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# Environmental monitoring



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# Goals

Environmental monitoring serves to **assess environmental conditions and trends.**

It **supports policy development** and its implementation and provides information to national policymakers, international organisations and the public.

It is critical to the **protection of human health and the environment.**



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# Applications

- Climate change and adaptation
- Weather forecasts
- Shipping and offshore activities
- Emergency situations coordination
- State of the environment
- Fisheries management
- Biodiversity trends



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# Approaches

- Satellite observations
- On-site measurements
  - Research vessels
  - Profilers / Argo floats
  - Gliders
  - Fixed oceanographic stations
  - Surveys of marine life
- Data on physical, chemical and biological systems



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# Satellite observations

Copernicus - EU Earth  
observation programme

<https://www.copernicus.eu>



NASA Earth Observatory

<https://earthobservatory.nasa.gov>



GEOSS Portal

<https://www.geoportal.org>





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# In situ monitoring

**AUVs and ROVs** - autonomous underwater vehicles and remotely operated vehicles

**Argo floats** - profiles of temperature, salinity and currents from sea surface to 2000 m

<http://www.monoceanetmoi.com>

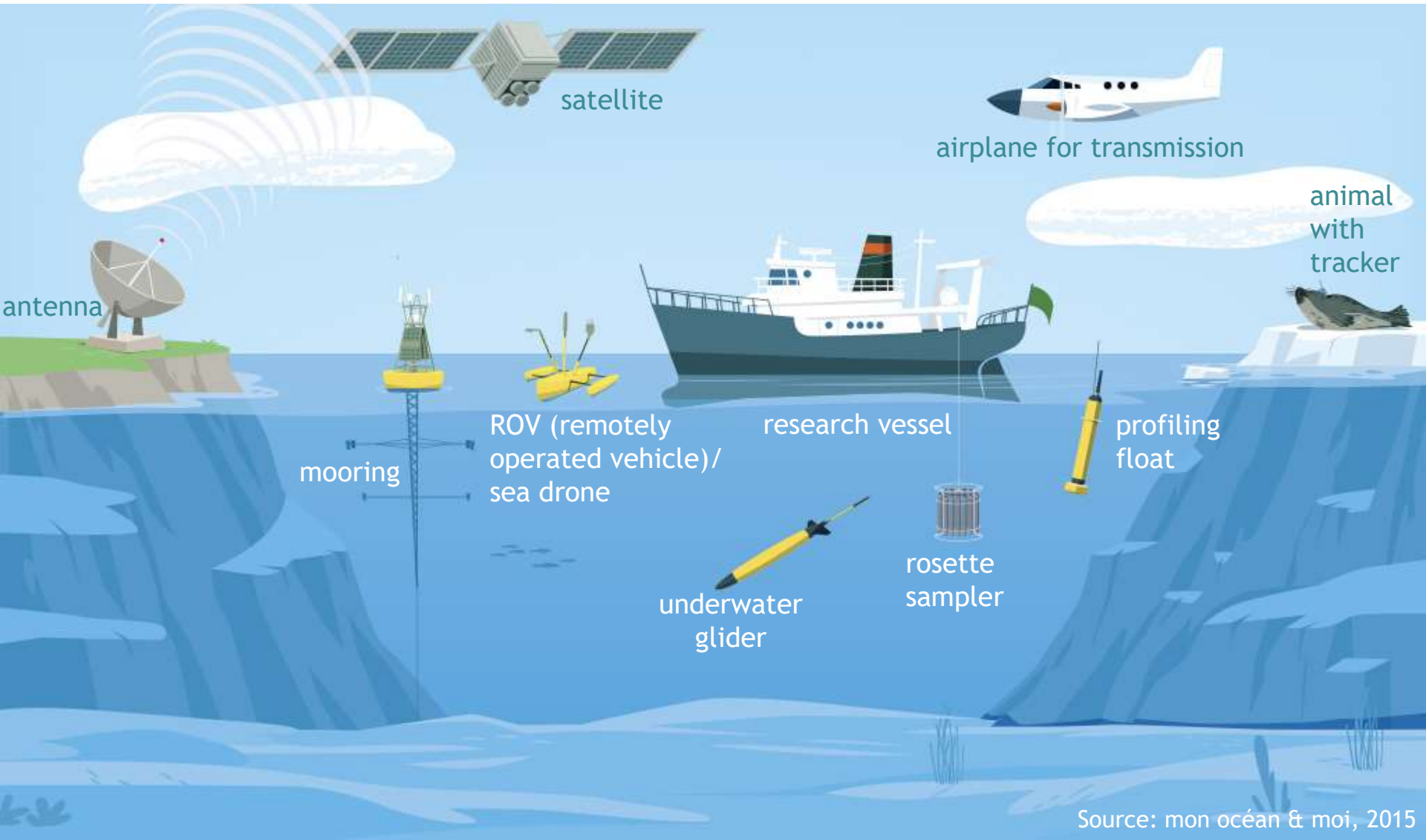


<https://argo.ucsd.edu>



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satellite

airplane for transmission

animal  
with  
tracker

antenna

mooring

ROV (remotely  
operated vehicle)/  
sea drone

research vessel

profiling  
float

underwater  
glider

rosette  
sampler



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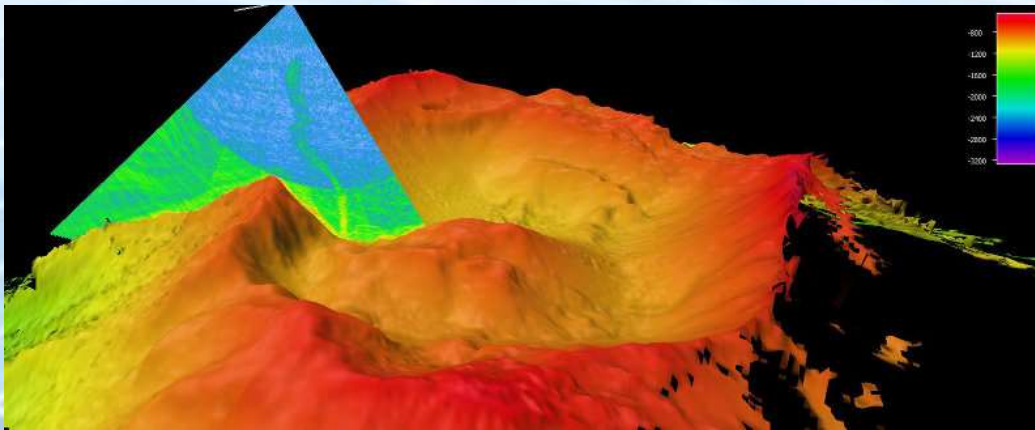
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# Surveys and samples

**Rosette sampler** - measuring conductivity, temperature and depth (CTD)

**Sonars** for seafloor mapping and underwater archeology







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# Fisheries management

Regular monitoring  
provides necessary data  
for managing fisheries.

Sustaining fishing yields  
and conservation of  
marine resources  
requires understanding  
of changes in fish  
populations.



Beam trawl

# MSFD monitoring programmes

Every EU coastal country has a **national monitoring programme** which measures its progress towards good environmental status of marine waters. It covers the following areas:

- Biodiversity
- Non-indigenous species
- Commercial fish stocks
- Food webs
- Eutrophication
- Sea floor integrity
- Hydrographical conditions
- Contaminants in the marine environment
- Contaminants in sea food
- Marine litter
- Underwater noise



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# Regional cooperation in the Black Sea

Black Sea Integrated Monitoring and  
Assessment Program (BSIMAP), 2002

Regional Marine Litter Monitoring Programme,  
2018

Projects supporting regional environmental  
monitoring

- EMBLAS Plus
- ANEMONE
- CeNoBS
- EO4SIBS



# Citizen science for environmental monitoring

## Beach litter

Marine LitterWatch



## Clouds

GLOBE Observer: Clouds



## Marine research

Sea Watchers / Observadores del Mar



## Birds

SmartBirds Pro



# Summary

- Monitoring is essential for better understanding of the environment and the changes occurring in it
- Monitoring is performed by a combination of remote sensing and on site measurements
- Common efforts across national borders are indispensable for a grasp of the ongoing processes
- Citizen sciences contributes to a more detailed picture of the environment



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