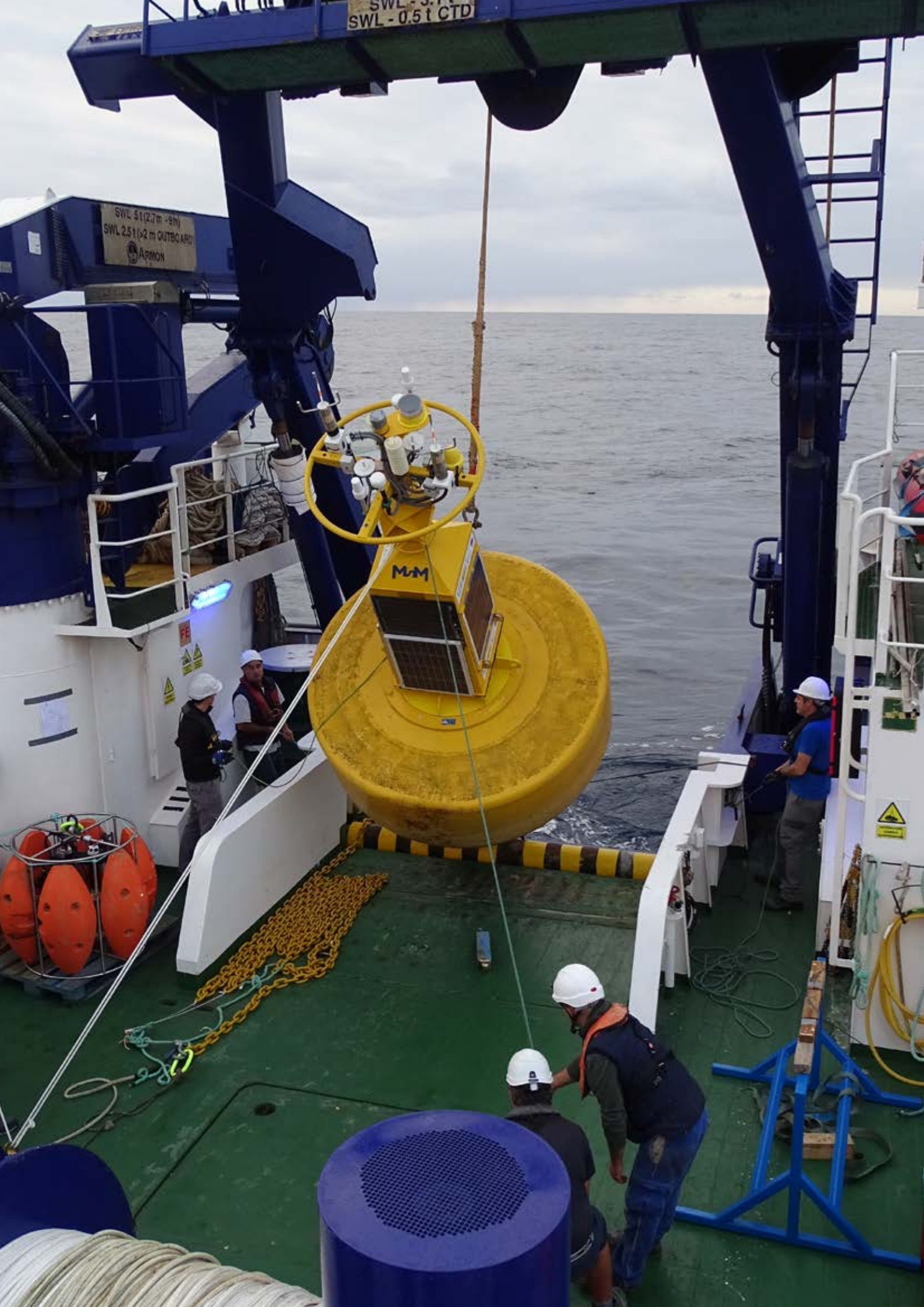

SWL - 0.5 t CTD
SWL 5 t (2.7 m - 9 m)
SWL 2.5 t (>2 m OUTBOARD)
ARMON
M&M

EMSO ERIC
Regional Facilities | 2022

EMSO consists of 14 Regional Facilities (RFs) – 12 cable and stand-alone observatories and 2 test sites - located at strategic environmental sites throughout Europe seas, from the Arctic seas to the North Atlantic and passing through the Mediterranean to the Black Sea, reaching depths down to 4850 m. The RFs monitor Essential Ocean Variables that address the observation of systematic geochemical changes that affect the water column due to persistent global changes, monitor the oceanographic conditions of marine ecosystems, and are alert for the occurrence of geo-hazards, all as general objective to better understanding the complex phenomena interactions between the hydrosphere, biosphere, geosphere and atmosphere that occur from the bottom to the surface of the oceans and their significant impact in Earth systems, providing interoperable high-quality data to the science community and those stakeholders responsible for policy formulations.

Looking at the actual configuration of EMSO RFs, in the Atlantic, there are five open-ocean facilities (Nordic Seas, Azores, Porcupine Abyssal Plain, Iberian Margin and Canary Islands) and shallow-water testbed site (SmartBay). In the Mediterranean, there are six facilities (Ligurian Sea, Western Mediterranean Sea, South Adriatic Sea, Cretan Sea, Western Ionian Sea and Hellenic Arc), each of which has multiple sites and one shallow water testbed facility at OBSEA, and the EuxRo buoys which are monitoring the Black Sea.

The Atlantic dimension has always represented a fundamental player in the climate system and global ocean circulation. The implementation of the network of multidisciplinary underwater observatories, with the recent entry of Norway into the consortium, brought an excellent fleet of ocean gliders, connecting fixed-point observatories with water column observations at the gate of the Arctic Ocean. The Nordic Seas facility includes several of the country's major universities and research institutes, with extensive Marine research and technology experience. Norway's relationship with the seafloor and water-column observatories date back to the establishment of the European Seas Observatory NETwork (ESONET), a Network of Excellence supported by the European Commission after the EMSO Preparatory Phase.

A huge step forward in the monitoring system of the Atlantic Ocean has been taken within the European Multidisciplinary Seafloor and Water Column Observatory – Portugal (EMSO-PT) initiative in the Iberian Margin node, aimed at generating continuous scientific data on marine environmental processes related to the interaction between the geosphere, biosphere and hydrosphere. In this node were installed two underwater fixed-point observatories, one deep-site and another shallower site in the Portuguese mainland northern coast (off the coast of Aguçadoura). Moreover, in each site, an EGIM (EMSO Generic

Instrument Module), a fixed mooring module with an instrument pack designed to measure homogeneously a set of core variables using the same hardware, sensor references, qualification methods and data format, was deployed in 2022 to continuously measure parameters of interest, ensuring accurate and comparable ocean variable measurements. EGIM was developed during the EU project EMSODEV (EMSO implementation and operation: DEVelopment of instrument module).

The use of new technologies and the optimization of ocean monitoring systems are the necessary and fundamental direction to allow international research infrastructures an adequate capacity to acquire representative and wide-ranging of ocean data. After more than 14 years of continuous operation at sea, the Western Mediterranean Sea RF (W1M3A) was recovered at the Palumbo shipyard in Savona for refitting at the end of August 2022. The refitting was funded by the National Research Council of Italy (CNR) and by the Ligurian Region in the framework of wider support to regional infrastructures. This operation is devoted to prolonging the life of the observatory and making it ready for new future scientific missions: the team of CNR, in fact, will implement some improvements to the buoy making it ready to host new sensors in the coming years to enhance the observational capacity of the observatory, with an upgraded control unit to continuously provide meteorological data and oceanographic observations from the sea surface to the ocean interior.

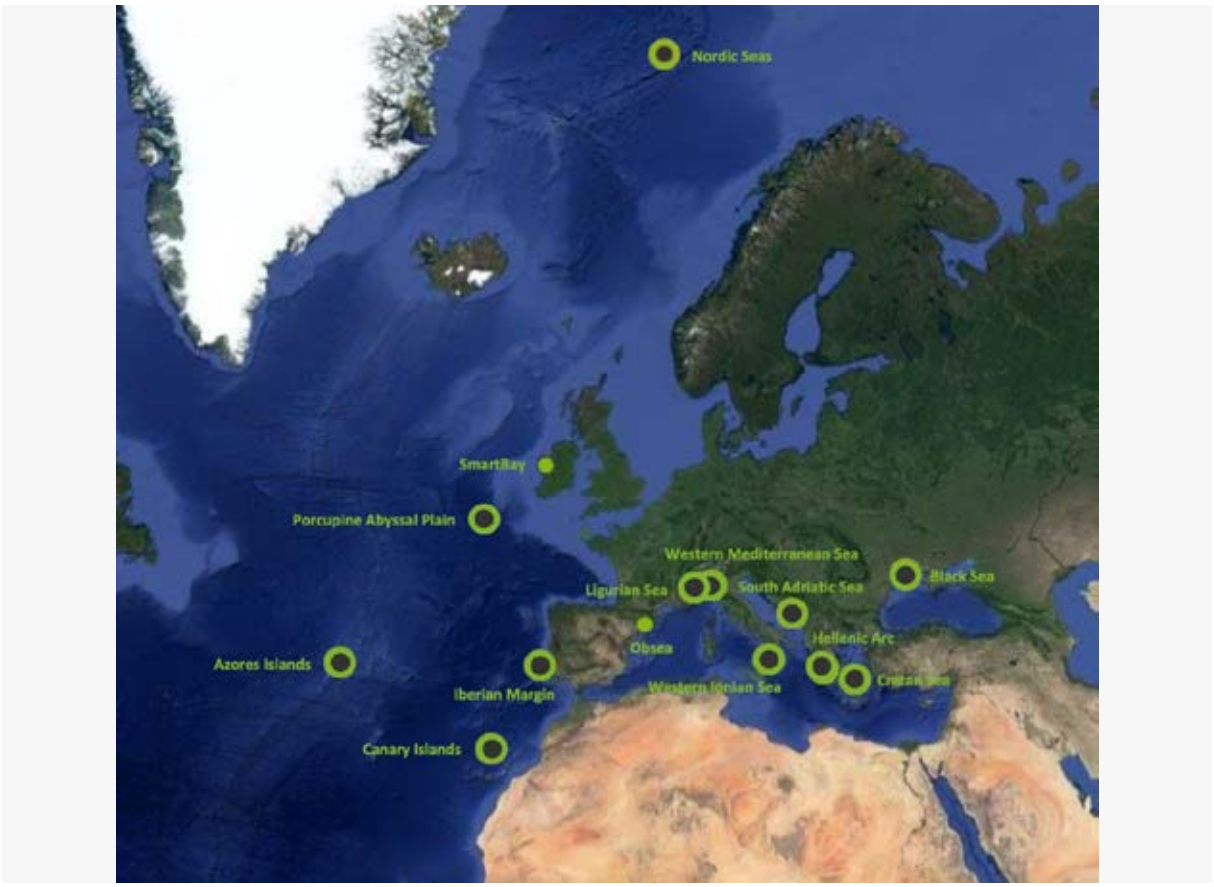


Figure 19 - EMSO Regional Facilities map

RFs of the EMSO distributed infrastructure currently offer 58 scientific services: 10 access services and 48 data-based services. Of these fifteen facilities, six are cabled and therefore capable of delivering real-time data, and four are equipped with buoys with near real-time satellite communication capability. A list of Services in science areas is listed in Figure 20.

The meteorological and water column physics and biogeochemistry services are offered at nearly all facilities. Marine ecology and biodiversity services are currently mostly offered at the Atlantic facilities, while geohazards and geodynamics services are mostly developed in the Mediterranean region. Several key environmental indicators are measured at each facility. TAs identified in the 2020 EMSO Science Service catalogue (see below), science services are delivered by individual RF. RFs were designed before creating the ERIC; they are operated independently, although EMSO ERIC activities are adding value to them through inter-facility standardization and the coordination of science, data management and logistics. Moreover, these services have clear potential as components of multi-nodes ERIC-scale services.

A detailed description of the Regional Facilities provided by Member countries is included in ANNEX 2.

SCIENCE AREAS	SCIENCE SERVICE CATEGORIES
ATMOSPHERE & OCEAN	METEOROLOGICAL PARAMETERS
	WATER COLUMN PHYSICS AND BIOGEOCHEMISTRY
BIOSPHERE	MARINE ECOLOGY AND BIODIVERSITY
GEOSPHERE	GEOHAZARDS AND GEODYNAMICS
ACROSS SCIENCE AREAS	ENVIRONMENTAL INDICATORS (MSFD)

Figure 20 - EMSO data-related science services categories and SSG thematic leaders

EMSO ERIC
Annex 1
List of the EMSO regional teams

REGIONAL TEAM	TEAM MEMBERS	NAME	AFFILIATION
Azores	Team Leader	**Sarradin Pierre Marie**	Ifremer
	Science SG	**Cannat Mathilde**	CNRS
	Data SG	**Van Iseghem Sylvie**	Ifremer
	Eng&Log SG	**Blandin Jérôme**	Ifremer
	Comm SG	**Sarrazin Jozée**	Ifremer
	IISG		
Black Sea	Team Leader	**Radulescu Vlad**	GeoEcoMar
	Science SG	**Raluca Tutuianu**	GeoEcoMar
	Data SG	**Raluca Radulescu**	GeoEcoMar
	Eng&Log SG	**Nesrin Acmola**	GeoEcoMar
	Comm SG	**Dinicoiou Mirela**	GeoEcoMar
	IISG	**Ivan Iulia**	GeoEcoMar
Canary Islands	Team Leader	**Delory Eric**	PLOCAN
	Science SG	**Delory Eric**	PLOCAN
	Data SG	**Gonzalez Javier**	PLOCAN
	Eng&Log SG	**Monagas Vidina**	PLOCAN
	Comm SG	**Loustau Josefina**	PLOCAN
	IISG		PLOCAN
Hellenic Arc	Team Leader	**Petihakis George**	HCMR
	Science SG	**Perivoliotis Leonidas**	HCMR
	Data SG	**Sotiropoulou Maria**	HCMR
	Eng&Log SG	**Pagonis Paris**	HCMR
	Comm SG	**Christodoulaki Sylvia**	HCMR
	IISG	**Frangoulis Costas**	HCMR

REGIONAL TEAM	TEAM MEMBERS	NAME	AFFILIATION
Iberian Margin	Team Leader	**Carlos Sousa**	IPMA
	Science SG	**Colaço Ana**	University of the Azores -IMAR
	Data SG	**Relvas Paulo**	Universidade do Algarve (CCMAR/FCT)
	Eng&Log SG	**Silva Eduardo**	INESC TEC
	Comm SG	**Sebastião Luis**	ISR- Instituto Superior Tecnico, Portugal
	IISG	**Vilhena Lourenco Nuno**	IPMA
Ligurian Sea	Team Leader	**Coppola Laurent**	Laboratoire Océanographique de Villefranche
	Science SG	**Lefevre Dominique**	MIO- CNRS
	Data SG	**Carval Thierry**	Ifremer
	Eng&Log SG	**Gojak Carl**	Division Technique de l'INSU
	Comm SG	**TBD**	
	IISG	**Hello Yann**	Geoazur - Université Côte d'Azur
Porcupine Abyssal Plain	Team Leader	**Hartman Susan**	NOC
	Science SG	**Gate Andrew**	NOC
	Data SG	**Snaith Helen**	NOC
	Eng&Log SG	**Cardwell Chris**	NOC
	Comm SG	**Pebody Corinne**	NOC
	IISG		NOC
Western Ionian Sea	Team Leader	**Embriaco Davide**	INGV
	Science SG	**Lo Bue Nadia**	INGV
	Data SG	**Fratianni Claudia**	INGV
	Eng&Log SG	**Marinaro Giuditta**	INGV
	Comm SG	**Giuntini Alessandrta**	INGV
	IISG		
Molène (Stop activities, and moving to another location)	Team Leader	**Lanteri Nadine**	Ifremer
	Science SG	**Garziglia Sébastien**	Ifremer
	Data SG	**Libes Maurice**	OSU Pytheas - CNRS
	Eng&Log SG	**Ciausu Viorel**	Ifremer
	Comm SG	**Chloé Batissous**	Ifremer
	IISG	**Barbero Aurore**	Ifremer

REGIONAL TEAM	TEAM MEMBERS	NAME	AFFILIATION
OBSEA	Team Leader	**Del Rio Joaquin**	UPC
	Science SG	**Mihai Toma Daniel**	UPC
	Data SG	**Martinez Enoc**	UPC
	Eng&Log SG	**Nogueras Marc**	UPC
	Comm SG	**Neus Vidal**	UPC
	IISG	**Del Rio Joaquin**	UPC
SmartBay	Team Leader	**Berry Alan**	MARINE INSTITUTE
	Science SG	**Gaughan Paul**	MARINE INSTITUTE
	Data SG		
	Eng&Log SG	**O'Malley Conall**	MARINE INSTITUTE
	Comm SG	**Donnelly Felicity**	MARINE INSTITUTE
	IISG	**Reilly Kieran**	MARINE INSTITUTE
Nordic Seas	Team Leader	**Ilker Fer**	University of Bergen
	Science SG	**Ingunn Skjelvan**	Norwegian Research Centre and Bjerknes Centre for Climate Research
	Data SG	**Rocio Castano Primo**	University of Bergen
	Eng&Log SG	**Beatrice Tomasi**	
	Comm SG	**Mottlova Lucie**	University of Bergen
	IISG	**TBD**	
Western Mediterranean Sea	Team Leader	**Bozzano Roberto**	CNR - Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino
	Science SG	**Bozzano Roberto**	CNR - Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino
	Data SG	**Pensieri Sara**	CNR - Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino
	Eng&Log SG	**Pensieri Sara**	CNR - Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino
	Comm SG	**Evangelista Lorenza**	CNR
	IISG	**Magnifico Giuseppe**	CNR

REGIONAL TEAM	TEAM MEMBERS	NAME	AFFILIATION
South Adriatic Sea	Team Leader	**Cardin Vanessa**	OGS - Istituto Nazionale di Oceanografia e Geofisica Sperimentale
	Science SG	**Miserocchi Stefano**	CNR - Istituto per le Scienze Polari
	Data SG	**Partescano Elena**	OGS - Istituto Nazionale di Oceanografia e Geofisica Sperimentale
	Eng&Log SG	**Brunetti Fabio**	OGS - Istituto Nazionale di Oceanografia e Geofisica Sperimentale
	Comm SG	**Petrera Francesca**	OGS - Istituto Nazionale di Oceanografia e Geofisica Sperimentale
	IISG	**TBD**	-
Cretan Sea	Team Leader	**Petihakis George**	Hellenic Centre for Marine Research (HCMR), Institute of Oceanography
	Science SG	**Petihakis George**	Hellenic Centre for Marine Research (HCMR), Institute of Oceanography
	Data SG	**Perivoliotis Leonidas**	Hellenic Centre for Marine Research (HCMR), Institute of Oceanography
	Eng&Log SG	**Pagonis Pagonis**	Hellenic Centre for Marine Research (HCMR), Institute of Oceanography
	Comm SG	**Christodoulaki Sylvia**	Hellenic Centre for Marine Research (HCMR), Institute of Oceanography
	IISG	**Frangoulis Constantin**	Hellenic Centre for Marine Research (HCMR), Institute of Oceanography

EMSO ERIC
Annex 2
Detailed description of the Regional facilities by Member countries

FRANCE

REPRESENTING ENTITIES:
Institut Français de Recherche pour l'exploitation de la Mer | IFREMER
Centre National de la Recherche Scientifique | CNRS
REGIONAL FACILITIES 2

EMSO AZORES

SCIENTIFIC OBJECTIVES

Understand the links between geological, physical and chemical processes and their effects on the dynamics of the hydrothermal fauna at different spatial and temporal scales at the Lucky Strike vent field.

GENERAL INFORMATION

Location: Mid-Atlantic ridge near Azores
Distance from land: 200 NM
Max water depth: 1700 m
Date 1st deployment: October 2010
Operated by: IFREMER, CNRS
Website: www.emso-fr.org
Status: running (updated November 2017)
Regional Team Leader: Pierre-Marie Sarradin, Ifremer

SCIENCE SERVICE CATEGORY	SCIENCE SERVICE NAME
Access	Access
METEOROLOGICAL PARAMETERS	Meteorological parameters
WATER COLUMN PHYSICS AND BIOGEOCHEMISTRY	Water mass characterisation
MARINE ECOLOGY AND BIODIVERSITY	Hydrothermal vents faunal and ecosystem response
GEOHAZARDS AND GEODYNAMICS	Seafloor geodesy
	Local seismicity
	Dynamics of mid atlantic ridge hydrothermal system
ENVIRONMENTAL INDICATORS (MSFD)	Underwater sound monitoring
	Seafloor environmental parameters

EMSO-MOLÈNE

SCIENTIFIC OBJECTIVES

Test of marine sensors to help manufacturers, platform operators and scientists to validate instruments.

GENERAL INFORMATION

Location: Near Molène Island
Distance from land: 2 km
Max water depth: 1 m
Date 1st deployment: 2012
Operated by: IFREMER
Website: www.emso-fr.org
Status:
Regional Team Leader: Nadine Lantéri, Ifremer

This site is currently under an intense readaptation with the aim of finding another location.

LIGURIAN SEA

SCIENTIFIC OBJECTIVES

Multidisciplinary long-term eulerian monitoring to study the slope failure processes on the continental slope (Nice site), water mass properties, biogeochemical cycles and biological communities' modifications in response to climate change and anthropogenic pressure (open sea platforms) and geo-hazards assessment with the monitoring of earthquakes and tsunamis.

GENERAL INFORMATION

Location: Mediterranean Sea, South of France
Distance from land: 42 km (Western Ligurian), 1 km (Nice), 50 km (Dyfamed)
Max water depth: 2400 m (Western Ligurian), 20-35 m (Nice), 2300 m (Dyfamed)
Date 1st deployment: October 2015 (Nice), 1998 and 1999 (Dyfamed), 2007 and 2010 (Western Ligurian)
Operated by: CNRS, IFREMER
Website: www.emso-fr.org
Status: running/in maintenance/in development (updated November 2017)
Regional Team Leader: Laurent Coppola, CNRS/UPMC

SCIENCE SERVICE CATEGORY	SCIENCE SERVICE NAME
Access	Access
WATER COLUMN PHYSICS AND BIOGEOCHEMISTRY	Water mass characterization: Hydrodynamic changes in the water column
	Biogeochemical cycles: Impacts of the deep and dense water formation and Evolution of the carbon pump
GEOHAZARDS AND GEODYNAMICS	Geohazard: Slope failure processes on a steep continental slope
	Geohazard: Seismic hazard, tsunami generation

GREECE

REPRESENTING ENTITY:
Hellenic Centre for Marine Research | HCMR
REGIONAL FACILITIES 2

HELLENIC ARC

SCIENTIFIC OBJECTIVES

Real-time long-term monitoring of oceanic circulation, deep-sea processes and ecosystems evolution. Study of episodic events such as earthquakes, submarine slides, tsunamis, benthic storms, biodiversity changes, pollution. Simultaneous data are relative to: seismology, geodesy, sea level, fluid and gas vents, physical oceanography and biodiversity imaging at different scales.

GENERAL INFORMATION

Location: Mediterranean Sea, Hellenic Arc
Distance from land: 12 NM
Max water depth: 1700 m
Date 1st deployment: May 2007
Operated by: HCMR
Website: poseidon.hcmr.gr
Status: running/in development (updated November 2017)
Regional Team Leader: George Petihakis, HCMR

SCIENCE SERVICE CATEGORY	SCIENCE SERVICE NAME
Access	Access
METEOROLOGICAL PARAMETERS	Meteorological parameters
WATER COLUMN PHYSICS AND BIOGEOCHEMISTRY	Water column environmental parameters
GEOHAZARDS AND GEODYNAMICS	Geohazard
ENVIRONMENTAL INDICATORS (MSFD)	Underwater sound monitoring

CRETAN SEA

SCIENTIFIC OBJECTIVES

The E1-M3A is considered a reference point for monitoring open-ocean biogeochemical processes (including air–sea interactions) of the Eastern Mediterranean and part of the operational oceanography observing system developments supporting the WFD and the MSFD implementation in the Mediterranean Sea. Consolidating on the long experience of physical variables monitoring, the objective of the observatory has been expanded in the last few years to include regular monitoring of the epipelagic ecosystem and the associated biogeochemistry.

GENERAL INFORMATION

Location: Mediterranean Sea, Hellenic Arc
Distance from land: 24 NM
Max water depth: 1400 m
Date 1st deployment: January 2000
Supported by: HELLAS
Operated by: HCMR
Website: http://poseidon.hcmr.gr
Regional Team Leader: George Petihakis, HCMR

SCIENCE SERVICE CATEGORY	SCIENCE SERVICE NAME
Access	Access
METEOROLOGICAL PARAMETERS	Meteorological parameters
WATER COLUMN PHYSICS AND BIOGEOCHEMISTRY	Water column environmental parameters

IRELAND

REPRESENTING ENTITY:
Marine Institute | MI
REGIONAL FACILITY 1

SMARTBAY

SCIENTIFIC OBJECTIVES

Test of marine sensors to help manufacturers, platform operators and scientists to validate instruments.

GENERAL INFORMATION

Location: Galway Bay, Ireland
Distance from land: 1.5 or 5 km
Max water depth: 27 m
Date 1st deployment: August 2015
Operated by: Marine Institute
Website: smartbay.marine.ie
Status: test site, fully operational (updated November 2017)
Regional Team Leader: Alan Berry, MI

SCIENCE SERVICE CATEGORY	SCIENCE SERVICE NAME
Access	Access
MARINE ECOLOGY AND BIODIVERSITY	Benthic Monitoring
ENVIRONMENTAL INDICATORS (MSFD)	Environmental parameters
	Underwater Noise Monitoring and BioAcoustics

ITALY

REPRESENTING ENTITY:
Istituto Nazionale di Geofisica e Vulcanologia | INGV
REGIONAL FACILITIES 3

WESTERN IONIAN SEA

SCIENTIFIC OBJECTIVES

Geo hazards assessment with the real-time monitoring of earthquakes and tsunamis. Physical oceanographic monitoring at the seafloor and along the water column of seawater EOVs. Time variations of terrestrial potential fields and electrical properties. Marine acoustic noise characterization and bio-acoustic tracking. Rheological properties of solid matter.

GENERAL INFORMATION

The multidisciplinary observatory is located in an area (25 km out of Catania, Sicily) which is prone to numerous natural hazard issues due to high seismicity and the presence of Mount Etna, one of the biggest and active volcanoes in Europe, whose roots possibly sink down to the seafloor.

Seismicity is linked to the collision between African and European plates and the region experienced large historical earthquakes and some of these strongest earthquakes (the most recent in 1908) caused also very intense tsunami wave. The area is also a key site for studying oceanographic dynamics governing exchanges between Eastern and Western Mediterranean basins through the Messina Strait and the Sicily Channel. Acoustic detectors, installed on the observatory, are used for undersea noise monitoring, considering that acoustic pollution affects the well-being of several ecosystems.

In the latest version of the observatory, thanks to an electro-optical cable that connects it to a ground station, the continuous power supply of the instruments installed on the observatory is guaranteed as well as the real-time transmission to the ground station of the data recorded at sea. This therefore also allows their immediate ingestion in a dedicated database and their use by researchers. Thanks to a GPS receiver installed in the ground station, all data from the observatory are synchronized in time.

The infrastructure has been enriched with water column data recorded by an oceanographic mooring, installed near the observatory, to integrate the information of the water column in the study of the processes that characterize the deep dynamics and their variability.

Location: Mediterranean Sea, East of Sicily
Distance from land: 25 km
Max water depth: 2100 m
Date 1st deployment: 2001
Supported by: Italy
Operated by: INGV, INFN
Website: https://westernioniansea.ingv.it/
Regional Team Leader: Davide Embriaco, INGV

SCIENCE SERVICE CATEGORY	SCIENCE SERVICE NAME
Access	Access
WATER COLUMN PHYSICS AND BIOGEOCHEMISTRY	Water masses characterization: monitoring of deep dynamics and variability of the water column
GEOHAZARDS AND GEODYNAMICS	Geohazards: quality check through probability PSD tool
	Geohazards: trigger for seismic events
	Geohazards: trigger for volcanic fall-out
	Tsunami detection
ENVIRONMENTAL INDICATORS (MSFD)	Underwater Acoustic Noise Monitoring

SOUTH ADRIATIC SEA

SCIENTIFIC OBJECTIVES

The interdisciplinary laboratory for oceanographic research in the Southern Adriatic "EMSO-ERIC Regional facility" is dedicated to studies on characterising long-term changes in the Adriatic Sea in response to local climate forces.

The objective is to study the processes of dense water formation, water mass properties, biogeochemical cycles and cascading in the Southern Adriatic Sea, and to understand the ecosystem function especially in relation to carbon sequestration dynamics and acidification processes in deep waters.

GENERAL INFORMATION

The E2-M3A observatory is located in the Southern Adriatic Pit. Oceanographically, it is positioned in the centre of the cyclonic gyre where deep convection processes take place, involving both the atmosphere and the ocean dynamics forming new dense and oxygenated waters.

It comprises two sites:

- the South Adriatic Trench Observatory (E2M3A)
- the Shelf-slope Observatory site (BB and FF) located in the western part of the basin.

Location: Southern Adriatic Pit
Distance from land: 60 nautical miles
Max water depth: 1200 mt
Date 1st deployment: November 2006
Supported by: National Institute of Oceanography and Applied Geophysics – OGS
Operated by: National Institute of Oceanography and Applied Geophysics – OGS and Istituto di Scienze Polari ISP – CNR
Website: www.ogs.it/en/european-multidisciplinary-seafloor-and-water-column-observatory-emso-eric
Regional Team Leader: Vanessa Cardin, National Institute of Oceanography and Applied Geophysics – OGS (vcardin@ogs.it)

SCIENCE SERVICE CATEGORY	SCIENCE SERVICE NAME
Access	Access
METEOROLOGICAL PARAMETERS	Meteorological parameters
WATER COLUMN PHYSICS AND BIOGEOCHEMISTRY	Water column environmental parameters, Biogeochemical cycles: Impacts of the deep and dense water formation and evolution of the carbon pump –South Adriatic Pit
	Water column environmental parameters – Bari Canyon
	Water column environmental parameters – Western margin (open slope)

WESTERN MEDITERRANEAN SEA

SCIENTIFIC OBJECTIVES

EMSO-Western Mediterranean (W1M3A) RF provides time-series to investigate air-sea interactions and connection between physics and bio-geo-chemistry along the water column on the long-term for assessing climate changes and ocean acidification. The RF allows also the monitoring of underwater ambient sound to identify anthropogenic, geophysical and biological sound sources.

GENERAL INFORMATION

The observatory is located in the more inland basin of the Mediterranean Sea: in this area, the particular orographic constraints and the thermal contrast between land and sea give rise to specific local effects that influence the general circulation of both atmosphere and ocean. The area is also part of the Pelagos Sanctuary for Mediterranean Marine Mammals that is a special marine protected area extending about 90.000 km2 between Italy, France, and the Island of Sardinia. The W1M3A observing system is composed of two sub-systems:

1. a large spar buoy, nominally known as "ODAS Italia 1" to acquire EOV in the upper 40 m of water column.
2. a sub-surface mooring acquiring data in the ocean interior.

The surface buoy represents one of the few examples in the world of large spar meteo-oceanographic buoy. The overall structure is 51-meter-long with a dry-weight of about 12 tons. The observatory is permanently moored on the seabed through a 2000 m long slack polypropylene mooring cable terminated by ship chains and an anchor. The buoy spans a watch circle of 3 km of diameter to sustain ocean currents, winds, and waves. The pole emerges about 15 meters above sea level, whereas the remaining 36 meters remain submerged. On the upper mast, the meteorological instruments are installed. At about 7 meter above the mean sea level, a small, closed space hosts the electronic systems for data collection. Along the underwater pole, at several depths, instruments are deployed. All electronic systems and most sensors are powered by a wind/solar system that recharges two separate batteries. Acquired data are stored on board but a subset of the data is transmitted ashore through a satellite link. The sub-surface mooring is a standard oceanographic mooring composed of pieces of Kevlar rope with floats kept in position by a ballast on the sea bottom which can be detached using a pair of acoustic releasers. Along the mooring line, several CTDs are deployed at different depths.

Location: Western Mediterranean Sea (009.118163° E 43.834516° N)
Distance from land: 80 Km
Max water depth: 1200 m
Date 1st deployment: February 2000
Supported by: Consiglio Nazionale delle Ricerche
Operated by: Consiglio Nazionale delle Ricerche
Website: http://www.w1m3a.cnr.it
Regional Team Leader: Roberto Bozzano

Data management: Sara Pensieri, Consiglio Nazionale delle Ricerche
Communications manager: Lorenza Evangelista, Consiglio Nazionale delle Ricerche
Engineering manager: Sara Pensieri, Consiglio Nazionale delle Ricerche
Industry and innovation manager: Giuseppe Magnifico, Consiglio Nazionale delle Ricerche

SCIENCE SERVICE CATEGORY	SCIENCE SERVICE NAME
Access	Access
METEOROLOGICAL PARAMETERS	Air-sea interaction
WATER COLUMN PHYSICS AND BIOGEOCHEMISTRY	Water column

PORTUGAL

REPRESENTING ENTITY:
Fundação para a Ciência e a Tecnologia | FCT
REGIONAL FACILITY 1

IBERIAN MARGIN

SCIENTIFIC OBJECTIVES

GENERAL INFORMATION

Location: Gulf of Cadiz and North Portugal continental shelf
Distance from land: to be defined
Max water depth: to bedefined
Date 1st deployment: July 2020
Operated by: EMSO Portugal
Website: emso-pt.pt
Status: in procurement (updated December 2019)
Regional Team Leader: Carlos Sousa, IPMA

SUMMARY

The area of Gulf of Cadiz is very important for geo-hazards. It was the site where one of the worst earthquakes that hit Europe occurred in 1755, coupled with a destructive tsunami. Here African and European tectonic plates converge. It is a seismic volcanic region. It is also the site to investigate the flow that from Mediterranean moves into the Atlantic and affects the deep-water circulation on a global scale. The geologic and oceanographic features of this region favour the presence of highly diverse benthic communities and have also a central role in the distribution of several marine mammals and fish species.

Planned EMSO scientific disciplines: geosciences, physical oceanography, biogeochemistry, marine ecology.

ROMANIA

REPRESENTING ENTITY:
Institutul National de Cercetare
Dezvoltare Pentru Geologie si Geoecologie Marina | GEOECOMAR
REGIONAL FACILITY 1

BLACK SEA

SCIENTIFIC OBJECTIVES
Long-term environmental monitoring and for the prevention/mitigation of the marine geo hazards.

GENERAL INFORMATION
Location: Three sites in the Black Sea
Distance from land: 180 km
Max water depth: 95 m
Date 1st deployment: June 2013
Supported by: Romania
Operated by: GeoEcoMar
Website:
Status: running (updated November 2017)
Regional Team Leader: Vlad Rădulescu, GeoEcoMar

SCIENCE SERVICE CATEGORY	SCIENCE SERVICE NAME
Access	Access
METEOROLOGICAL PARAMETERS	Meteorological characterization
WATER COLUMN PHYSICS AND BIOGEOCHEMISTRY	Hydrography (Currents, Salinity, Temperature, Pressure)
ENVIRONMENTAL INDICATORS (MSFD)	Hydrodynamic changes on the seafloor

SPAIN

REPRESENTING ENTITY:
Plataforma Oceánica de Canarias | PLOCAN
REGIONAL FACILITIES 2

EMSO CANARIAS

SCIENTIFIC OBJECTIVES

Long-term changes of stratification and circulation on seasonal and inter-annual times scales of the subtropical Central-Eastern waters of the Atlantic Ocean.

GENERAL INFORMATION

Location: Atlantic Ocean near Canary Islands
Distance from land: 112 km
Max water depth: 3630 m
Date 1st deployment: 1994
Operated by: PLOCAN
Website: plocan.eu/en/open-ocean-observatory
Status: running (updated May 2020)
Regional Team Leader: Eric Delory, PLOCAN

SCIENCE SERVICE CATEGORY	SCIENCE SERVICE NAME
Access	Access
METEOROLOGICAL PARAMETERS	Meteorological parameters
WATER COLUMN PHYSICS AND BIOGEOCHEMISTRY	Hydrography (Currents, Salinity, Temperature, Pressure)
	Biogeochemistry (Oxygen, Nutrients, Chlorophyll, Turbidity, Carbon system, Particle flux)
ENVIRONMENTAL INDICATORS (MSFD)	PLOCAN Underwater Sound service

OBSEA

SCIENTIFIC OBJECTIVES

Test of marine sensors to help manufacturers, platform operators and scientists to validate instruments.

GENERAL INFORMATION

Location: Balearic Sea, South of Spain coast
Distance from land: 4 km
Max water depth: 20 m
Date 1st deployment: 2009
Operated by: Universitat Politècnica de Catalunya, UPC
Website: www.obsea.es
Status: test site running (updated November 2017)
Regional Team Leader: Del Rio Joaquin, UPC

SCIENCE SERVICE CATEGORY	SCIENCE SERVICE NAME
Access	Access
METEOROLOGICAL PARAMETERS	Meteorological parameters
MARINE ECOLOGY AND BIODIVERSITY	Seafloor environmental parameters
GEOHAZARDS AND GEODYNAMICS	Geohazard (earthquake)
ENVIRONMENTAL INDICATORS (MSFD)	Seafloor environmental parameters
	Underwater sound monitoring

UK

REPRESENTING ENTITY:
National Oceanography Centre | NOC
REGIONAL FACILITY 1

PORCUPINE ABYSSAL PLAIN

SCIENTIFIC OBJECTIVES

Measurement of EOVs from surface to full depth (4850m) in the productive northeast Atlantic.

GENERAL INFORMATION

Location: 49N, 16.5W
Distance from land: 300 miles
Max water depth: 4850 m
Date 1st deployment: 2002
Supported by: NC CLASS funding
Operated by: NOC
Website: projects.noc.ac.uk/pap
Regional Team Leader: Sue Hartman, NOC

SCIENCE SERVICE CATEGORY	SCIENCE SERVICE NAME
Access	Access
METEOROLOGICAL PARAMETERS	Meteorological parameters
WATER COLUMN PHYSICS AND BIOGEOCHEMISTRY	Ocean physics and biogeochemistry
MARINE ECOLOGY AND BIODIVERSITY	Ecosystem function: surface to seafloor
	Dynamics of the benthos of the porcupine abyssal plain
ENVIRONMENTAL INDICATORS (MSFD)	Anthropogenic impacts on open ocean systems

NORWAY

REPRESENTING ENTITY:
University of Bergen
REGIONAL FACILITY 1

NORDIC SEAS

SCIENTIFIC OBJECTIVES

Better understand the drivers for the temporal and spatial changes of water mass transformations, ocean circulation, acidification, and thermo-chemical exchanges at the seafloor in the Nordic Seas, and contribute to improvement of models and forecasting by collecting and making available high-quality data.

GENERAL INFORMATION

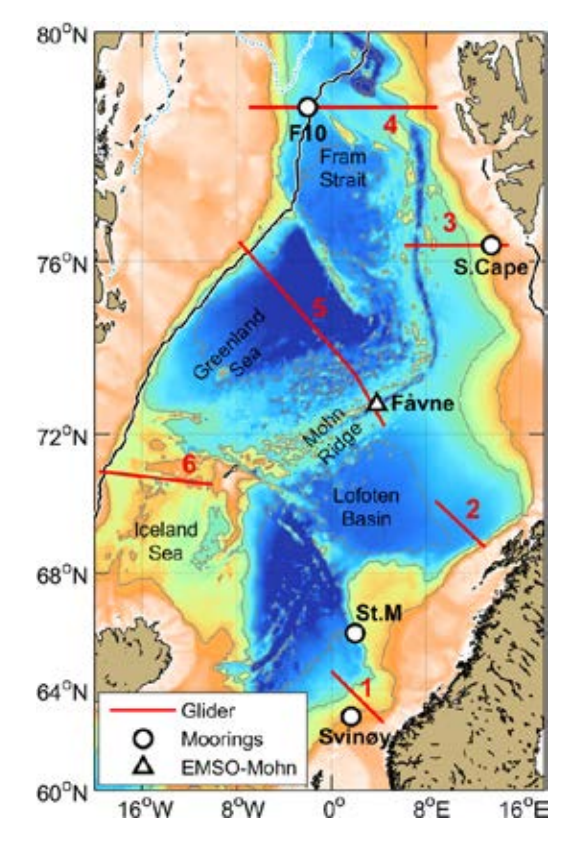
Location: Norwegian Sea, Greenland Sea, Iceland Sea, Fram Strait
Distance from land: Distributed, 50– 1000 km
Max water depth: 3050 m
Date 1st deployment: Fall 2020
Supported by: Kingdom of Norway
Operated by: University of Bergen, Institute of Marine Research, NORCE, Norwegian Polar Institute, University of Tromsø, and Norwegian Meteorological Institute
Website: https://www.uib.no/en/noremso/
Status: in development (update date – October, 2022)
Regional Team Leader: Ilker Fer, University of Bergen

SUMMARY

The Nordic Seas regional facility is a distributed infrastructure, member of the EMSO consortium and comprises multiple ocean glider sections, 4 oceanographic mooring sites, and one seabed-water-column-coupled observatory.

Glider transects are in the Norwegian Sea (Svinøy: 62.7°N, 4.4°E - 64.7°N, 0.0°E; Gimsøy: 68.8°N, 13.0°E - 70.2°N, 8.8°E), Fram Strait (78.8°N, 9.0°E - 78.8°N, 7.0°W), the Greenland Sea (73.5°N, 2.0°E – 76.4°N, 7.8°W) and the Iceland Sea (70.6°N, 10.0°W – 71.0°N, 19.6°W). All gliders measure temperature, salinity, pressure, and depth-averaged velocity. Gliders are in operation since 2021.

Mooring sites are Svinøy (63°N 4°E in the southern Norwegian Sea at 500 m isobath; ocean currents, temperature and salinity; running since 2020); Station M (66°N 2°E in the Norwegian Sea at 2050 m isobath; temperature, salinity and pCO2; running since 2020), South Cape (76.107°N 15.967°E, off South Cape of Svalbard at 390 m isobath near the gas hydrate Pingo; temperature, salinity, pH, CH_4 and CO_2



sensors; in development), and the central Fram Strait (78.83°N 2°W in Fram Strait at 2655 m isobath; ocean currents, temperature, salinity, dissolved oxygen, pH and pCO_2; running since 2020).

The fixed-point seabed-water-column-coupled and wireless observatory is at the Mohn Ridge (72.756°N 3.834°E, Fåvne vent field at 3050 m isobath; in development). The observatory will be composed of one deep-ocean water-column mooring coupled with a seafloor node, and of a transmission buoy that communicates acoustically with the seafloor station and relays data (pressure, temperature, turbidity, currents) via satellite.

EMSO scientific disciplines: geosciences, physical oceanography, biogeochemistry, marine ecology (planned).

SCIENCE SERVICE CATEGORY	SCIENCE SERVICE NAME
WATER COLUMN PHYSICS AND BIOGEOCHEMISTRY	Svinøy: Hydrodynamic changes in the water column and transport series of the Norwegian Atlantic Current
	South Cape: Methane release variability and transport
	Fram Strait: Hydrographic and current variability in the Arctic water column
	Station M: Hydrography and biogeochemistry time series in the Norwegian Basin
	Gliders: Hydrography and currents along 5 glider sites in the Nordic Seas
	EMSO-Mohn: Hydrothermal plume variability and transport
ENVIRONMENTAL INDICATORS (MSFD)	South Cape: Influence of high methane content in water column geochemistry
	Station M: Anthropogenic impact in the southern Nordic Seas