

# Strategy for Future Marine Operational Systems in the SES ... in line with Blue Growth initiatives

(some examples from SOCIB)

Joaquín Tintoré (Research Prof. CSIC)

SOCIB and IMEDEA (CSIC-UIB)

# OUTLINE

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1. New Technologies: Paradigm Change Ocean and Coastal Observation. EU international leadership
2. Marine Research Infrastructures, Ocean Observatories: SOCIB, Integrated Science priorities, Technology Development and Society Needs
3. Innovation and Blue Growth: innovation in oceanography - gliders- (multi-disciplinary teams), data availability) and ...  
“Turning Data into Jobs...”

Discussion: Are we ready for these changes ? Do we have the framework and right structures to get all the benefits from these changes ? (“to enforce what we think has to be done...”)

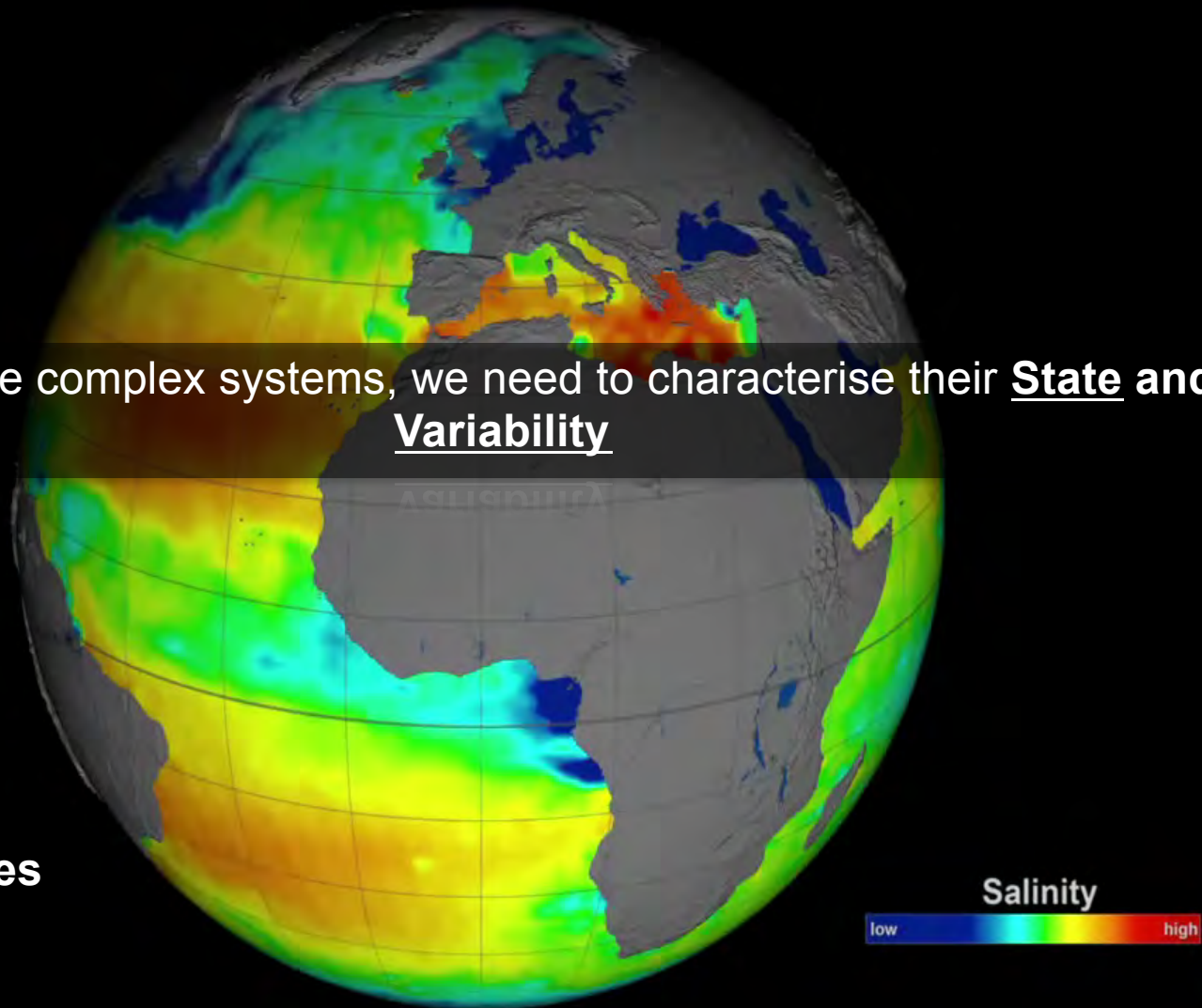
Oceans are complex systems, we need to characterise their State and Variability

We need:

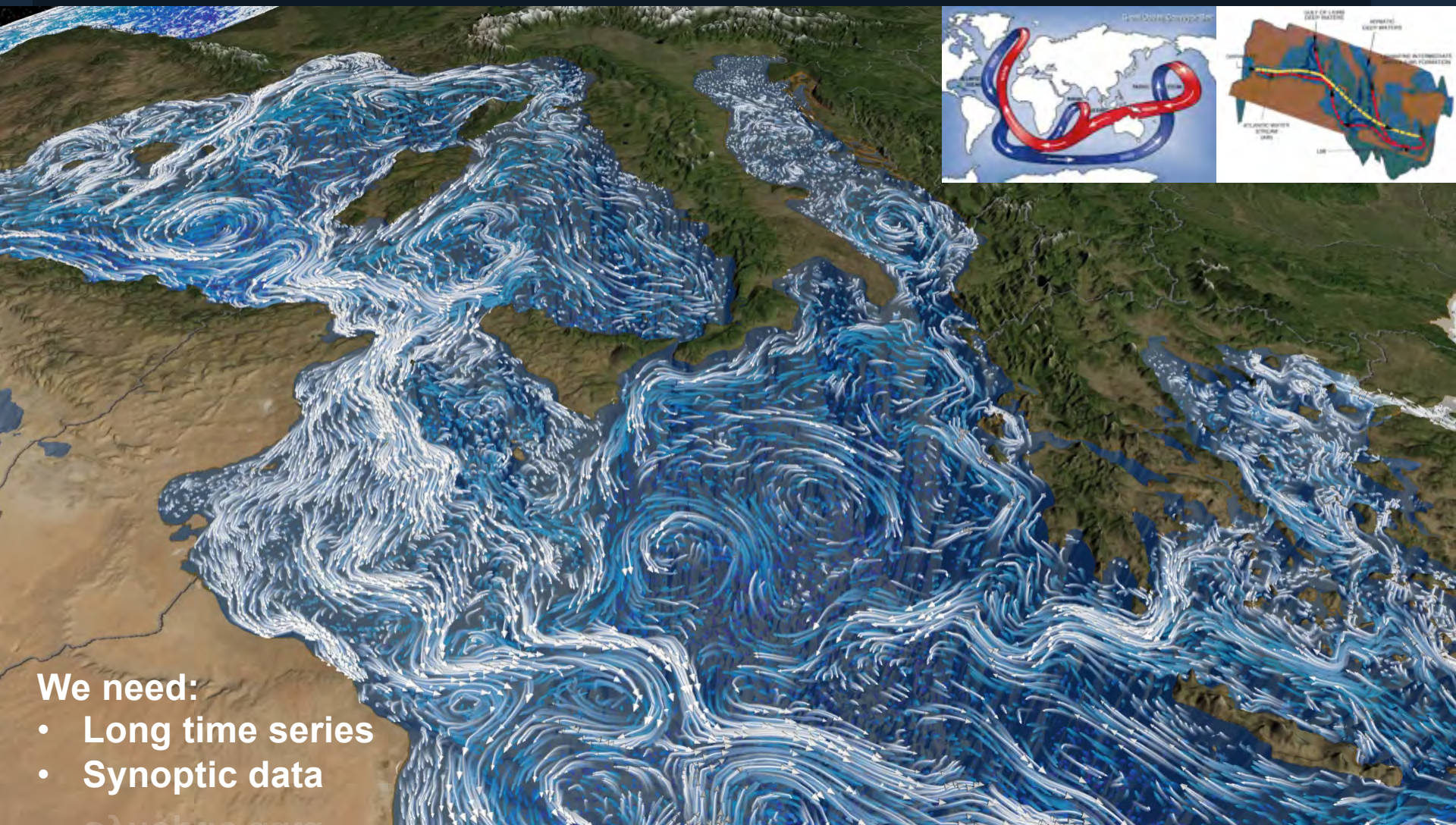
- Long time series
- Synoptic data

• *global data*

NASA's Aquarius salinity, from December 2011 through December 2012







We need:

- Long time series
- Synoptic data

**Mediterranean Sea: Small Scale Ocean, high relevance European Citizens (Science and Society)**



# New Technologies: Paradigm Shift

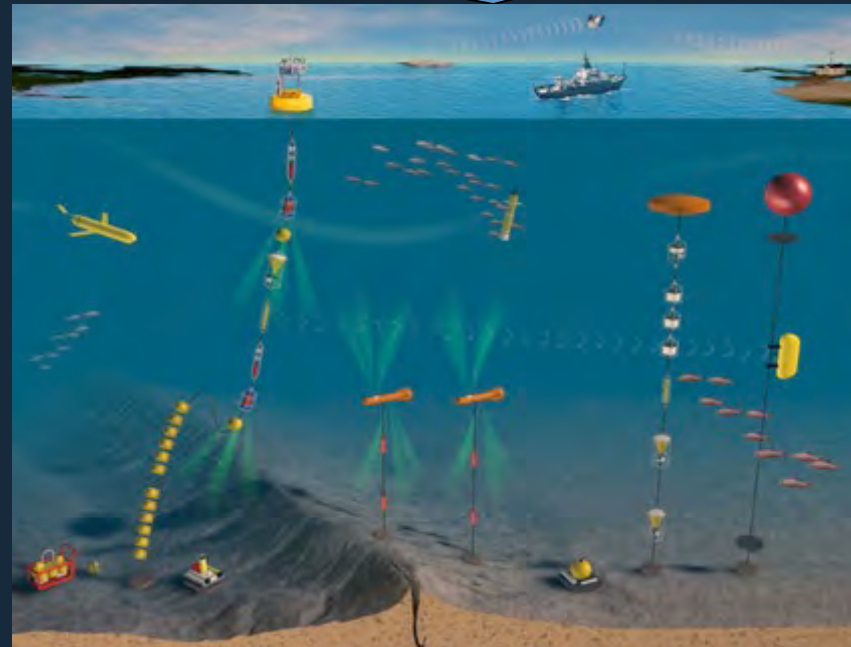
## → Ocean Observation

From: Single Platform - Ship based observation

To: Multi-platform observing systems

Network - distributed  
Systems

Platform-centric  
Systems



(Adapted from Steve Chien, JPL-NASA)

“A single ship can only be in one place at one time. We need to be present in multiple places in multiple times.” ([John Delaney, Nature, Sept. 25, 2013](#))

# New Technologies: Paradigm Shift

## → Data Availability

**From:** Data only available 12-24 months/years after cruises....

**To:** Quasi-real time quality controlled data available

*A 2020 Vision for  
Ocean Science*

JOHN R. DELANEY  
University of Washington  
ROGER S. BARGA  
Microsoft Research

### Data available for science and society

- Huge increase in human potential for analysis, models/data inter-comparison
- Allowing new science and knowledge based management oceans and coast
- More reliable knowledge based response under emergencies

“Le véritable voyage de découverte ne consiste pas à chercher de nouveaux paysages, mais à avoir de nouveaux yeux” – “The real voyage of discovery consists not in seeking new landscapes, but in having new eyes”. (Marcel Proust)

**NEW CHALLENGES:** implies adaptation ... Scientists, Society...

**Key words:**

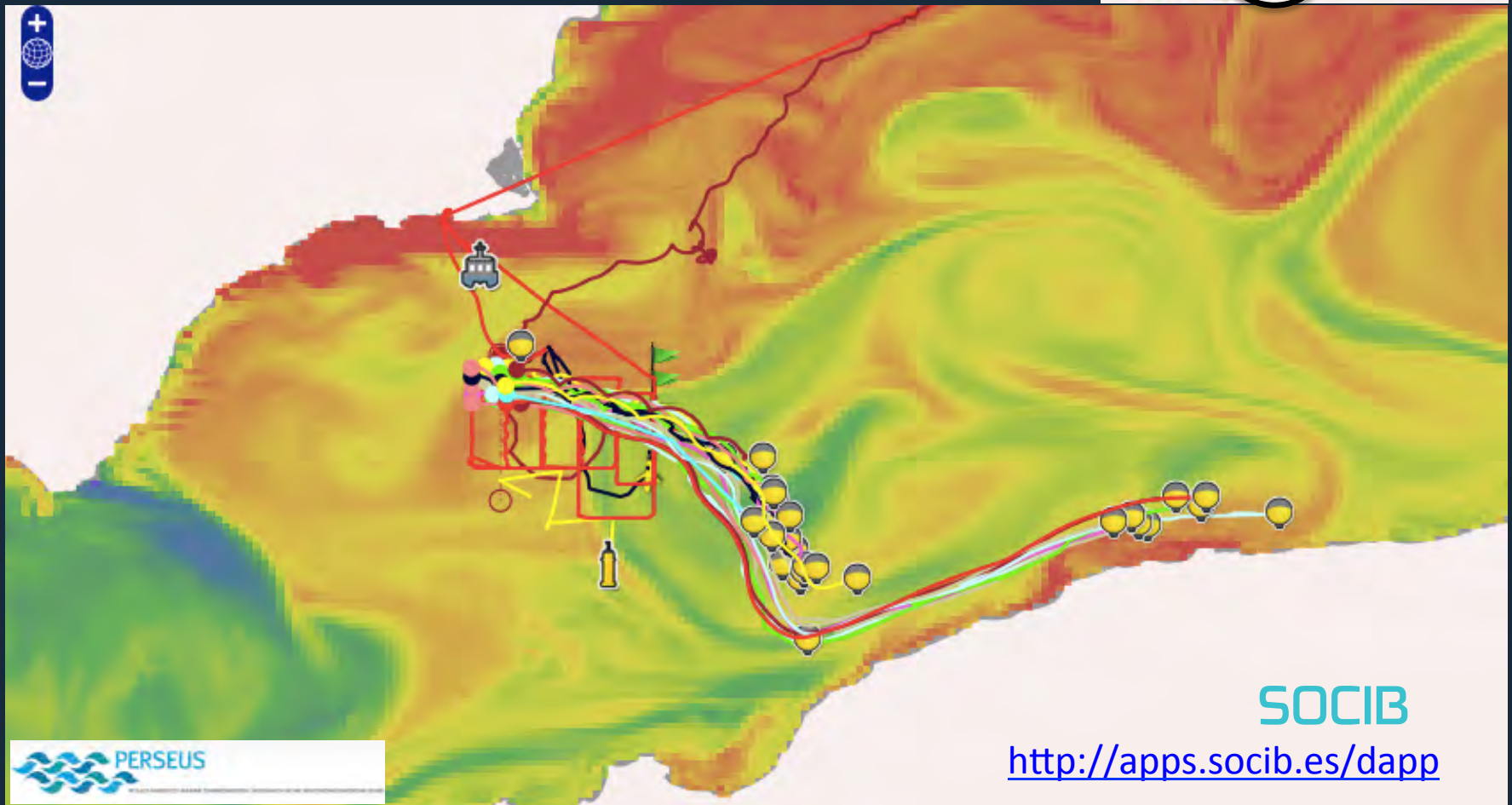
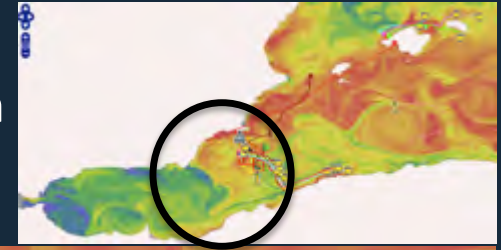
- **Multi-disciplinary. Multi-platform. Free and Open Data. Integration.**
- Scientific career. Students. Science evaluation. Society response.

# New Technologies: Paradigm Shift

## → Data Availability

ALBOREX, May 30, 2014 situation (1040h)

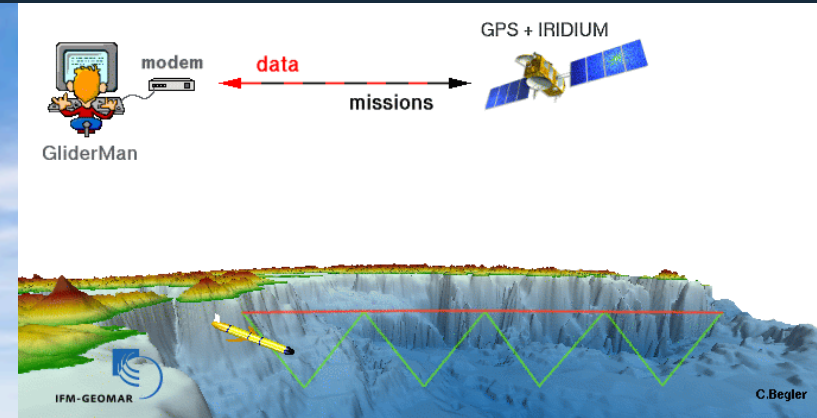
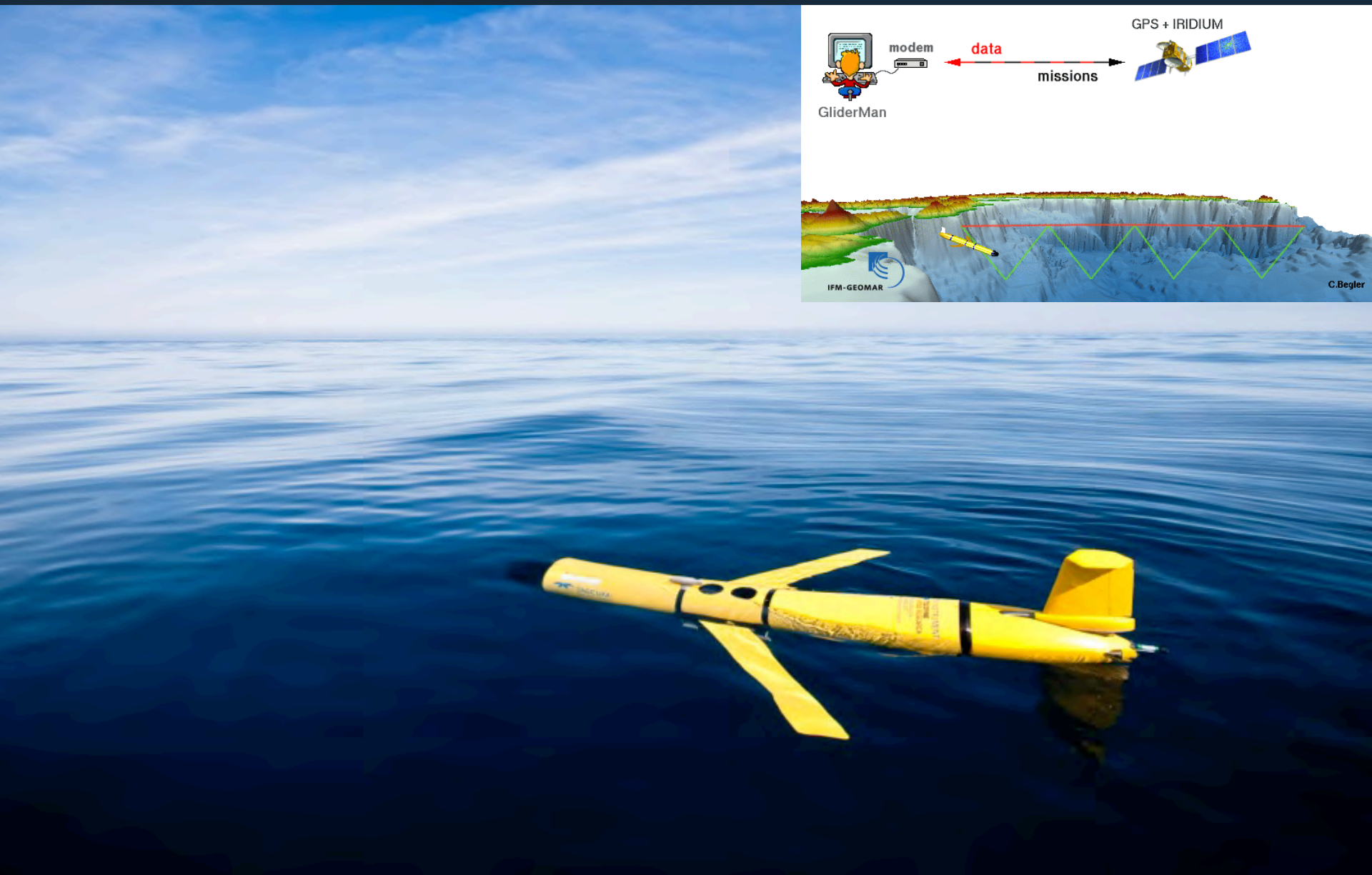
Ruiz et al., 2013: Anchovy landings x 10 related to Alboran gyre location...



SOCIB

<http://apps.socib.es/dapp>

# An Example of New Technologies: Autonomous Underwater Gliders





# Why Ocean Observatories, why SOCIB, why now?

New Technologies triggered a paradigm change  
New Approach to Marine and Coastal Research

Allow three-dimensional real time observations, that combined with forecasting numerical models, and data assimilation, ...

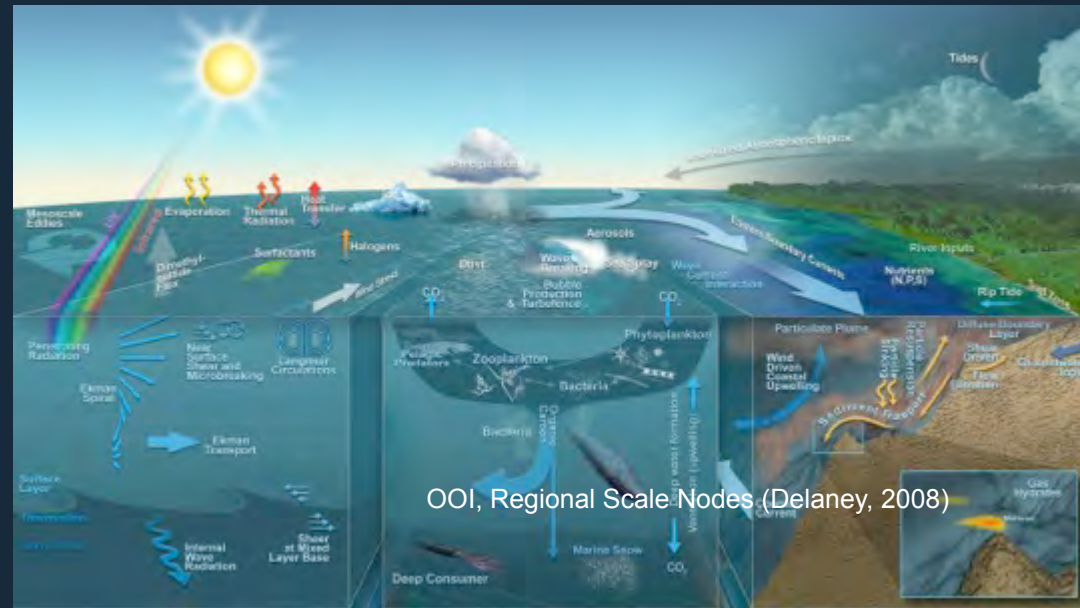


A quantitative major jump, in scientific knowledge and technology development



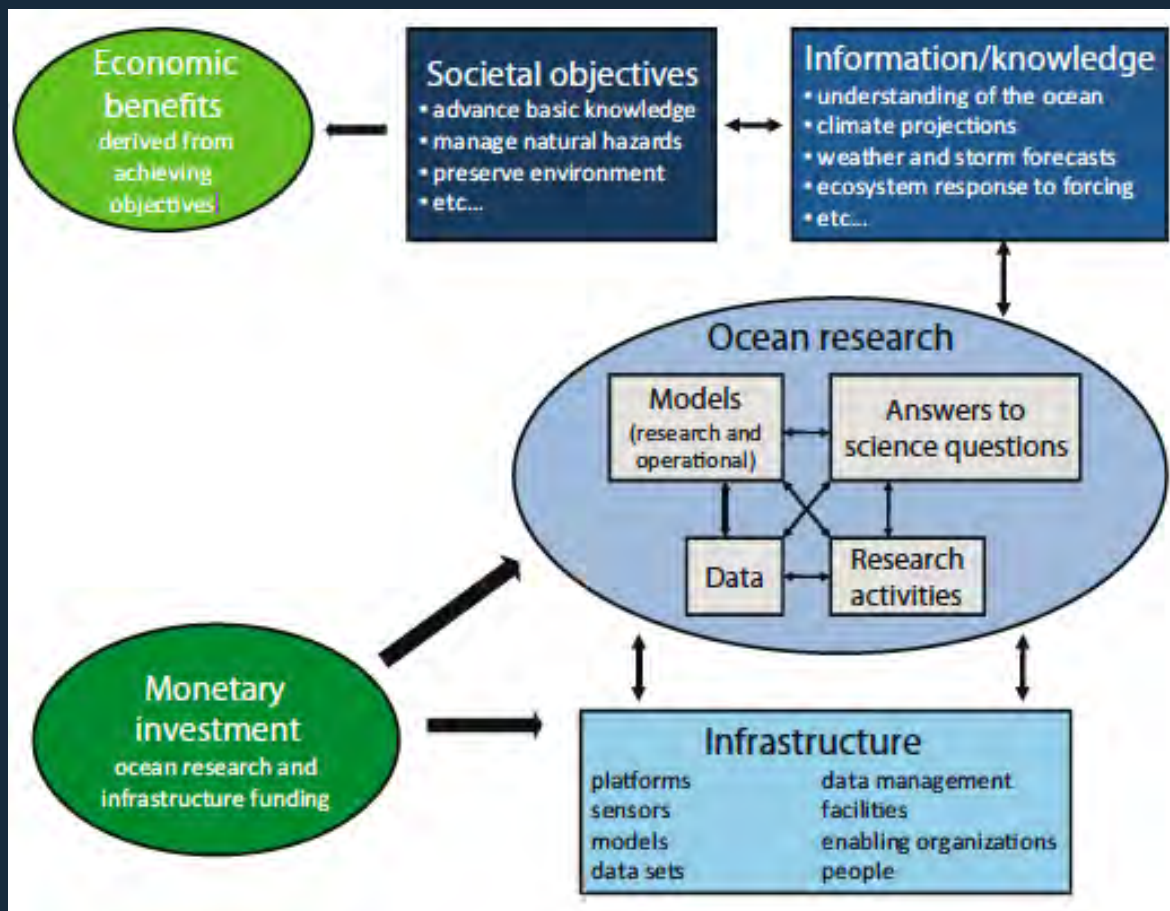
The development of a new form of Integrated Coastal and Ocean Management

on a global change context (where climate change is one of the most important, but not the only one...), and following sustainability principles



Are we ready for these changes?  
We need to open our minds, adapt scientific and educational structures, management procedures

# Ocean Observatories, Marine Research Infrastructures: International Frame



[Committee on an Ocean Infrastructure: Strategy for U.S. Ocean Research in 2030. NRC \(2011\)](#)

# SOCIB: MRI International Framework

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## Europe

- POSEIDON, Cosyna, MONGOOS, among others ...
- ESFRI –

## EEUU

- OOI (NSF research)
- IOOS (inter-agency operational)

## Canada

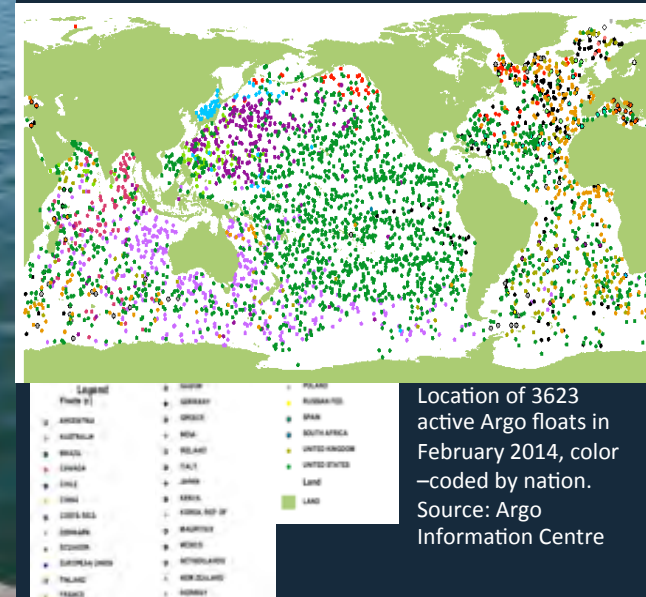
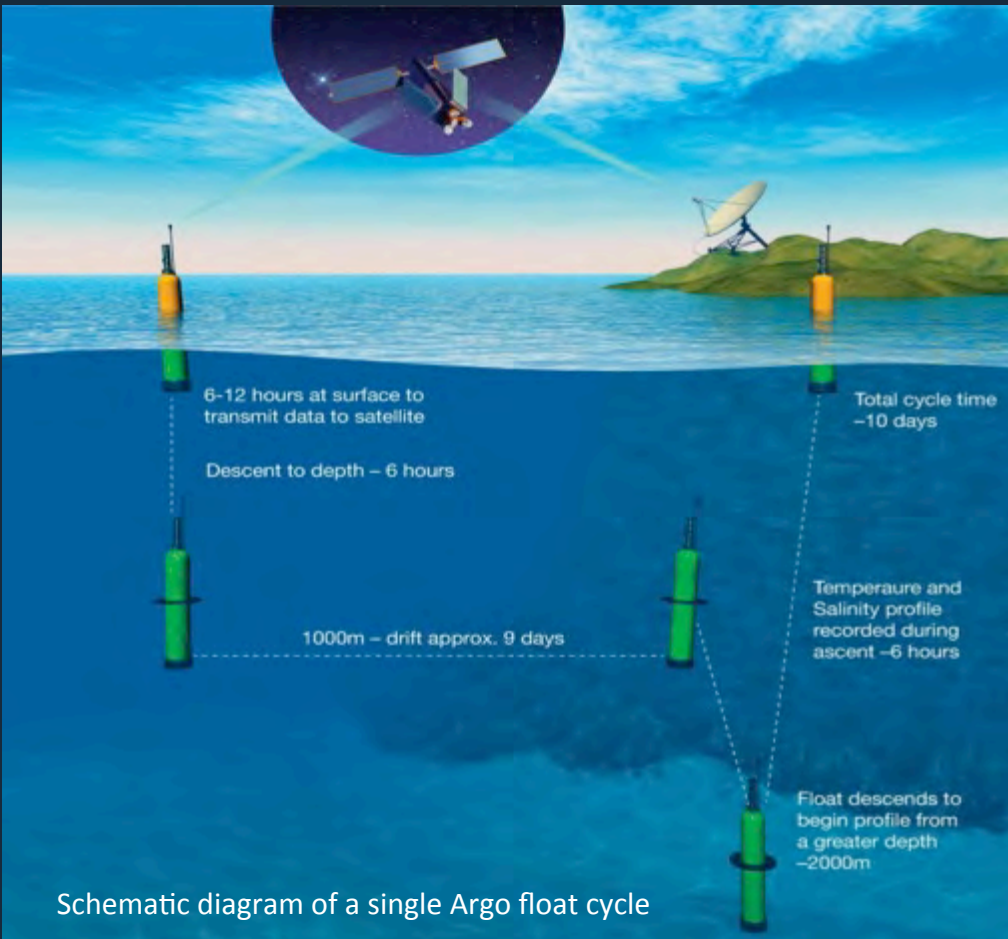
- NEPTUNE, VENUS,

## Australia

- IMOS: Integrated Marine Observing System



# Why now?: Last decade, successful Argo international programme, Euro-Argo



<http://www.euro-argo.eu>

Argo Programme -combined with satellite altimetry- allowed characterisation

**STATE OF LARGE SCALE OCEAN CIRCULATION**

# Why now?: The real challenge today is Ocean Variability: monitoring at the right scales

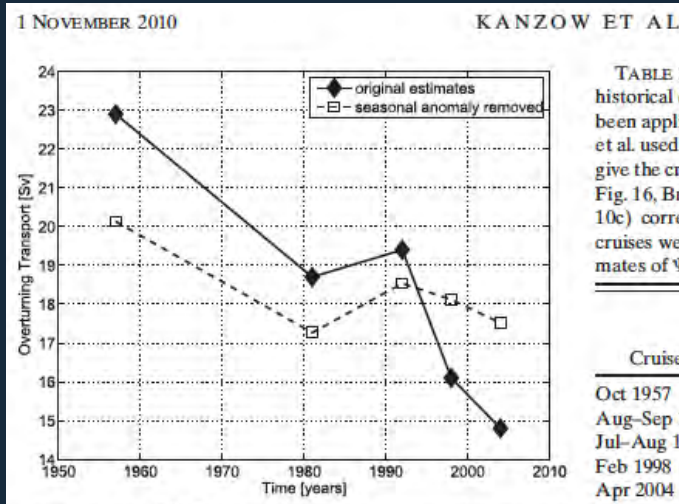
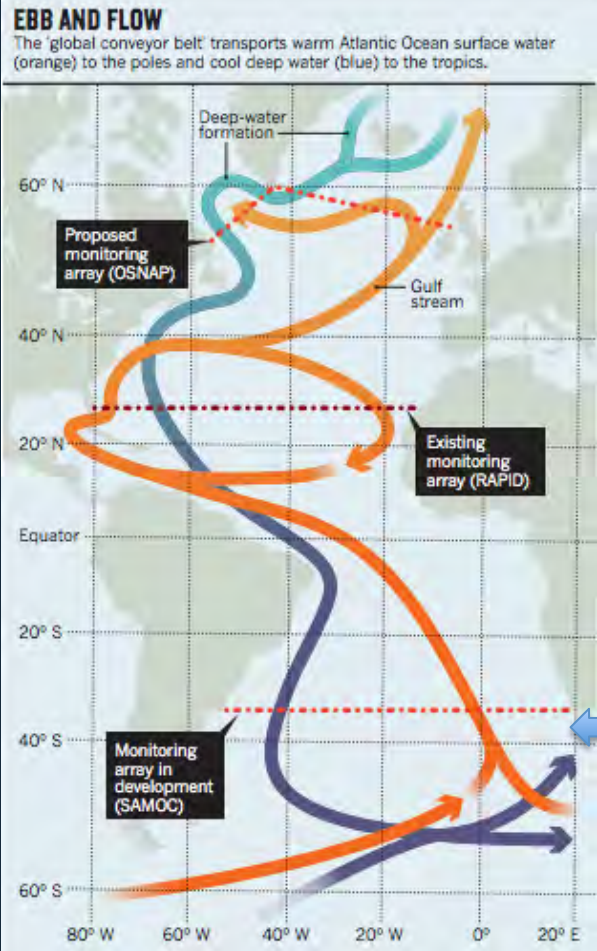


FIG. 16. The  $\Psi^{MAX}$  inferred from five hydrographic snapshot estimates between 1957 and 2004 (solid diamonds), as reproduced from Bryden et al. (2005b). The hydrography cruises were carried out in different seasons, namely, in October 1957, August–September 1982, July–August 1991, February 1998, and April 2004. The open squares represent the historical estimates of  $\Psi^{MAX}$  with seasonal anomalies of  $T_{UMO}$  (Fig. 10c; Table 2) subtracted.

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10c) corre  
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Feb 1998  
Apr 2004

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## AMOC recent key milestones:

- 2005
- 2010
- 2012
- 2013

In April 2009, the array recorded a 30% drop in average current strength that persisted for a year, reducing the amount of heat transported to the North Atlantic

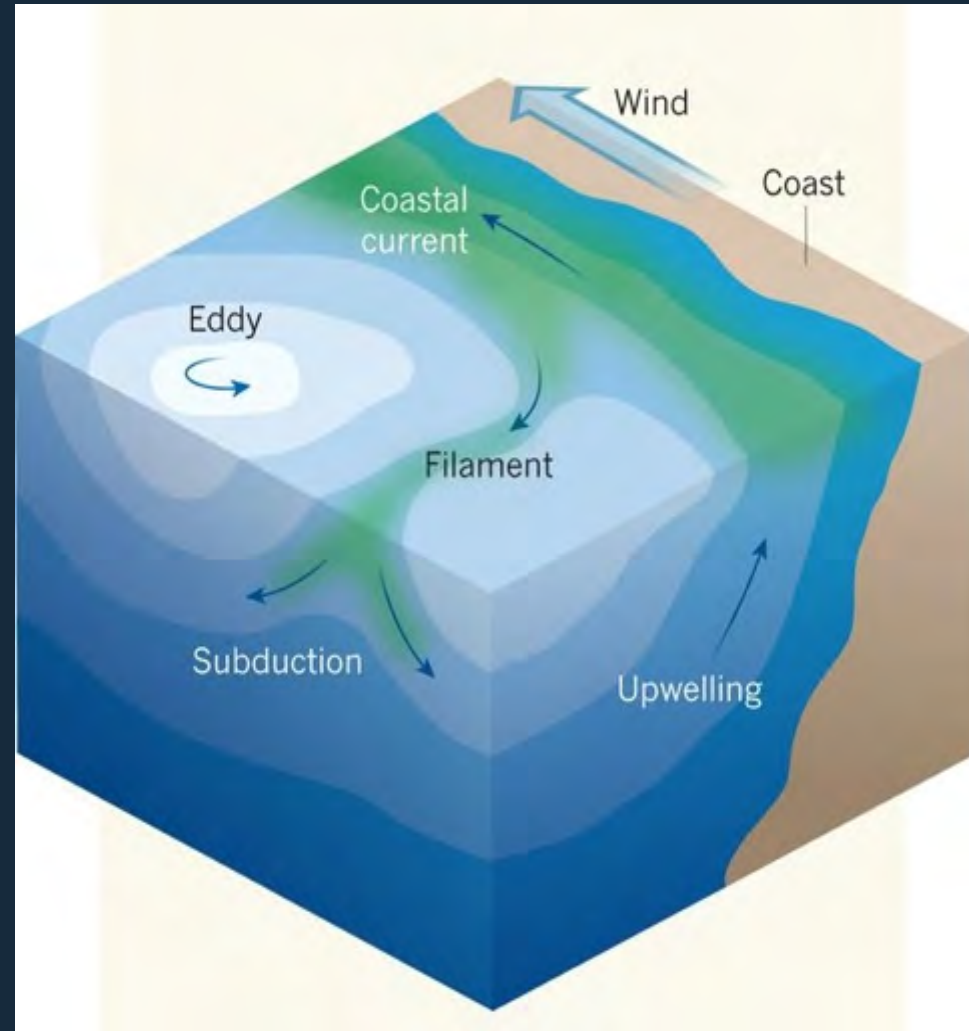
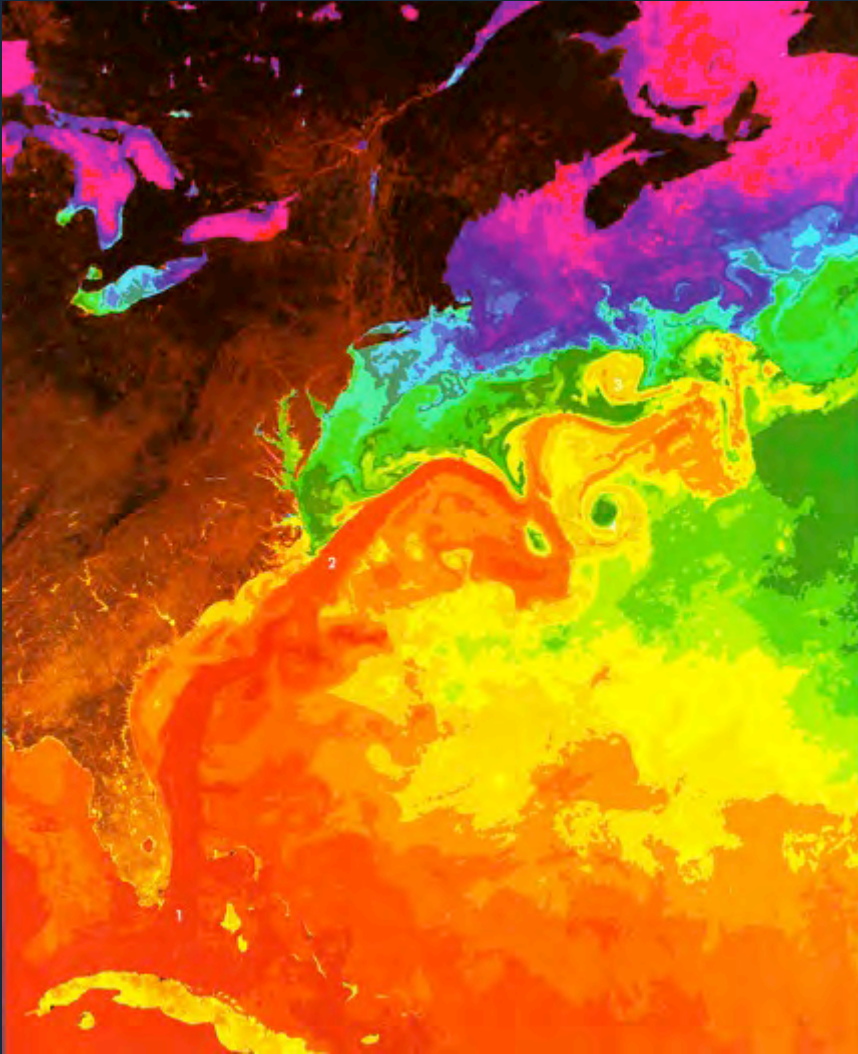
## An Example: AMOC, Atlantic Ocean Meridional Circulation

2005: decline.

2010: seasonal biases correction



# Ocean currents, eddies and instabilities: the mesoscale, the oceanic weather



Mahadevan (Nature, 2014)

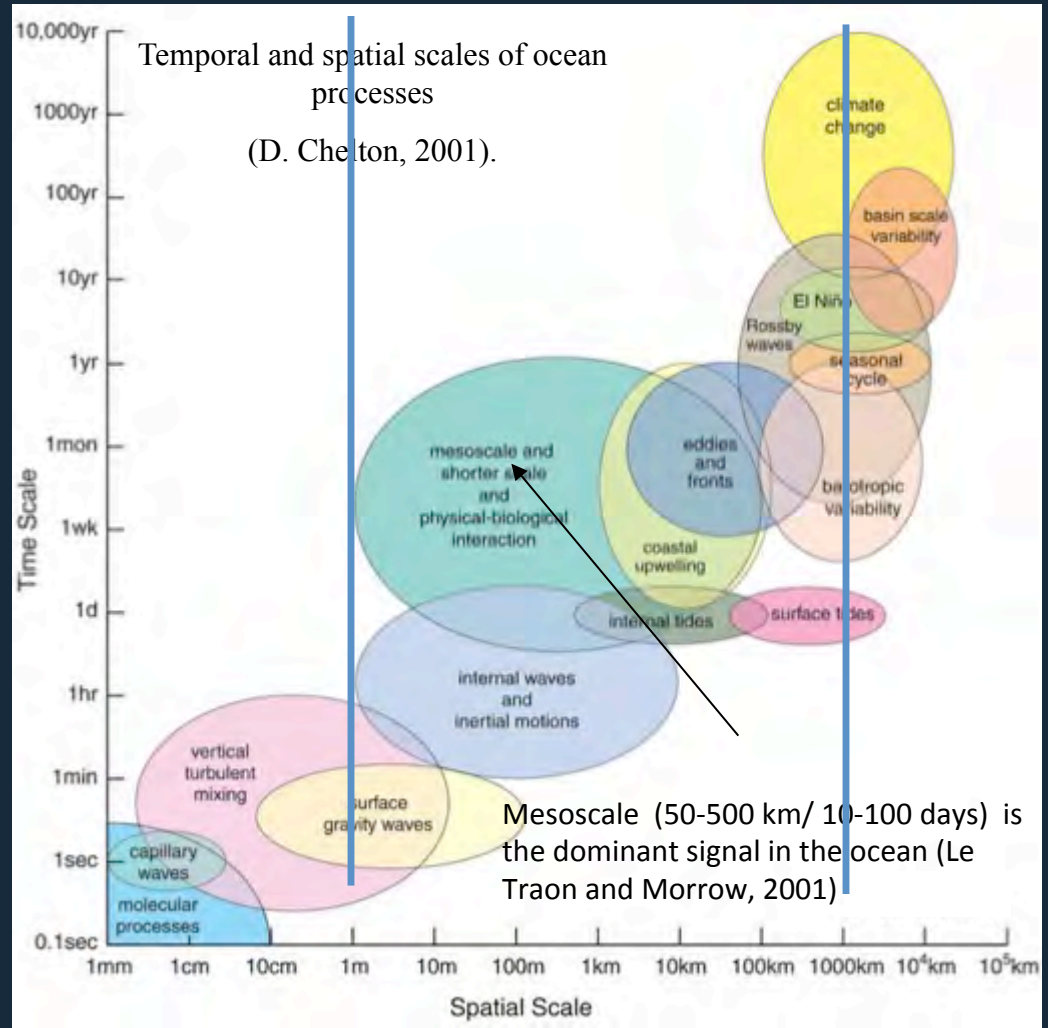


# Why and how to focus on Variability at Mesoscale and Coastal interactions?

Theory and observations have shown that there is a maximum energy at the mesoscale (include fronts and eddies ~10-100km),

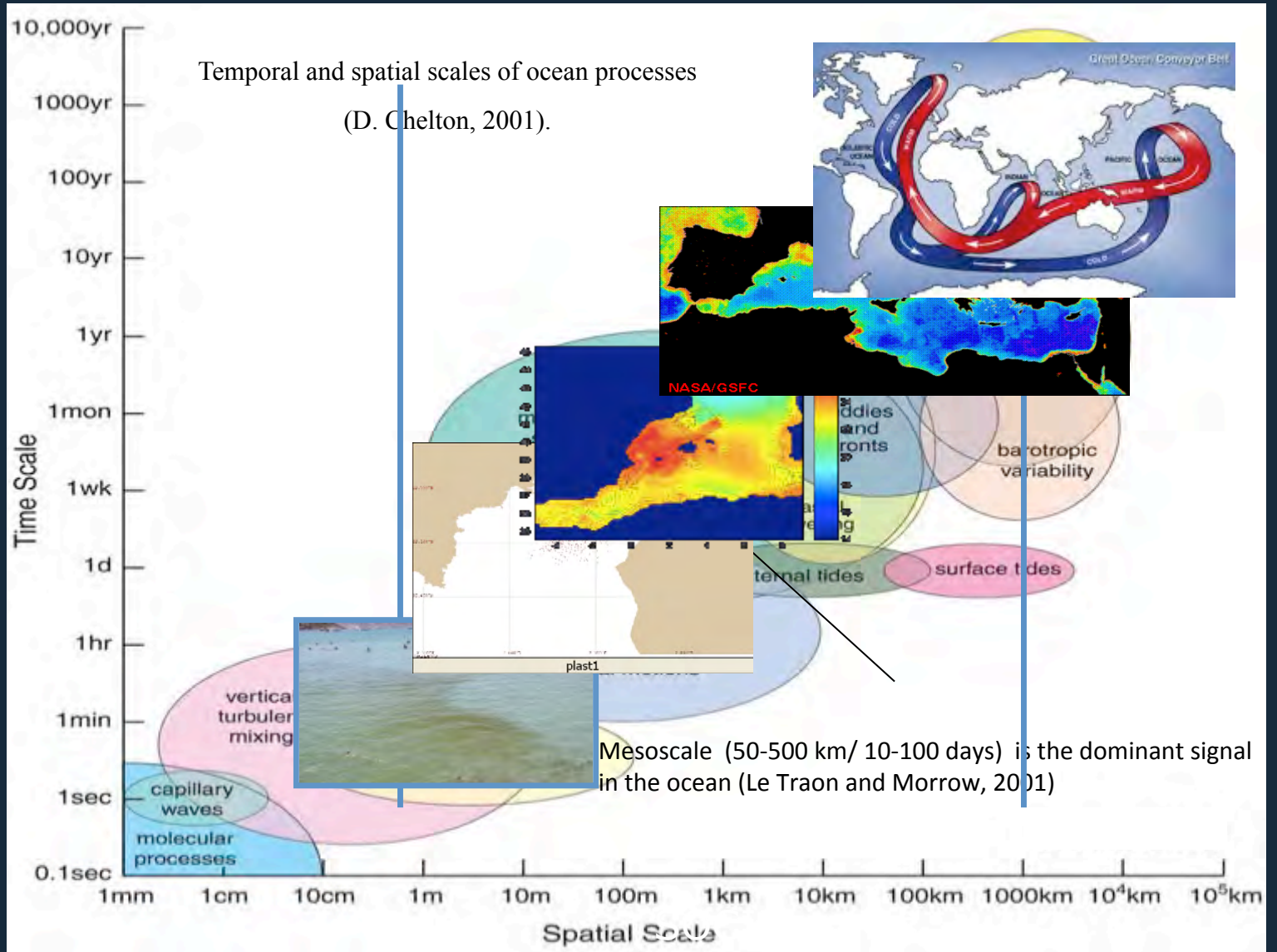
**SOCIB focus:** mesoscale & submesoscale and their interactions with general circulation and their effects on vertical motions, impact on ecosystem variability.

**With inputs from 'both sides'....**  
(nearshore and coastal ocean and also seasonal/inter-annual and decadal variability)

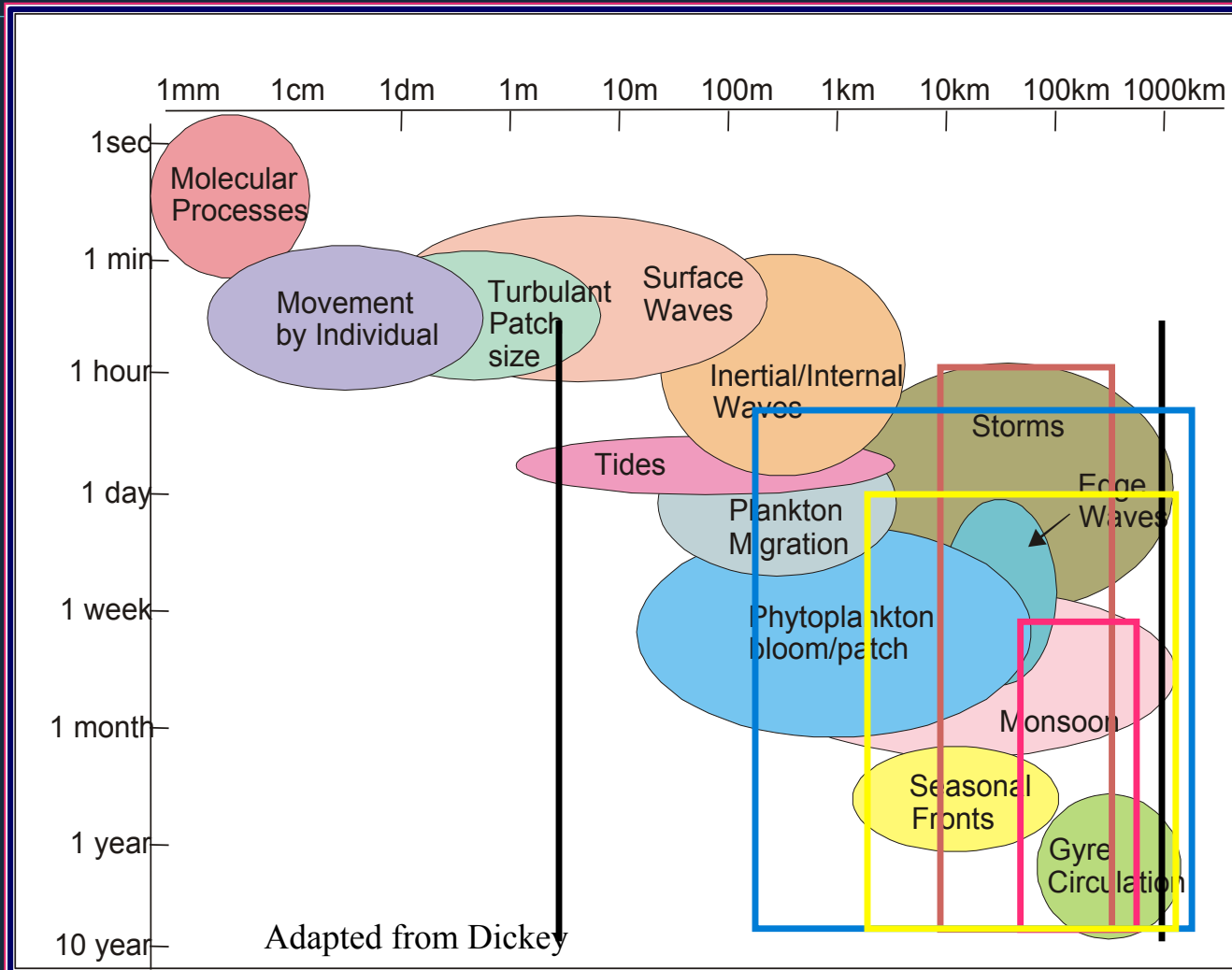


SOCIB scales

# Why and how to focus on Variability at Mesoscale and Coastal interactions?



# SOCIB scales and monitoring tools



**Gliders**

**Fixed  
Platforms**

**HF radar**

**24 m R/V  
Catamaran**

**Satellite**



# The real challenge for the next decade...:

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## To use and integrate these new technologies to carefully and systematically

- Monitor the variability at small scales, e.g. mesoscale/weeks, to
- Resolve the sub-basin/seasonal and inter-annual variability and by this
- Establish the decadal variability, understand the associated biases and correct them ...

# OUTLINE

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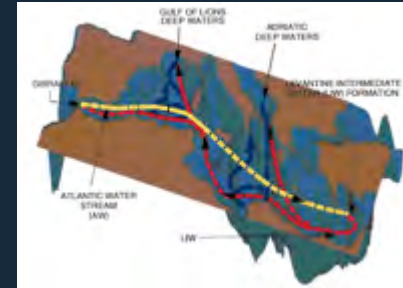
1. New Technologies: Paradigm Change Ocean and Coastal Observation. EU international leadership
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“Turning Data into Jobs...”

Discussion: Are we ready for these changes ? Do we have the framework and right structures to get all the benefits from these changes ? (“to enforce what we think has to be done...”)

# Why Mediterranean and why SOCIB, ?

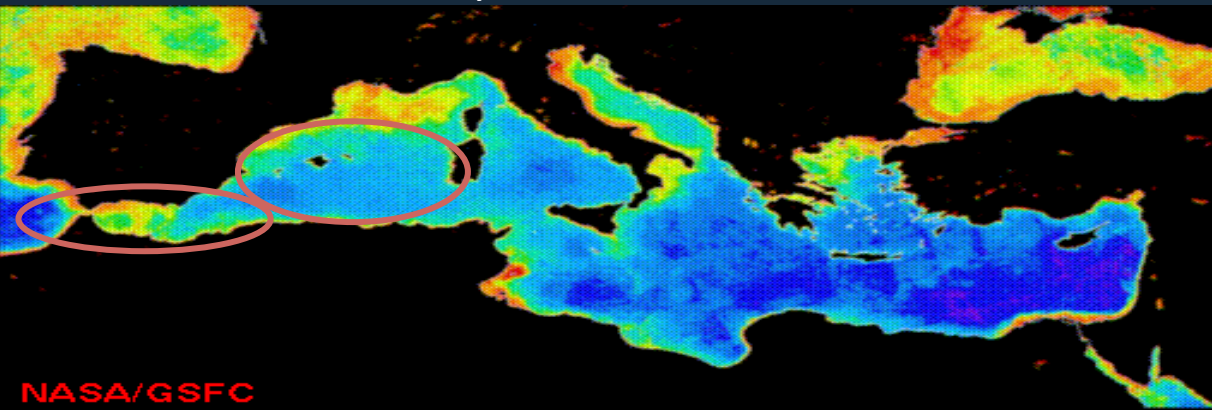
## Mediterranean

- Scientific relevance as small scale ocean, THC; (e.g., Malanote-Rizzoli et al., 2014).
- Society relevance: European citizens
- Leading ocean science, new technologies, data management, society response



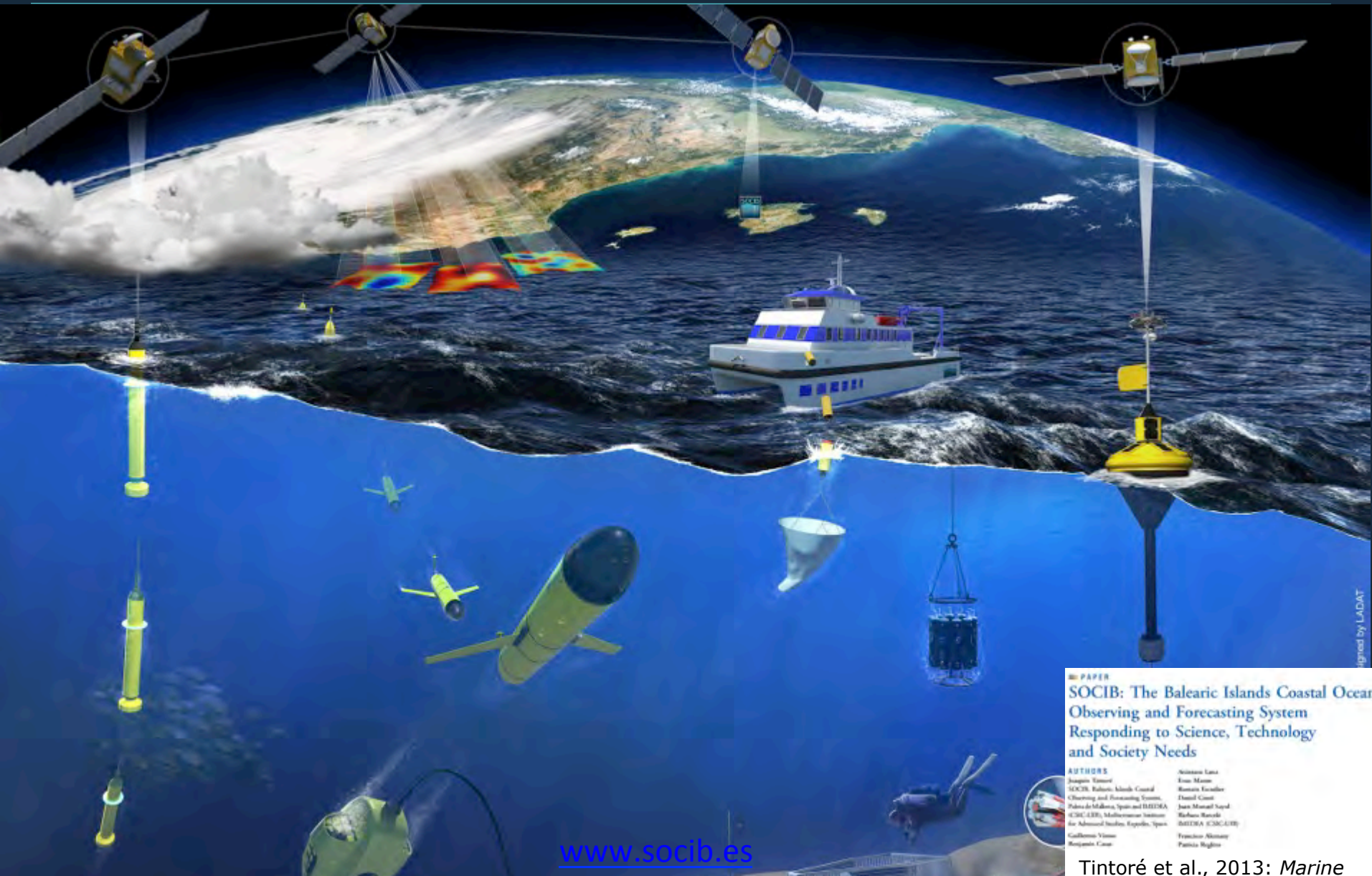
## Balearic Islands ... after 25 years...

- Scientific know-how and technological infrastructures: leading international science
- Governmental unified joint support (MINECO and Balearic Gov); RIS3 Smart and Sustainable Tourism
- Civil Society endorsement





# What is SOCIB? A multi-platform observing system,



PAPER  
**SOCIB: The Balearic Islands Coastal Ocean  
Observing and Forecasting System  
Responding to Science, Technology  
and Society Needs**

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[www.socib.es](http://www.socib.es)

Tintoré et al., 2013; *Marine*

# What is SOCIB? A multi-platform observing system, from nearshore to open-ocean in Mediterranean

## OBSERVING FACILITIES



Research vessel



HF Radar



Gliders



Lagrangian platforms



Fixed stations

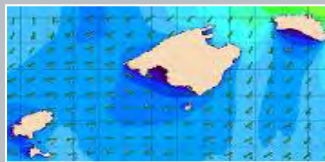


Beach Monitoring

## MODELLING FACILITY



Currents (ROMS)



Waves (SWAN)

## STRATEGIC ISSUES & APPLICATIONS FOR SOCIETY



Integrated Coastal Management



Marine Spatial Planning

## DATA CENTER



Data access – Data Repository – Applications  
Spatial data infrastructure – Real time monitor



# What is SOCIB? A multi-platform observing system, from nearshore to open-ocean in Mediterranean

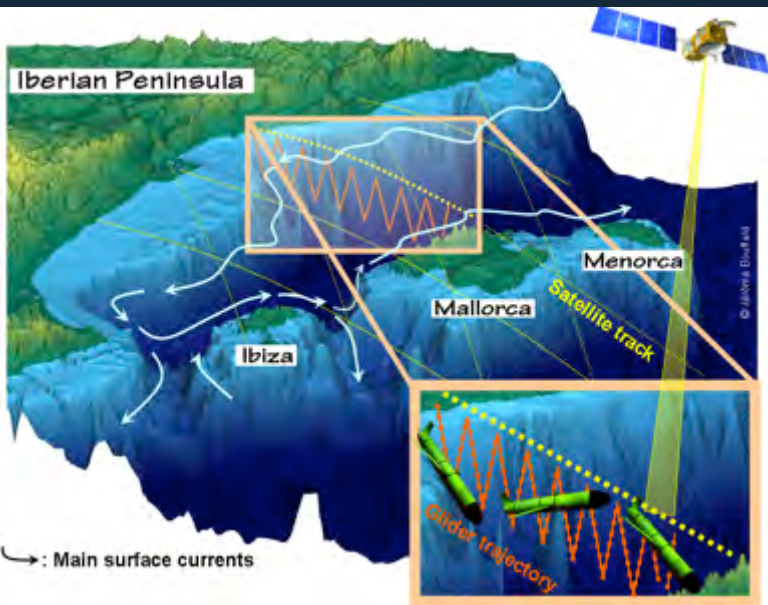
The screenshot shows the SOCIB website interface. At the top, there's a navigation bar with 'Articulos', 'Yammer', 'Madrid\_Copas', 'Madrid\_Hoteles', and 'Madrid\_Rest'. Below that is the SOCIB logo and a navigation menu with 'home', 'about us', 'facilities', 'news', 'multimedia', 'job opportunities', and 'competitive access'. The main content area features a large image of a research vessel with the caption 'SOCIB RV Information'. To the right is a 'latest news' section with three articles: '25 French entrepreneurs meet SOCIB; science and society' (27-05-2014), 'SOCIB, invited speaker at GreinSus 2014' (12-05-2014), and 'SOCIB participates in the EMODnet MedSea Checkpoint Project' (06-05-2014). Below the news is a 'facilities' section with icons for 'COASTAL OBSERVATION', 'COASTAL HF RADAR', 'GLIDER', 'LAGRANGIAN PLATFORM', 'FIXED STATIONS', 'BEACH MAPPING', 'OCEAN FORECAST', and 'DATA CENTER'. At the bottom is a 'direct links' section with a grid of links: 'SACOSTA Environmental Sensitivity of the Coastline', 'ICTS Map Spanish Large Scale Fisheries Map', 'contractor profile Consortium's contractual activity is made available on the internet', 'Wave forecast wastes in collaboration with Puente del Esteo and Aur. Portuaria IB', 'Dapp Our real time deployment monitoring application', 'Satellite Satellite observations', 'Seaboard Dashboard visualizations of the real time and forecast ocean data out...', 'Follow the glider Educational web developed by CEFAS, IMEDEA (CSIC-UIB) and', and 'LW4NC2 Web application to visualize NetCDF data interactively'.

## 3 Drivers

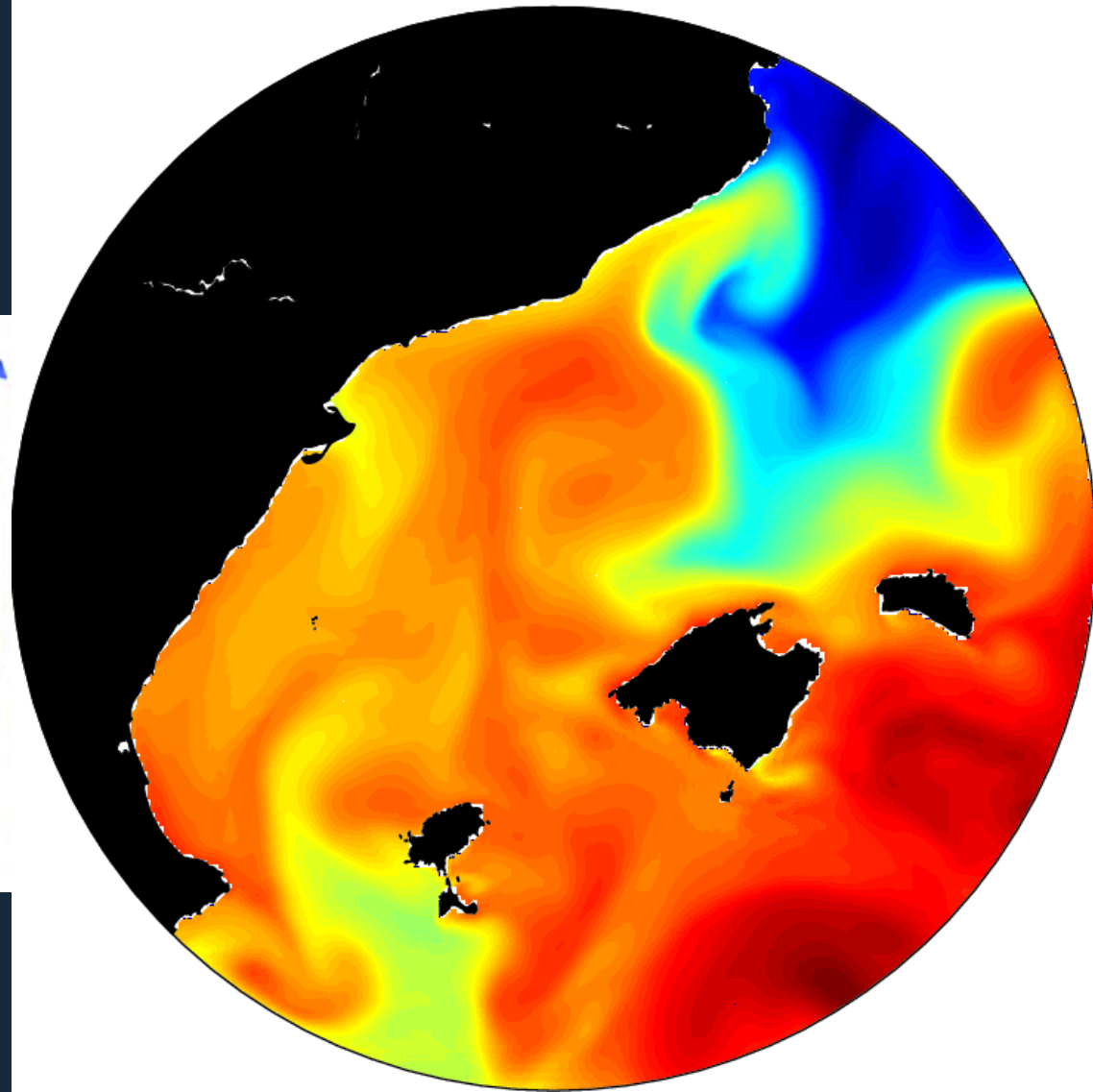
- Science priorities
- Technology Dev.
- Society Needs



# Ocean Circulation Variability, an example in the Balearic Sea (biodiversity hotspot)



DAY = 1



# SOCIB Data Centre: Real Time, Free Access & Download, Quality Controlled, Interoperable Data



MedSea Portal



# Gliders Facility: Science



Mesoscale – Submesoscale /  
Vertical motions - biogeo effects

Eddy/mean flow interactions –  
Blocking effects General Circulation

GEOPHYSICAL RESEARCH LETTERS, VOL. 36, L14607, doi:10.1029/2009GL038569, 2009

JGR, 2010

Vertical motion in the upper ocean from glider and altimetry data Coastal and mesoscale dynamics characterization using altimetry and gliders: A case study in the Balearic Sea

Simón Ruiz,<sup>1</sup> Ananda Pascual,<sup>1</sup> Bartolomé Garau,<sup>1</sup> Isabelle Pujol,<sup>2</sup> and Joaquín Tintoré<sup>1</sup>

Jérôme Bouffard,<sup>1</sup> Ananda Pascual,<sup>1</sup> Simón Ruiz,<sup>1</sup> Yannice Faugère,<sup>2</sup> and Joaquín Tintoré<sup>1,3</sup>

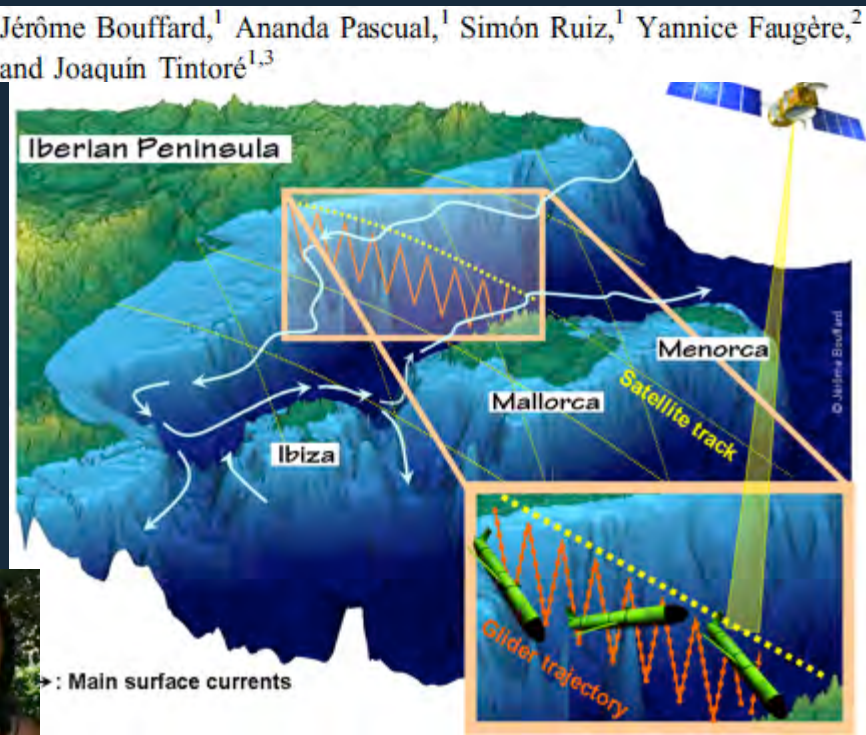
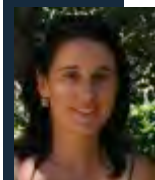
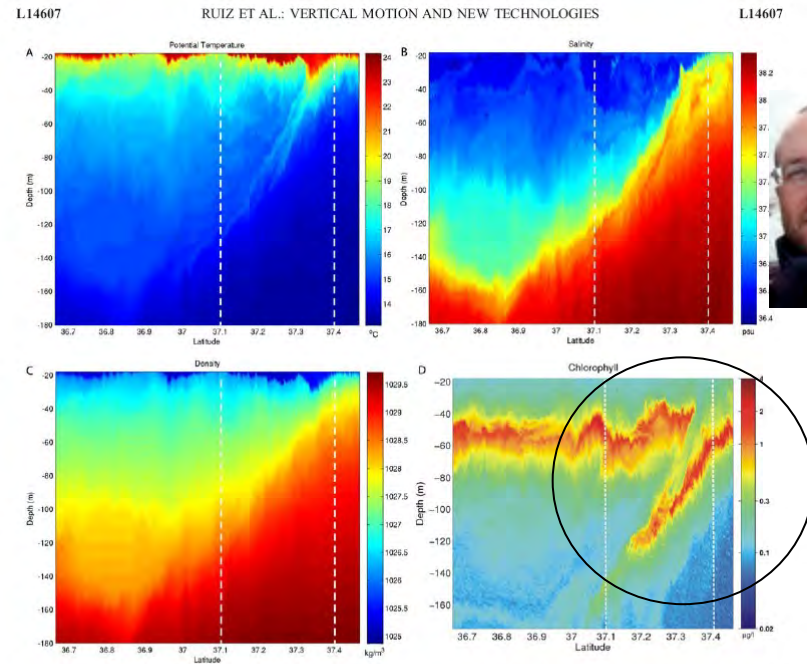


Figure 2. Vertical section of temperature (°C), salinity (PSU), density (kg/m<sup>3</sup>) and chlorophyll (µg/l) from glider section 2 (dashed magenta in Figure 1). White dashed lines define sub-section in the northern part of the domain.



# Gliders Facility: Operational

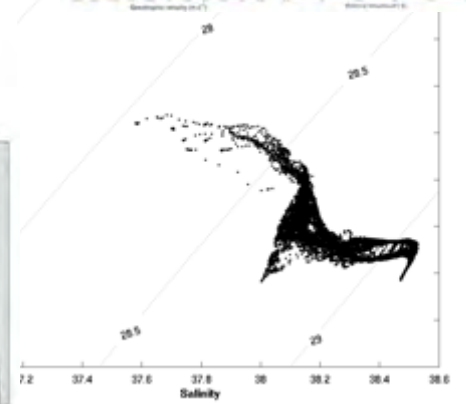
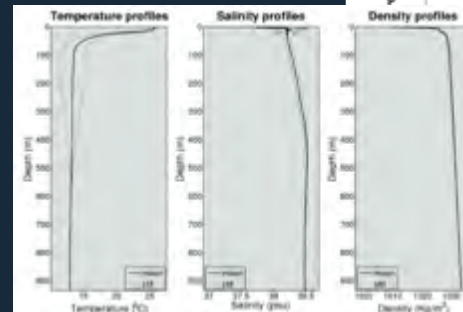
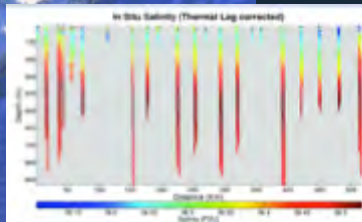
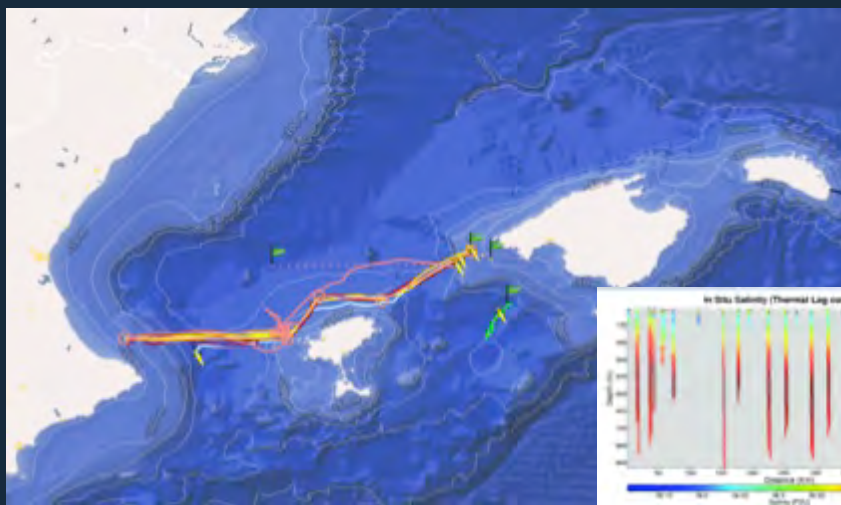
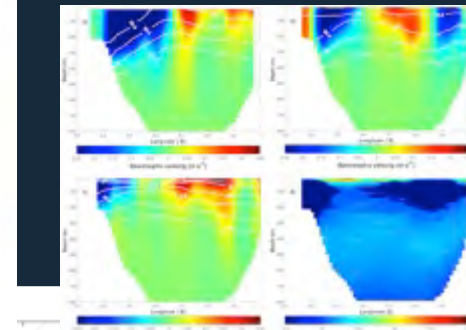
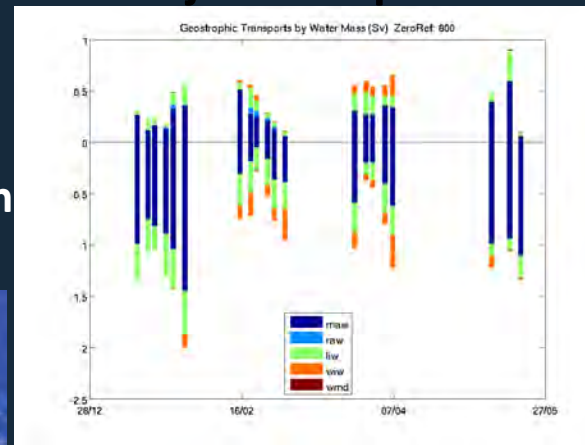
GEOPHYSICAL RESEARCH LETTERS, VOL. 39, L20604, doi:10.1029/2012GL053717, 2012

## Autonomous underwater gliders monitoring variability at “choke points” in our ocean system: A case study in the Western Mediterranean Sea

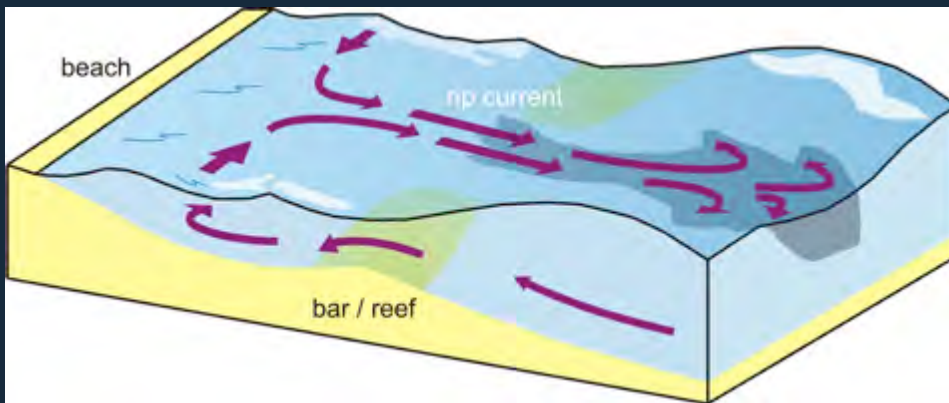
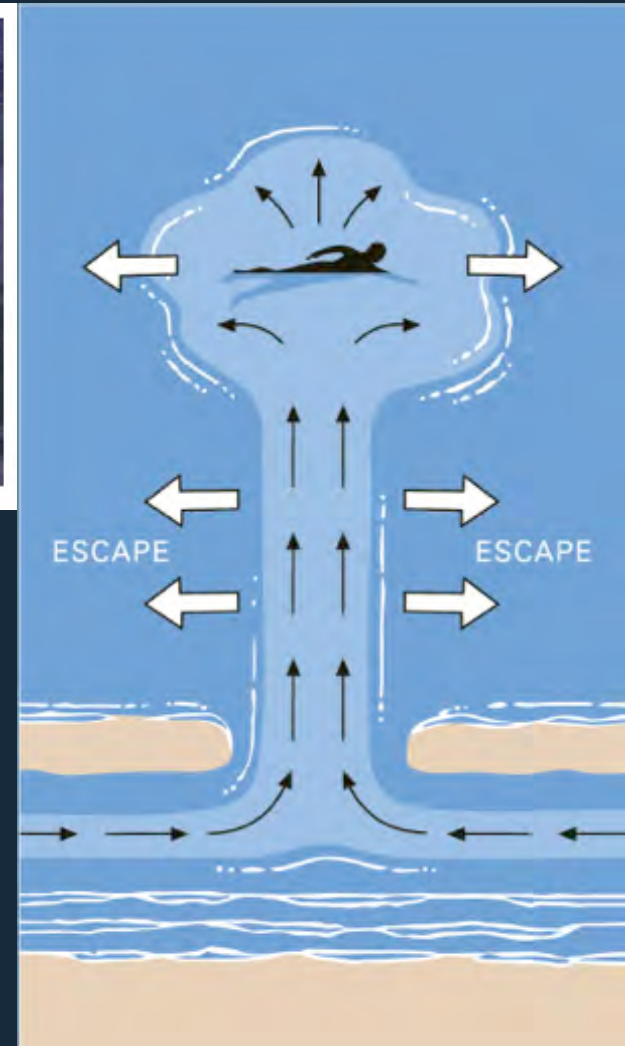
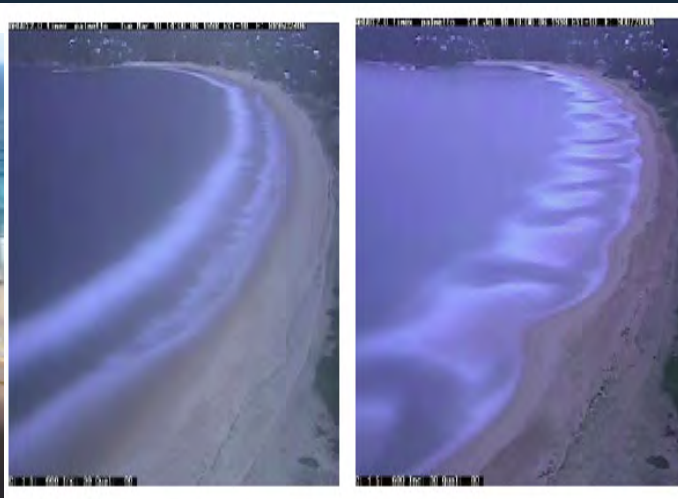
Emma E. Heslop,<sup>1</sup> Simón Ruiz,<sup>1</sup> John Allen,<sup>2,3</sup> José Luís López-Jurado,<sup>4</sup> Lionel Renault,<sup>5</sup> and Joaquín Tintoré<sup>1,5</sup>

### Major transport changes

- After 32 glider missions (started in 2006), + 17.000 profiles (30 Euros/profile)
- Since January 2011; routine operation



# SOCIB Technology Development & Applications: Beach Safety -Rip Currents-



Beach monitoring using cameras, breakers, rips, bathymetry changes, etc.

# SOCIB Developments and Applications: Mobile Apps



900 downloads



300 downloads



# SOCIB Developments and Applications: Touristic sector



Be proud of your hotel!



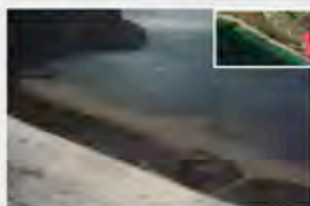
We are pleased to inform you that this hotel contributes to beach conservation and science based coastal and ocean management. Your hotel collaborates with the Beach Monitoring Programme from SOCIB.



## Observation and real time data

## Forecast

### Beach evolution



Son Bou - Cam 01: 19/03/2014 12:00

### Hotel weather station

#### Rain accumulation

0,24 mm

0.24 High 0.24 Low

### Weather forecast

Light rain on Sunday and Monday; temperatures peaking at 29° on Saturday.

#### Today

Windy in the morning.			
Temp	Wind	Humidity	Pressure
17.9 °C 13.7 °C	25.0 km/h (20)	76 %	1022.0 hPa

#### Thursday

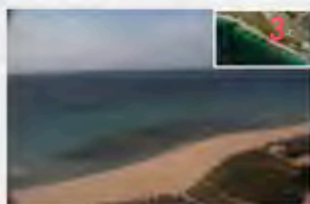
Mostly cloudy throughout the day			
Temp	Wind	Humidity	Pressure
18.8 °C 14.1 °C	6.4 km/h (4)	82 %	1020.7 hPa

#### Friday

Clear throughout the day			
Temp	Wind	Humidity	Pressure
18.8 °C 14.4 °C	5.8 km/h (4)	81 %	1020.6 hPa

\*Powered by Thomson

### Beach overview



Son Bou - Cam 03: 19/03/2014 13:18

### Swimming conditions



No data received

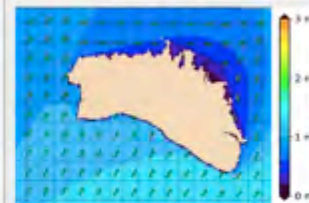
### More information



### Beach information

Beach type: 2.5 km linear natural beach with dunes  
Sediment type: medium to fine biogenic sands  
Scientific interest: beachrocks, lagoon inlet, rip

### Waves forecast

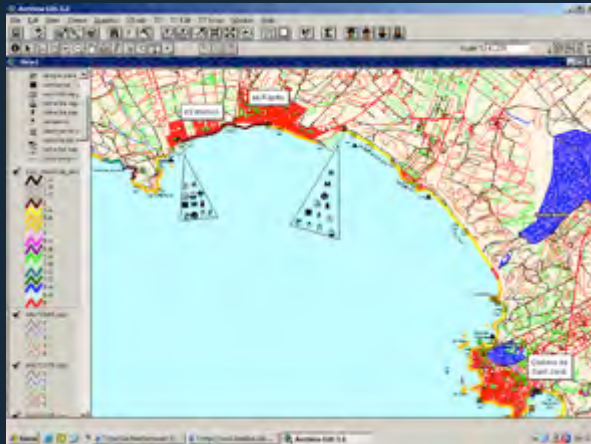


Waves at 21/03/2014 11:00

# SOCIB Developments and Applications: Tools for Marine and Coastal Safety Decision Support

## ESI (Environmental Sensitivity Index)

This system incorporates all the available information and identifies resources at risk, establishing protection priorities and identifying appropriate response.



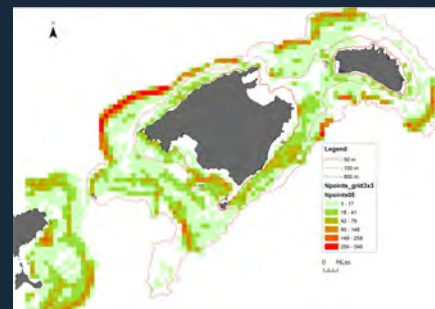
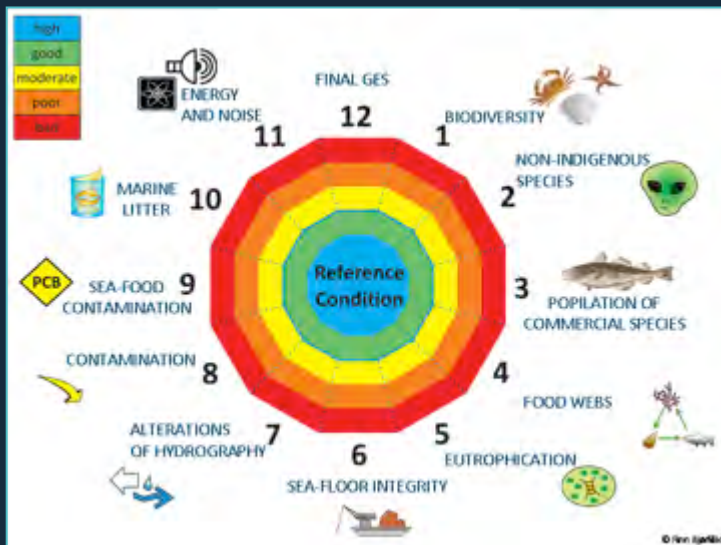
# SOCIB Developments and Applications: Contribution to IMP, e.g., MSFD. Strong science for wise decisions.

## MSFD A KEY SOCIETAL DRIVER:



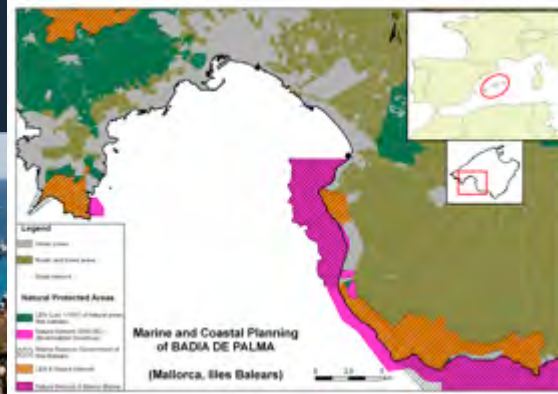
*"What we measure affects what we do. If we have the wrong measures, we will strive for the wrong things"*  
(Joseph Stiglitz, 2010)

*"Bridging the science-policy gap is arguably the biggest current challenge to achieving sustainability"*  
(Lubchenco and Sutley, 2010, Science).





# SOCIB Developments and Applications: Sustainability indicators; Science and Society




Marine Policy 34 (2010) 772–781

Contents lists available at ScienceDirect

**Marine Policy**

journal homepage: [www.elsevier.com/locate/marpol](http://www.elsevier.com/locate/marpol)

## Balancing science and society through establishing indicators for integrated coastal zone management in the Balearic Islands

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<sup>a</sup>IMEDEA (CSK-UIB), Mediterranean Institute of Advanced Studies, Calle Miquel Marqués, 21, 07190 Esporles, Mallorca, Balearic Islands, Spain  
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 Spain

### ABSTRACT

This paper explores the process by which indicators may be developed as tools for communicating science to decision-makers using the participatory approach demonstrated by the Balearic Indicators Project. This initiative reflects a series of compromises considered necessary to achieve the objective of generating an indicator system that is scientifically viable, comparable internationally yet locally relevant, and to facilitate its implementation. The article highlights questions regarding the utility of science for addressing current global issues related to sustainability and why science often fails to promote change at the societal level.

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## New tools: MSP, ICOM Social and Economic Council.

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Integrated and interdisciplinary scientific approach to coastal management.

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**ARTICLE INFO**

**ABSTRACT**

Coastal zones and beach management practices, regulatory demands, and land use planning activities along coastal zones have historically been made with insufficient information concerning the dynamic coastal environment. In this study we address and propose an interdisciplinary scientific approach to Coastal Management in a scenario where lack of information has resulted in the alteration of the natural dune system of the beach of Cala Millor (Mallorca, Balearic Islands, Spain) and also in the penetration of the beach area and in a parallel loss of the tourism resources. In this work a detailed analysis on beach morphodynamics has been developed as a basis for integrating proper beach management, beach natural dynamics, and local users and economic agents interests. From this point of view a set of solutions are considered as the basis for a management policy that links beach science and beach use as a sustainable resource.

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# SYSTEM OF INDICATORS for Integrated Coastal Zone Management in the Balearic Islands



Official Opinion 5/2007 of the Economic and Social Council of the Balearic Islands



# SOCIB Developments and Applications: Socio-environmental studies carrying capacity beaches



2007/09/09 9:23:53 (+2.0 hrs) Lat=38.70342 Lon=1.38745 Alt=1107ft MSL WGS 1984

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## Multi-Method Approach to Exploring Social–Ecological Dimensions in a Mediterranean Suburban Beach Setting

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# SOCIB Developments and Applications: Outreach

Follow the Glider

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STUDENTS | TEACHERS | EXPLORE

f t ●● YOU TUBE ESPAÑOL

FOLLOW THE GLIDER

EXPLORE

Where are our gliders today →

<http://followtheglider.com>

DISCOVER THE OCEAN'S SECRETS WITH UNDERWATER GLIDERS

The image shows a browser window with the URL 'followtheglider.socib.es/en/'. The page features a navigation menu with 'STUDENTS', 'TEACHERS', and 'EXPLORE'. There are social media icons for Facebook, Twitter, and YouTube, along with a language selector for 'ESPAÑOL'. The main content area has a large graphic with the text 'FOLLOW THE GLIDER' and 'EXPLORE'. Below this, it says 'Where are our gliders today' with a yellow arrow icon. At the bottom, there is a blue link to 'http://followtheglider.com' and a red banner with the text 'DISCOVER THE OCEAN'S SECRETS WITH UNDERWATER GLIDERS'. The background of the graphic is a stylized underwater scene with a yellow glider, a red crab, a red octopus, and a red ship on the surface.

# OUTLINE

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1. New Technologies: Paradigm Change Ocean and Coastal Observation. EU international leadership
2. Marine Research Infrastructures, Ocean Observatories: SOCIB, Integrated Science priorities, Technology Development and Society Needs
3. **Innovation and Blue Growth: innovation in oceanography - gliders- (multi-disciplinary teams), data availability) and ...**  
**“Turning Data into Jobs...”**

Discussion: Are we ready for these changes ? Do we have the framework and right structures to get all the benefits from these changes ? (“to enforce what we think has to be done...”)



# Innovation in oceanographic instrumentation

We need:

- Long time series
- Synoptic data
- $\beta$ λυοβητικη οραση

3 elements:

- Oceans complexity imply and drive a need for improvement of instrumental capacities

- The innovation process, complexity and incubation time:

- Incubation time: 15-30 years (computer mouse, 30 years). Gliders 10 years. WHY?

- The key to success



## INTRODUCTION

The tools of oceanography include instruments that measure properties of the ocean and models that provide continuous estimates of its state. Major improvements in tool capabilities lead to leaps in understanding, and this increased knowledge has many practical benefits. Advances in tool capabilities are sometimes viewed as an objective of basic research, a viewpoint reflected in the basic research funding category of "science and technology" (S&T).

The complexities of and incubation times for advancing instrumentation are often not fully appreciated, resulting in unrealistic expectations and discontinuous support. Greater understanding of the process of innovative instrument development can contribute to sustaining it. Innovation can be incremental or radical depending on performance gains (Utterback, 1994), stimulated or suppressed depending on institutional factors (Van de Ven, 1989; Office of

Technology Assessment, 1995), and sustaining or disruptive depending on value propositions (Christensen, 1997). For example, going from a Nansen to a Niskin bottle was an incremental innovation, whereas going from bottle casts to CTD profiles was a radical innovation. Moored current meters incrementally advanced from film recording of gauges, to mechanically digitized signals on reel-to-reel tape, to solid-state analog, to digital conversion and memory. Radical innovation of current-field measurement came with the acoustic Doppler current profiler.

In large organizations, stimulated innovation often occurs in research departments, particularly when the projects have champions: "the new idea either finds a champion or dies" (Schon, 1963). In other parts of the same organization, innovation may be suppressed by the costs associated with re-integrating a system and minimal perceived competition. The incubation time of the

computer mouse from inception to wide use was 30 years. In oceanographic observation, where synoptic coverage is an objective, a sustaining innovation would be a sampling platform with improved propulsion that doubles its speed. A disruptive innovation would be a new platform with much slower speed, but with much longer duration and a low enough cost to be deployed in great numbers. Here, we will focus on radical, stimulated, disruptive innovation that involves both science and engineering.

To motivate continued investment in basic research, the histories of many radical innovations, ranging from the transistor to radar to the Internet, have been documented (Bacher, 1959; Hetrick, 1959; Becker, 1980; Hove and Gowen, 1979; Allison, 1985; Abbate, 2000). The Defense Acquisition History Team at the US Army Center of Military History is also preparing a document on this subject. These cases clearly demonstrate that "rapid" innovation in

# The innovation process (for advancing instrumentation)

3 key decision centres:

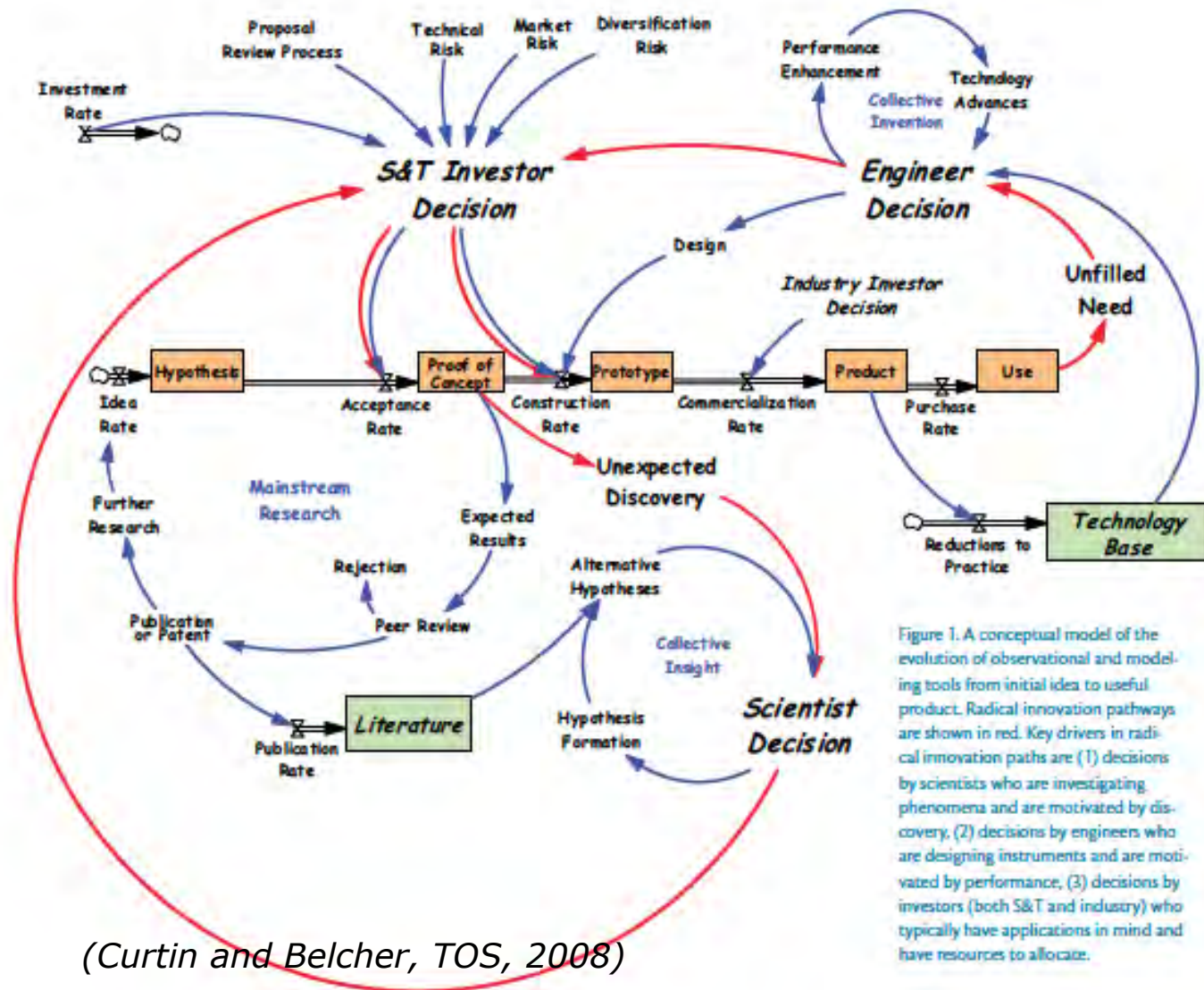


Figure 1. A conceptual model of the evolution of observational and modeling tools from initial ideas to useful product. Radical innovation pathways are shown in red. Key drivers in radical innovation paths are (1) decisions by scientists who are investigating phenomena and are motivated by discovery, (2) decisions by engineers who are designing instruments and are motivated by performance, (3) decisions by investors (both S&T and industry) who typically have applications in mind and have resources to allocate.

# The key to success for radical innovation in oceanographic instrumentation

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1. Visionary leadership
2. Close coupling between science and engineering
3. A coherent investment strategy based on distributed, coordinated resources
4. Effective processes for communication, feedback, and contingency planning.
5. Incentive to assume responsibility for risky instrumentation development projects without undue career jeopardy.

**In summary:** work in collaborative, multidisciplinary teams, be tenacious and focused on long term objectives while producing short-term success, and find creative champions among funding agencies and investor organizations.

- MULTI-DISCIPLINARY APPROACH
- INTEGRATION



# Data Availability....

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## OPEN DATA PRINCIPLES

- Discoverable and accessible
- Freely available
- Interoperable, standardized and quality controlled

## EU FRAMEWORK

- MARINE KNOWLEDGE 2020;
- EU COM May 8, 2014;

[EU eyes oceans innovation as source of sustainable growth;](#)



**Turning DATA INTO JOBS (US - NOAA)....**

# The role of Ocean Observatories/new Marine Research Infrastructures-MRI- in H2020, Blue Growth, RIS3, ...

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- ➔ SOCIB, an example MRI capabilities to **respond to 3 drivers**:
- Science Priorities (ok!)
  - Strategic Society Needs (more listening!: to policy makers & managers endorsement, MSFD -GES- Energy, Tourism, etc.).
  - New Technology Developments (to reach companies, social society endorsement)

➔ Ocean Observatories/MRI are key innovation elements, well placed to fill science-policy gap in H2020: mission, vision, critical mass, multi-disciplinary and integrated approach.


➔ Need to define a **JOINT STRATEGY** at European level, more than coordination, Partnership...

## In Summary

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1. New technologies/paradigm change Ocean Observation: Ocean Variability, with shift from Large Scale to Mesoscale and Coasts.
2. Marine Research Infrastructures/Observing Systems in Europe; international leadership -e.g., SOCIB-, & key elements in Blue Growth initiatives (**EU Oceans Innovation COM**) because their:
  - Critical mass
  - Multi-disciplinary approach
  - Integration capabilities of Science, Technology, Society

In other words: ...



**New observing systems with real time open data are  
key elements for real innovation initiatives  
“Turning data into jobs”**



The image is a composite illustration representing oceanographic research. At the top, several satellites are shown in orbit around the Earth, with beams of light directed towards the ocean surface. One satellite is specifically labeled 'Efgaristó'. Below the surface, a white and blue research vessel is depicted. Underneath the water, various scientific instruments are shown, including yellow floats, a yellow autonomous underwater vehicle (AUV), and a deep-sea sampling device. The background features a colorful map of the ocean's surface and a detailed view of the seafloor with coral reefs and a diver. The overall scene is set against a dark blue background, suggesting the vastness of the ocean.

Efgaristó

# Εfgaristó Ευχαριστίες