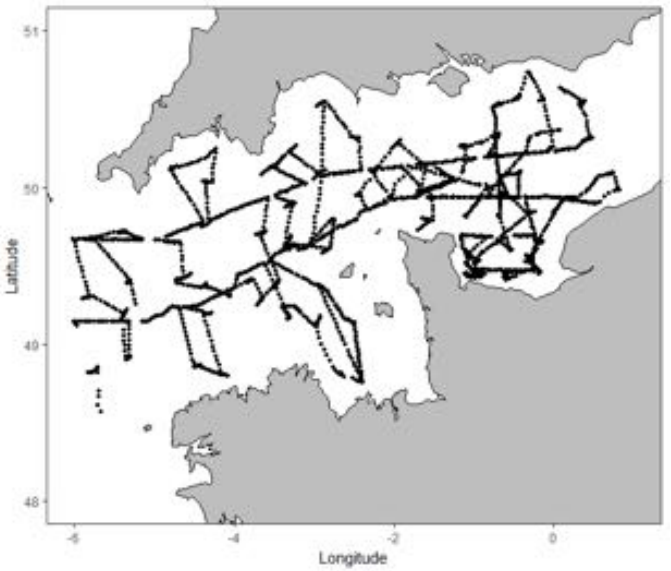
Today in JERICO-NEXT

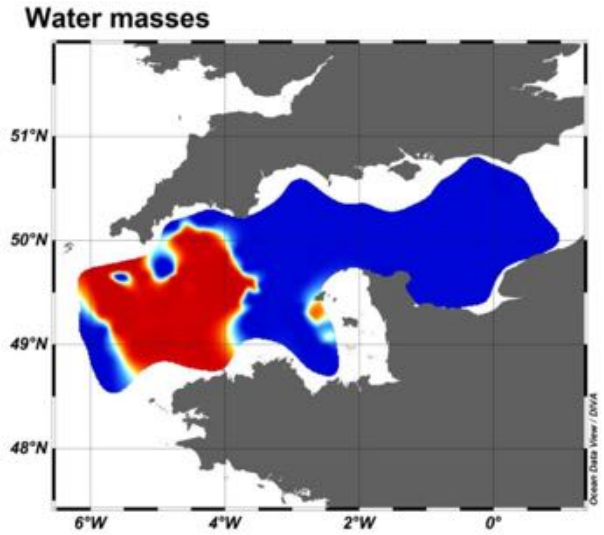
Observations from ferrybox systems on R/V & M/S

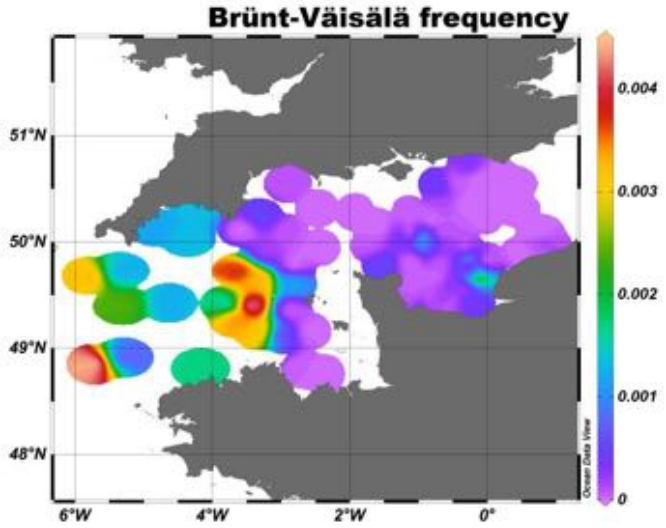
Cruise in July 2017

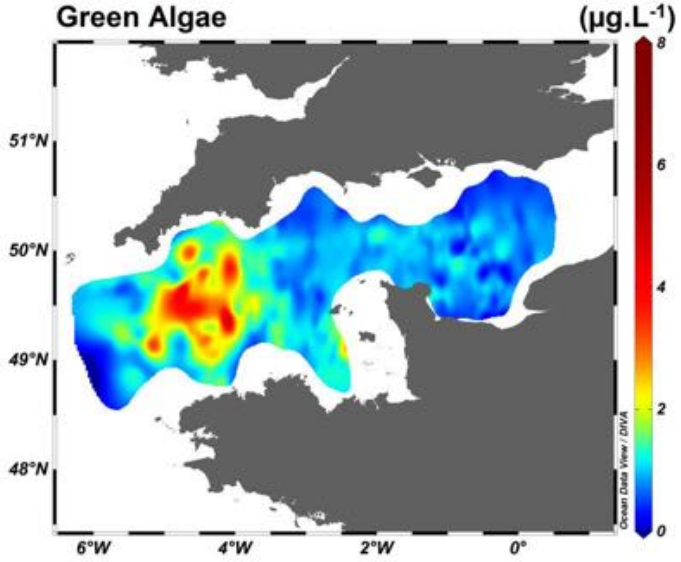
Contribution of *B. Karlson (SMHI), S. Lehtinen (SYKE), F.Artigas, A. Louchart, Fabrice Lizon (CNRS-LOG), L. Stemann (CNRS-OOV),* J. Seppälä (SYKE)

2) Case of phytoplankton monitoring in the Channel





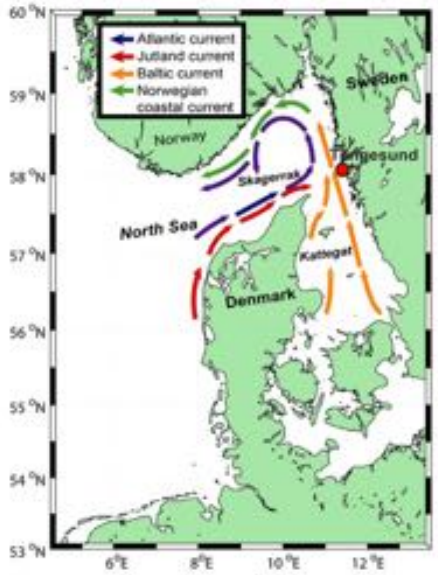




A. Louchart (1), A. Lefebvre (2), M. Didry (1), G. Wacquet (1), L.F. Artigas (1)

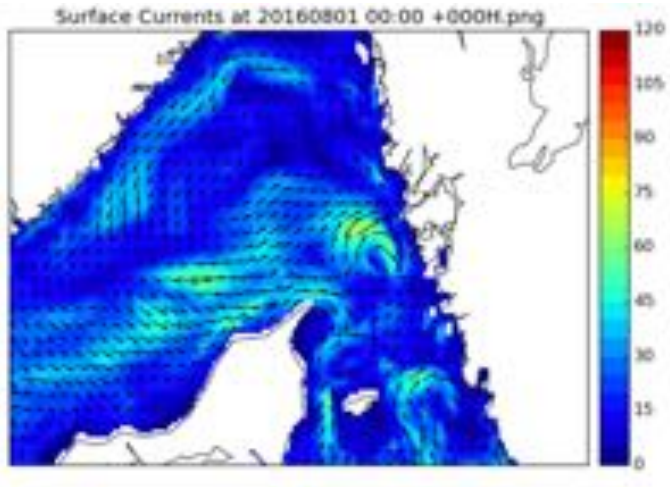
1) CNRS -LOG, Université du Littoral-Côte d'Opale, Wimereux, France
2) IFREMER LER/BL, Boulogne sur mer, France

3) Case of phytoplankton monitoring in the Skagerrak (B. Karlson, SMHI)



Nemo ocean model

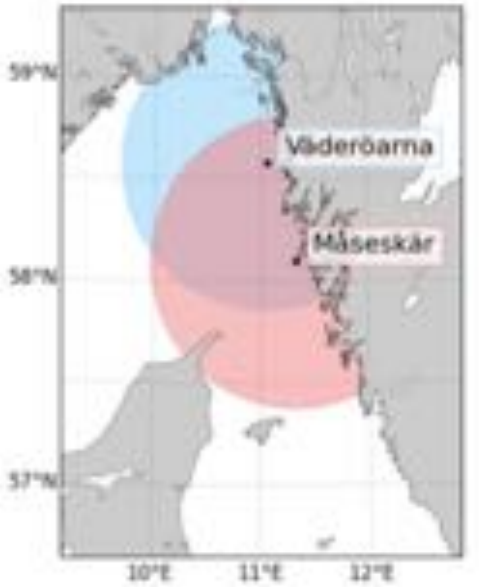
- SMHI set up
- Nemo-Nordic
- 3-D model
- Coupled to biogeochemical model

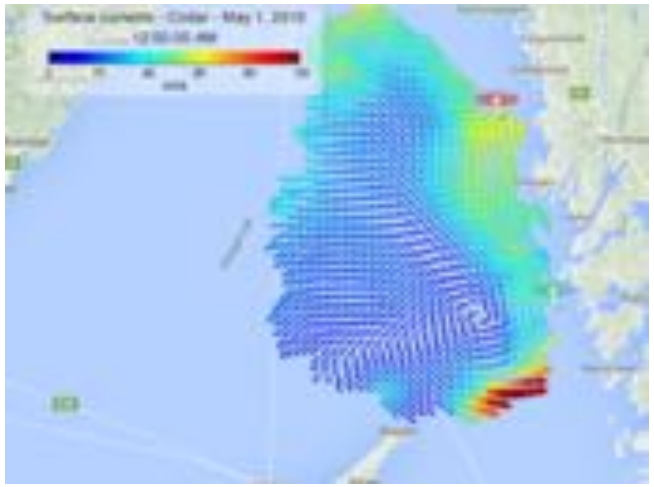


Surface currents, 1 Aug. 2016

HF Radar

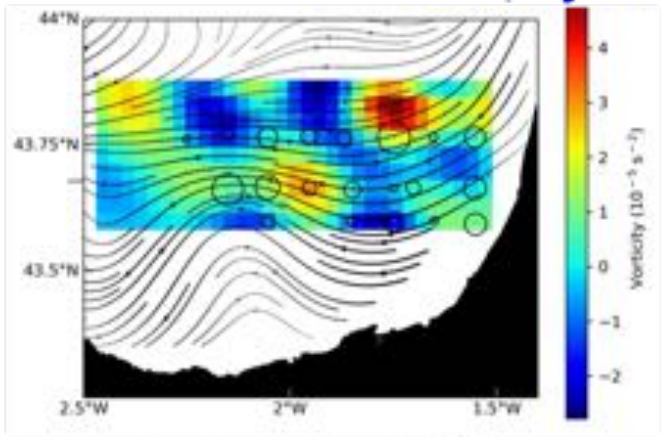
- Two antennas installed in autumn 2014
- Surface currents
- Waves
- Data assimilation in Nemo





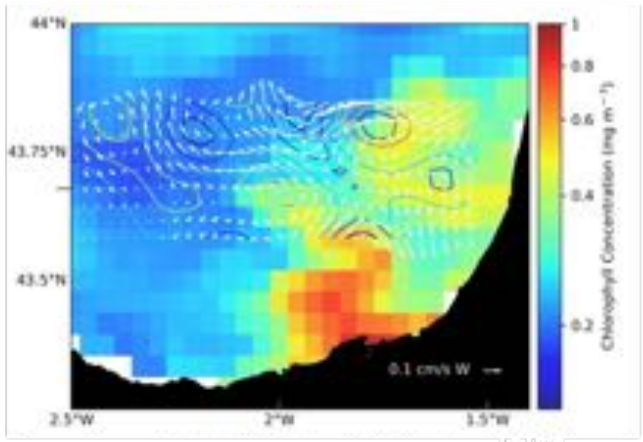
Surface currents, 1 May 2015

Bay of Biscay: ETOILE experiment (Aug. 2017)
HF radar, hydrology & marine litter



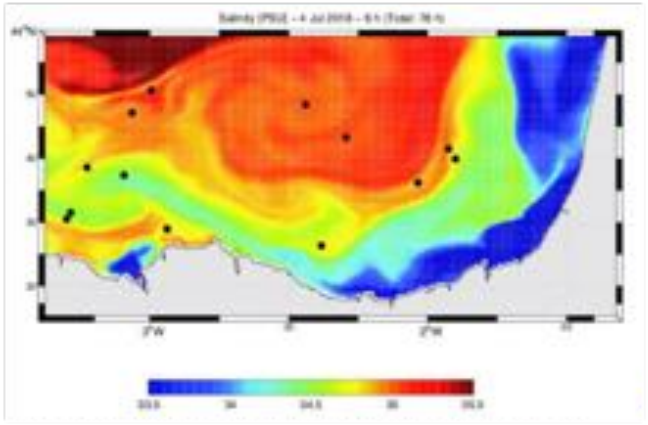
Geostrophic Relative Vorticity.

Black lines: *Lagrangan Residual Currents from HF Radars.* ***Black circles:*** *location & quantity of marine litter from a 500 µm Neuston net (microplastics).*



Geostrophic Relative Vorticity.

White arrows*: Chlorophyll data from satellite overlaid on the relative vorticity field, together with the derived geostrophic velocities.*



Operational simulations *of salinity and particle advection using a 670 m horizontal resolution ROMS configuration for the SE Bay of Biscay (more: www.euskoos.eus/en).*

A first insight on the distributions of floating marine litter and phytoplankton in relation with currents and hydrography in the SE Bay of Biscay.

✓Marine litter & phytoplankton distributions : influenced by vorticity.

✓Advection to be considered

✓Increased sampling step needed

4) Example in the SE Bay of Biscay

HF radar + model + Microplastics + phytoplankton

Contribution of : A. Rubio, O. C. Basurko, A. Caballero, X. Davila, L. Ferrer (AZTI) and L.F. Artigas (CNRS-LOG)

Illustration with 4 examples

- Illustration of progresses and strengths

1) Integration of physics with biology
2) (Semi) automated systems are working
3) Harmonisation of methods across systems
4) Work and integration at European scale: Baltic, North Sea, Channel, Bay of Biscay, Western Med. Sea.

Table of content

What else? … in JERICEXPRESSO mode

- Toward a phytoplankton operational monitoring

  - Merging of products: ex : satellite + ferrybox data

  - Linking hydrodynamic modeling, including forecasting with phytoplankton product (sat + FB) to forecast phytoplankton transport

  - Phytoplankton modeling to progress a lot

  - Warning and communication system towards the users (aquaculture etc…) …

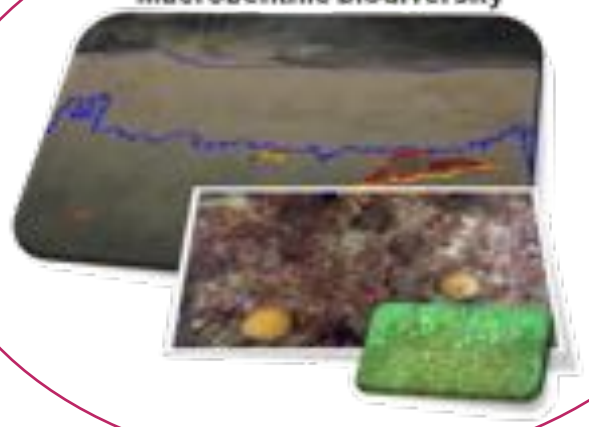
  - Collaboration with Users to be formalised

- One of the expected developments in technology

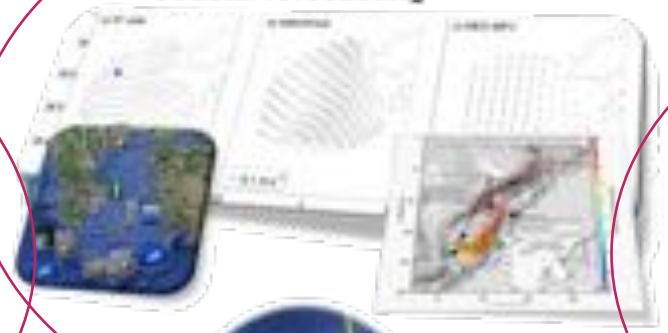
  - Progress in Marine Genomics : DNA sensors … towards an operational process? Automation & integration

What else? …

Macrobenthic biodiversity

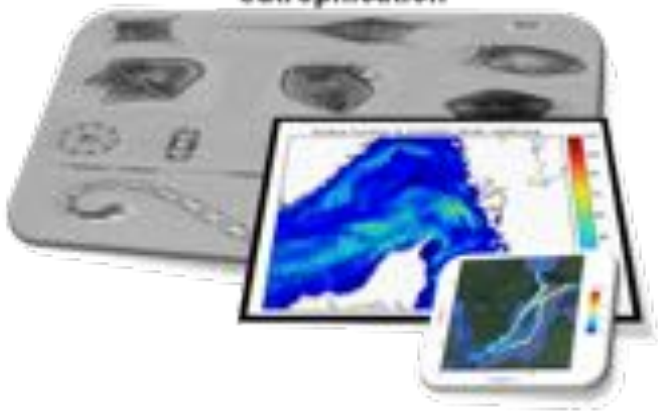


Coastal forecasting

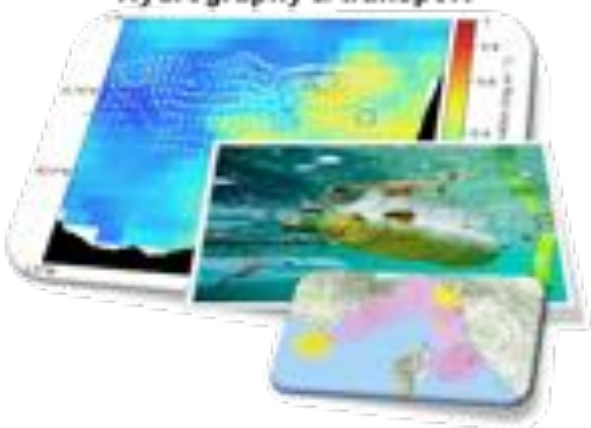


Chemical contaminants & biological responses

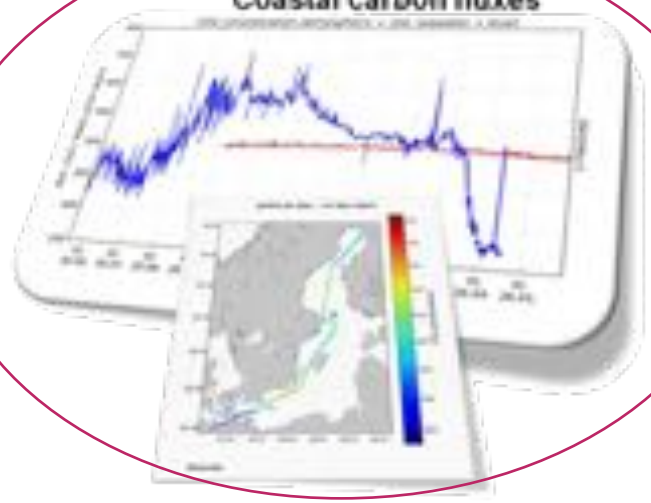
Phytoplankton, HAB & eutrophication



Hydrography & transport



Coastal carbon fluxes



The end…

More on www.jerico-ri.eu

jerico@ifremer.fr

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654410.