

**UNIONE EUROPEA**  
 Fondo Sociale Europeo  
 Fondo Europeo di Sviluppo Regionale



MINISTERO DEL  
 TURISMO  
 E  
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 PATRIMONIO  
 021-493382



**ENERGIA E SOSTENIBILITÀ  
 PER LA  
 TRANSIZIONE ABBINATA**



**European  
 Multidisciplinary  
 Seafloor and water  
 -column  
 Observatory**



**Strengthen collaboration in Ocean Observation to  
 preserve “Ocean health and resources”**

**Paolo Favali**

**25 ANNI DELL’OSSERVATORIO CLIMATICO ENEA DI LAMPEDUSA**  
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# EUROPEAN MULTIDISCIPLINARY SEAFLOOR AND WATER COLUMN OBSERVATORY

EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM

**EMSO ERIC is an intergovernmental organisation,** with autonomous legal status (ERIC) since 2016, participated by nine European countries. EMSO is headquartered in Rome, Italy

**EMSO ERIC aims to promote excellent science** through the coordination of a distributed infrastructure of fifteen observatories serving marine science researchers, marine technology engineers, policymakers, industry and the general public

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# EMSO ERIC RF Components and locations

## DISTRIBUTED RESEARCH INFRASTRUCTURE

- ✓ 9 Countries
- ✓ 28 Research Institutions

## 15 FIXED-POINT MUTI-SENSORS PLATFORMS:

- ✓ 12 Deep Sea Observatories (Cabled & Stand-alone)
- ✓ 3 Test Sites, Shallow water

## OBSERVING AND MONITORING THE OCEANS

- ✓ **Time-series:** continuous parameters acquisition
- ✓ **Target:** Open Ocean Multi/Interdisciplinarity

*Geosphere-Hydrosphere-Biosphere-Atmosphere interactions*



**EMSO RFs Access to HIGH-QUALITY MARINE ENVIRONMENTAL INFORMATION**

[www.emso.eu](http://www.emso.eu)

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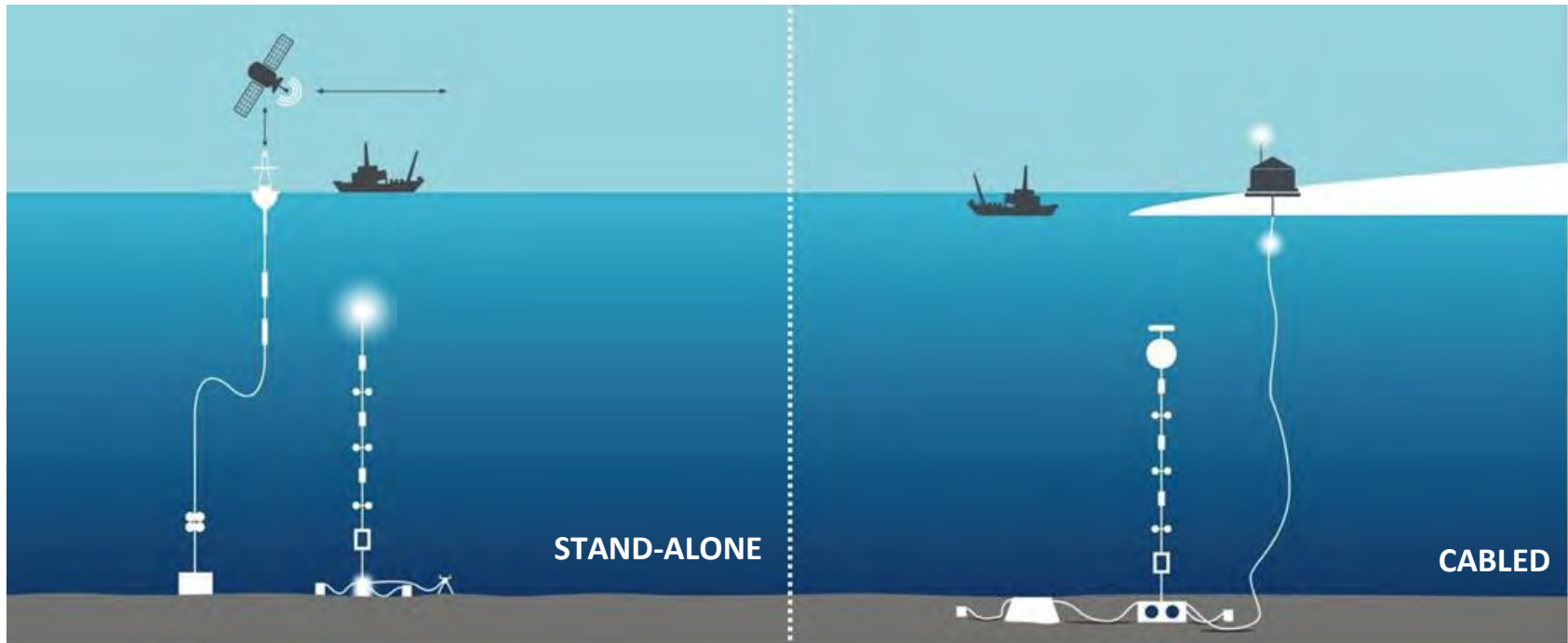
# RESEARCH CONSORTIUM

COUNTRY	REPRESENTING ENTITY
<b>FRANCE</b>	<b>Ifremer</b> L'Institut Français de Recherche pour l'Exploitation de la Mer <b>CNRS</b> Centre National de la Recherche Scientifique
<b>GREECE</b>	<b>HCMR</b> Hellenic Centre for Marine Research
<b>IRELAND</b>	<b>MI</b> Marine Institute
<b>ITALY</b> Host Country	<b>INGV</b> Istituto Nazionale di Geofisica e Vulcanologia
<b>NORWAY</b>	<b>RCN</b> The Research Council of Norway
<b>PORTUGAL</b>	<b>FCT</b> Fundação para a Ciência e a Tecnologia
<b>ROMANIA</b>	<b>GeoEcoMar</b> National Research and Development Institute for Marine Geology and Geoecology
<b>SPAIN</b>	<b>PLOCAN</b> Plataforma Oceánica de Canarias
<b>UK</b>	<b>NOC</b> National Oceanography Centre

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# EMSO ERIC INFRASTRUCTURES



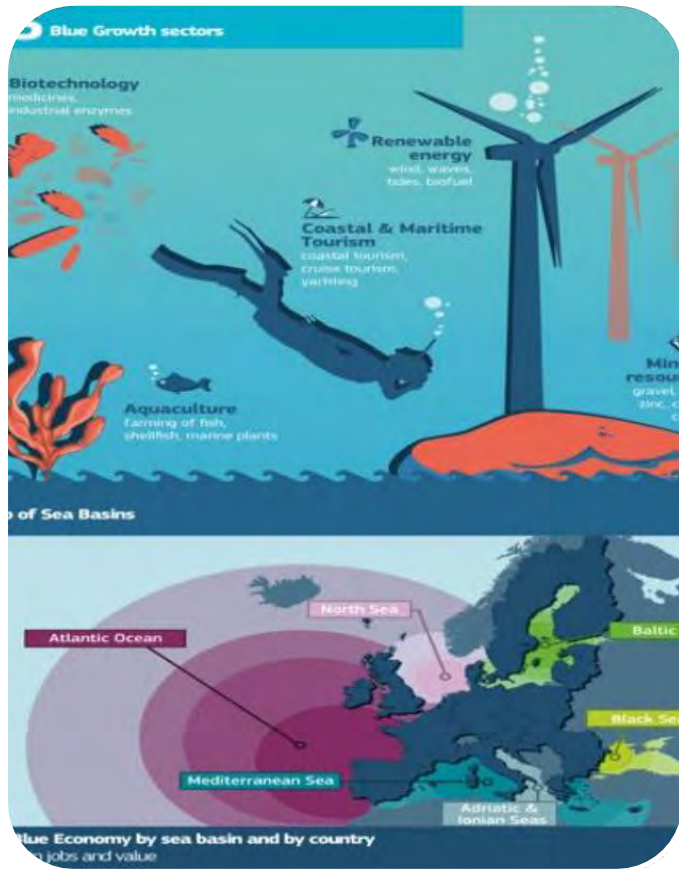
**To reach a standard configuration:** each observatory shall be equipped with the *EMSO Generic Instrument Module (EGIM)* incorporating a suite of sensors to measure presently seven *Essential Ocean Variables*

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# EMSO ERIC MISSION



To establish a comprehensive and intelligent sensor system in the water column, seafloor, and sub-seafloor environments

EMSO ERIC is an integrated and distributed organisation that provides high-quality data and knowledge to illuminate major environmental processes for understanding the complex interactions among the geosphere, hydrosphere, biosphere, and atmosphere



# WHY OBSERVE THE DEEP SEA?

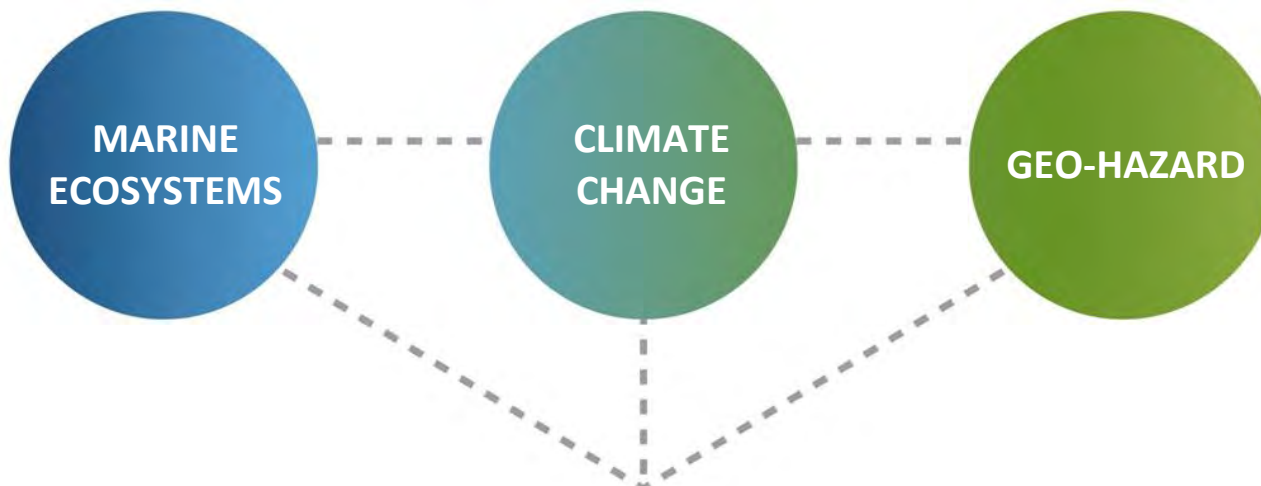
## Oceans play a crucial role in human wellbeing

*Deep Ocean knowledge will certainly help us to better understand process like,*

- Degradation and loss of biodiversity impacts marine resource exploitation
- Ocean circulation and how affects climate change
- Natural hazards such as tsunamis from earthquakes and volcanic eruptions impacts human life

### EMSO ERIC MISSION

supports multidisciplinary research in:



**TO ACHIEVE** sustainable management and protection of marine resources

**TO UNDERSTAND** the complex interactions among the geosphere, hydrosphere, biosphere, and atmosphere

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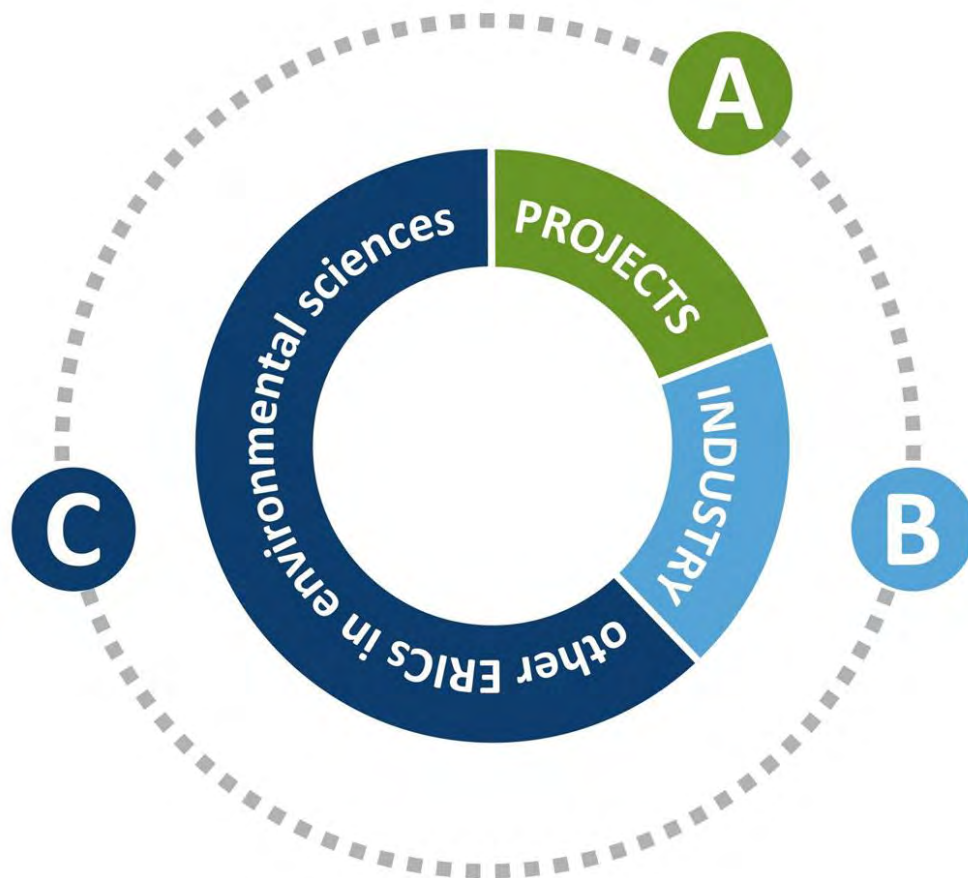


# LINKS WITH

**A** **PROJECTS** such as EOSC-Future, EGI-ACE, ENVRI-Fair, Eurofleets+, ERIC-FORUM, eRImote, EUROSEA, Geo-INQUIRE, iMagine, MINKE and DOORS are key to exchange information and develop synergies in reach the goals of EMSO.

**B** **INDUSTRY** as a full partner of EU RIs is the objective of the work EMSO is doing in the H2020 project ENRIITC as one of the main actors in shaping the EU strategy in exploiting the Ris potential. EMSO is collaborating with the industry providing data services and tools, training, and physical access to the regional facilities.

**C** **INFRASTRUCTURES** such as ERICs in environmental sciences (e.g., ICOS, EURO-ARGO, EPOS) and other international infrastructures (e.g., OOI, ONC, IMOS) to reach a global monitoring for marine environment.

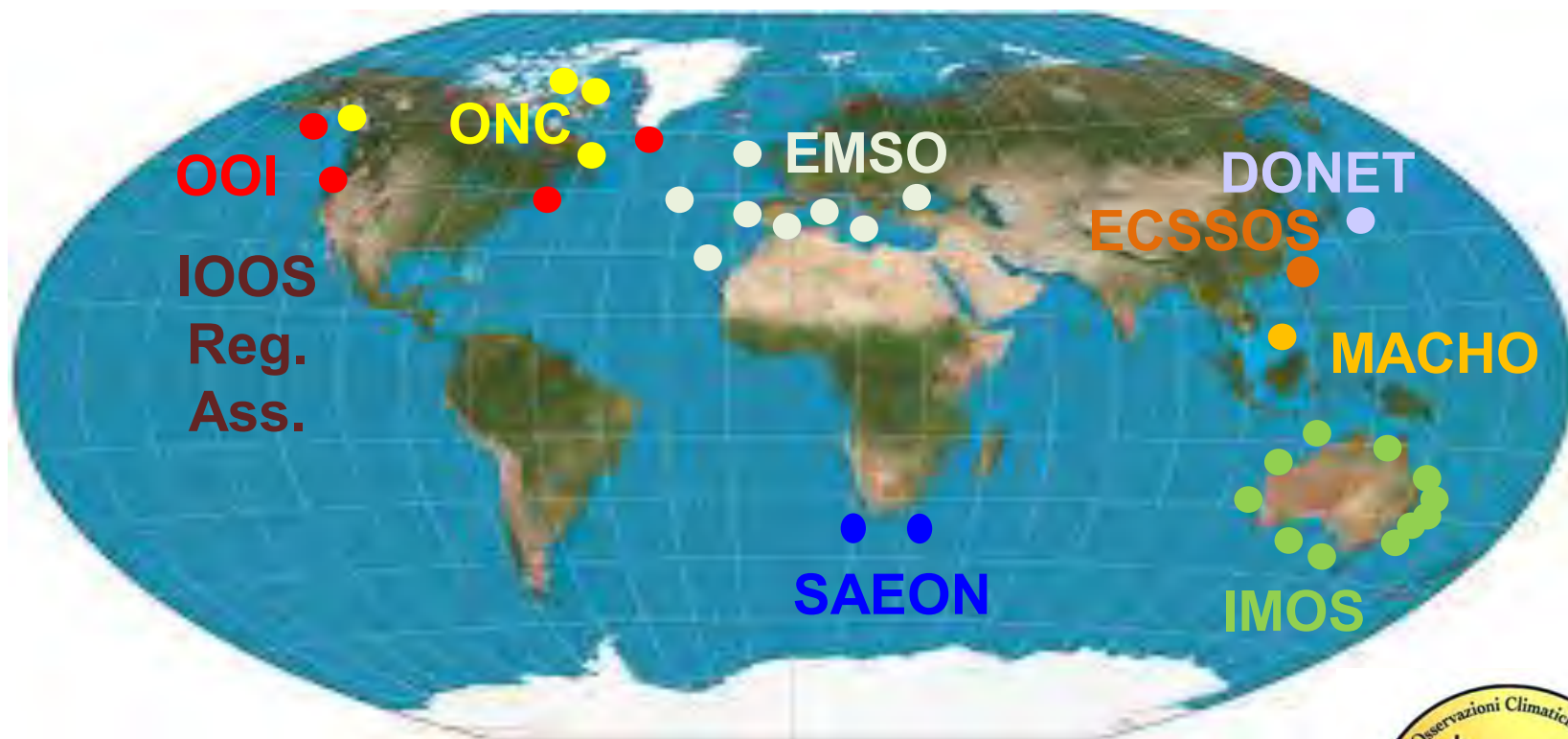


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# LINKS WITH INTERNATIONAL OBSERVATORY PROGRAMS AND DATA USER ORGANISATIONS



EMSO has an MoU with ONC

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# Benefits of EMSO Ocean Observations



## Direct economic benefit

Commercial products and services derived from ocean observations

### Examples:

- > sale of sea surface temperature data
- > development of innovative sensing technologies



## Indirect economic benefits

Benefits from wider economic activities enabled by products or services

### Examples:

- > cost savings due to better information on marine and weather events
- > increased revenue due to cost avoidance



## Societal benefits

Broad benefits to society of ocean observations

### Examples:

- > improved environmental monitoring and management
- > enhanced understanding of ocean systems

# SHARING EMSO ACHIEVEMENTS WITH



## SCIENTIFIC COMMUNITY

To make **world-class science** with multi-inter-disciplinary approaches supported by the infrastructure. To offer **HQ data products and opportunities** for collaboration.

## POLICY MAKERS

To make aware on the need of **increasing the synoptic/aggregated information on marine health** and for an **efficient exploitation of sea resources** through long-term observations. To make aware also of the importance of the international cooperation in this domain guaranteeing a support to make decisions for a sustainable Blue Growth.

## SOCIETY WIDER PUBLIC

To increase the awareness **of the marine domain on Earth good health and global processes (such as Climate Change). Active participation in the UN Decade of the Oceans**

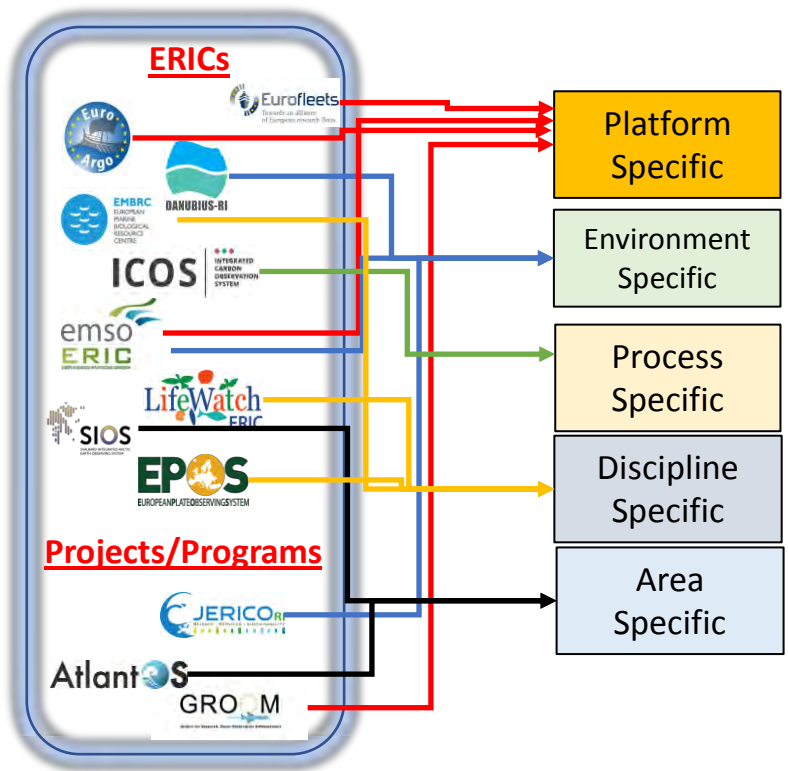
To attract the youngest generation to a scientific carrier for their future. To highlight the importance of European Union funds to finance the marine research in order to help a sustainable future.

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## The Marine RIs - to enhance collaboration

EU Contribution to Global efforts`



### Significant Marine stressors

**Climate Change**  
*Ocean uptake excessive green house gases significantly impact Oceans; **acidification, warming** and **deoxygenation***

**Biodiversity-Ecosystems**  
 Protect marine and costal systems, promote a sustainable fisheries industry, reserve marine habitats.

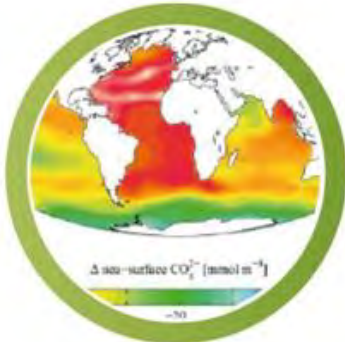
**Pollution** Between 4.8 and 12.7 million tonnes of plastic pieces are dumped into our oceans yearly. *Only 1%* of marine litter floats, everything else sinks to the seafloor





# RESEARCH INFRASTRUCTURE CHALLENGES

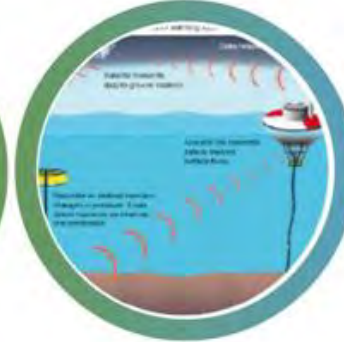
To fulfil European societal scientific demands targeted in the EU's Blue Growth Strategy



Global ocean warming and acidification



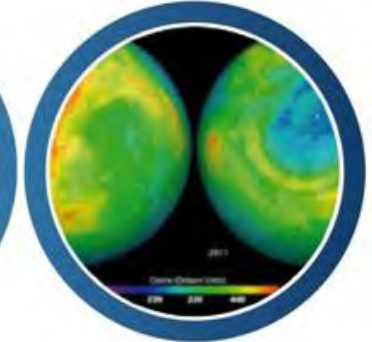
Impact and sustainability of Marine Resources exploitation



Real-time observations and early warning systems for earthquakes & tsunamis



Marine Ecosystems and Climate Change mitigation



Earth interactions hydrosphere, biosphere, lithosphere, atmosphere

ACCESS HIGH-QUALITY MARINE ENVIRONMENTAL DATA

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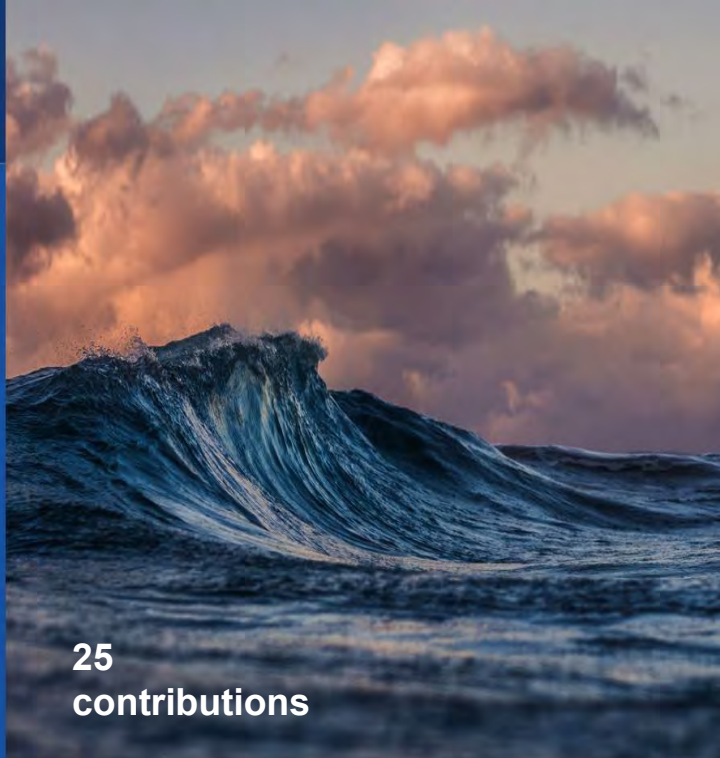


## The Discovery of the Unknown Planet: The Ocean

### Edited by

Paolo Favali, Juan José Dañobeitia, Bruce M Howe & Henry Ruhl

[frontiers.in/unknown\\_planet](https://frontiers.in/unknown_planet)



25  
contributions

### HIGHLIGHT:

**"The role of the marine Research Infrastructures in the European marine observation landscape: present and future perspectives"**

**Juan José Dañobeitia, Sylvie Pouliquen, Nicolas Pade, Christos Arvanitidis, Richard Sanders, Adrian Stanica, Claire Gourcuff, George Petihakis, Valentina Tegas, Paolo Favali**

**This paper represents a "white paper" to figure out the integration process among marine Research Infrastructures**

**Under revision**

### About this Research Topic

Oceans are the engine of the Earth's ecosystem; they regulate the exchange and storage of carbon dioxide, control the climate and absorb most of the heat excess from greenhouse gas emissions. Temperature, acidity, and stratification of the oceans affect the distribution of marine species and the functioning of marine ecosystems. The impacts of anthropogenic pollution and eutrophication, coastal development and intensified agriculture, overexploitation of marine resources, and invasive species in the marine environments show no decreasing trend. In addition, 70% of the Earth's volcanism occurs on the ocean floor, which together with large earthquakes and submarine landslides are the main sources of earthquakes and tsunamis with consequent socio-economic impact. There is increasing interest to explore and understand all these aspects of the oceans, for instance UN launched the 2021-2030 Decade of Ocean Science for Sustainable Development. These programs can give answers to all these challenges.

Many global scientific and technological infrastructure programs monitor and study for a better understanding the Ocean's complex interrelated processes. The unique role of the research infrastructures underlies with their capability to collect long-term time series and spatial data from the surface, along the water column, down to the deep seafloor. They explore the Ocean with Eulerian and Lagrangian approaches calling for a comprehensive and integrated strategy. They represent a fundamental and irreplaceable contribution to the advancement in the oceanic processes' knowledge to highlight the effects of the multidisciplinary variety of processes on life and human beings' wellness. The aims of these programs are perfectly aligned with the key priorities of the UN Agenda 2030, Horizon Europe (2021-2027) and strongly contribute to the strategic areas of other initiatives, such as the EU JPI-Oceans.

This Research Topic intends to highlight the benefits of having a complete integrated and interdisciplinary approach. To tackle this, all the main worldwide actors will be involved, asking contributions as review papers and the scientific and technological results reached using the new tools are both welcome. We solicit contributions on: International and European strategy, updates to ongoing global scientific and technological infrastructure programs, scientific and technology results, relevant discoveries, current and future prospects.

The specific themes to address include:

- International and European strategy
- Worldwide recent and ongoing infrastructure programs
- Relevant scientific and technology results
- Best practices, data quality control and data FAIRness
- Conclusions with the present and future perspectives.

We welcome research papers to this Research Topic.

Important Note: All contributions to this Research Topic must be within the scope of the section and journal to which they are submitted, as defined in their





# Joint Research Unit (JRU) EMSO-Italia (2015-2025)

[www.emsoitalia.it](http://www.emsoitalia.it)

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## WHAT'S JOINT RESEARCH UNIT (JRU)?

- **JRU is a collaborative agreement among research institutions (universities or research centres) recognised by EC and by the Country**
- **JRU includes National partners to favour the realisation of projects sharing resources in a defined research area**
- **EMSO-Italy benefits of the EMSO ERIC and strengthens the Italian contribution to the research infrastructure**





## Leading National R&D Players Team Up to support EMSO

- INGV - National Institute of Geophysics and Volcanology ([www.ingv.it](http://www.ingv.it))
- CNR - National Research Council ([www.cnr.it](http://www.cnr.it))
- INFN - National Institute of Nuclear Physics ([www.infn.it](http://www.infn.it))
- OGS - National Institute of Oceanography and Experimental Geophysics ([www.inogs.it](http://www.inogs.it))
- SZN - Zoological Station “Anton Dohrn” of Naples ([www.szn.it](http://www.szn.it))
- ISPRA - Italian Higher Institute for the Protection and Environmental Research ([www.isprambiente.gov.it](http://www.isprambiente.gov.it))
- ENEA - National Agency for New Technologies, Energy and Sustainable Economic Development ([www.enea.it](http://www.enea.it))
- CONISMA - National Consortium on Marine Sciences ([www.conisma.it](http://www.conisma.it))
- IIM - Navy Hydrographic Institute ([www.marina.difesa.it](http://www.marina.difesa.it))



# Thank you for your attention

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