Monitoring the coastal ocean: from local to regional

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RAIA partners

Ocean monitoring

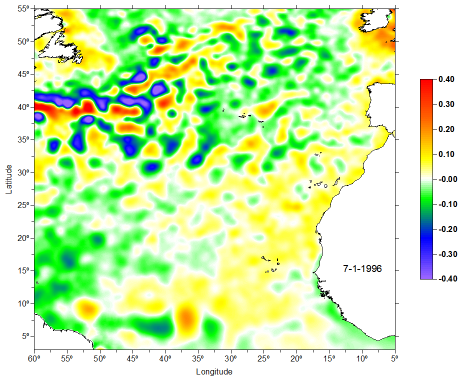
- To **answer key societal and scientific challenges** – navigation safety, fisheries, floods, coastal erosion, climate variability, sea level variations, ecosystem services, leisure, etc. – we need to characterize and understand ocean dynamics at different scales.
- Ocean/land transition zone have specific demands in terms of the **spatial** (local effects) and **temporal** (short events) **scales**.
- Coastal Observatories play a key role in providing information for operational oceanography at **regional and local scales**.

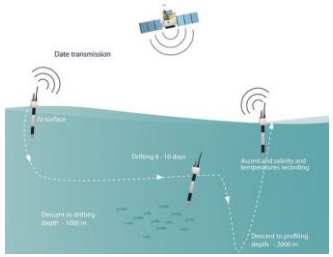
Why and what to monitor

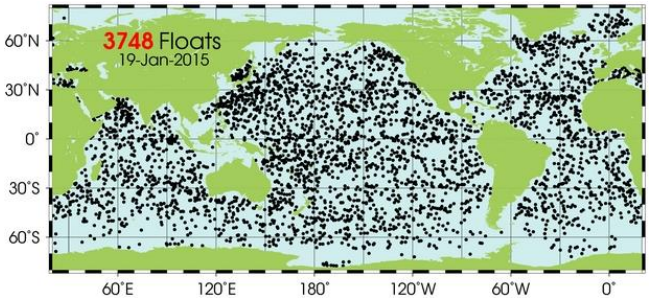
- Why
  - Understand variability at different scales, correlations, impact of local conditions, improve oceanographic models, human impact and vulnerability…
- What
  - Physical, meteorological, biological and chemical parameters, sediments, ocean noise, bottom topography, coastline morphology…

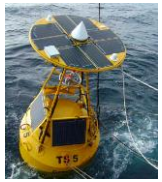
How to monitor - Open Ocean

- **Marine** (buoys, drifters, gliders, vessels, seafloor platforms, etc.)
- **Space** (remote sensing from satellites)





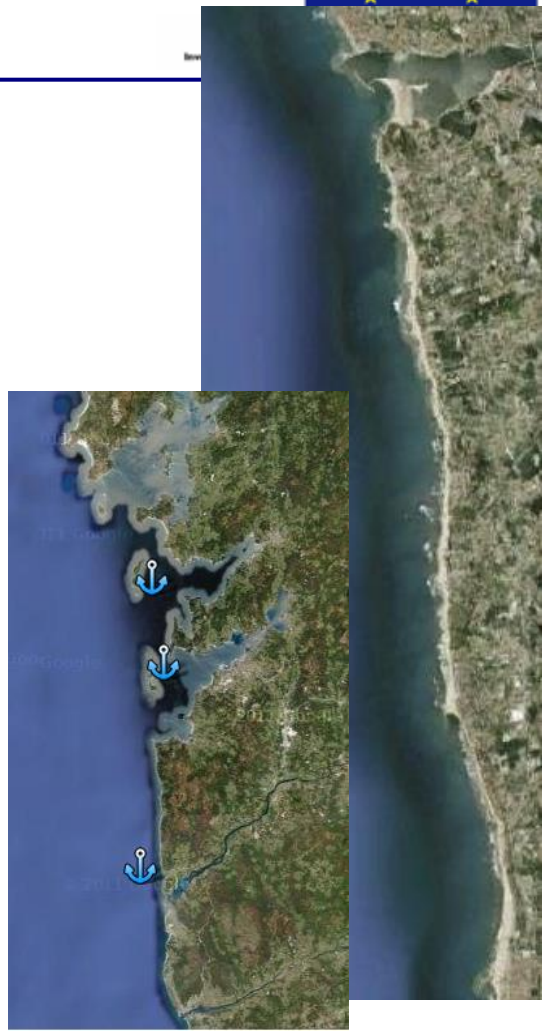


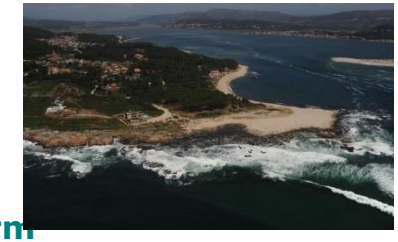


Resolution needed for open ocean is not adequate to investigate processes at small scales.

Coastal ocean

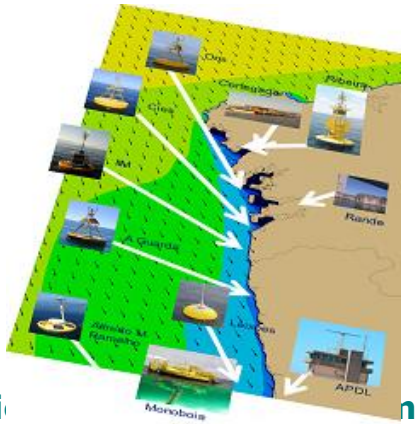
- Different shores
- Local/regional conditions prevail
  - Littoral currents
  - Coastal morphology
  - Near shore bottom topography
  - etc.

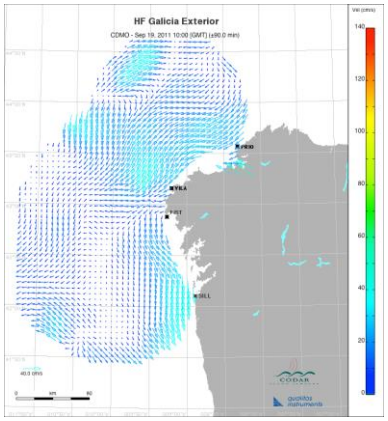


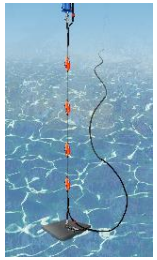


How to monitor - Coastal ocean

- **Marine** (buoys, profilers, drifters, gliders, Autonomous Underwater Vehicles (AUVs), Autonomous Surface Vehicles (ASVs), vessels, platforms of opportunity, etc.)
- **Space and aerial** (remote sensing from satellites, aircrafts or Unmanned Aerial Systems-UAS)
- **Terrestrial** (HF radars, optical sensors, meteo sensors, etc.)







Monitoring the coastal ocean

- Define **spatial and temporal scales** to be addressed.
- Combine continuous **in-situ observations with periodic measurements** (using mobile platforms) to extend the monitoring coverage.
- **Integrate observation systems** to monitor different parameters at the sea surface and along the water column (physical and biochemical parameters wave characteristics, SSH, sea-bottom topography, etc.).

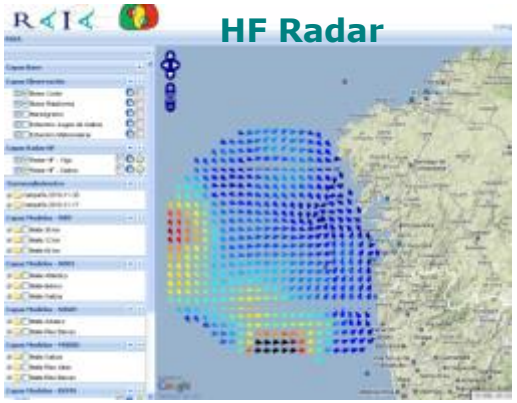
Guarantee long term monitoring to understand ocean variability.

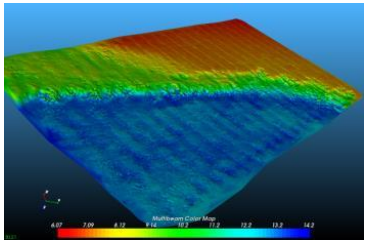
Monitoring outputs

- Data for improving operational forecasting models.
- Information and products tailored to specific communities:
  - Science;
  - Decision makers (sustainable development, Civil Protection, environment monitoring, …);
  - Navigation and port authorities;
  - Renewable energies;
  - Leisure (nautics, surf, swimming,..)
- New platforms and sensors;
- Support to Early Warning Systems.

RAIA Observatory (www.observatorioraia.org)

- Use a multi-platform approach to collect data - buoys, moorings, drifting buoys, satellite, HF radar.
- Deploy tailored solutions and methodologies for monitoring and mapping the coastal zone.
- Manage data and data access (web and mobil interfaces).
- Improve oceanographic models and products for endusers.





Technical challenges

- Low cost plattforms easy to deploy and maintain;
- Low cost/low power consumption sensors and systems;
- New solutions for power supply and harvesting (exploit renewable energies);
- Efficient and affordable data transmission using mixed air/water solutions (acoustic, wifi, etc.);
- Innovative sensors (specially to collect biological and chemical data).

Improve monitoring cost-effectiveness

Drivers for coastal ocean research

- Provide **seamless data access** (real time or delayed mode).
- Define/monitor **Essential Ocean Variables.**
- Colect multi-scale/multi-temporal data (from **seconds to decades**).
- Guarantee **continuous monitoring** for extended time periods.
- Promote **citizens ocean observatories**.

Deliver information to answer society needs

Atlantic coastal observatories network (MyCoast)

- Use common observation strategies.
- Use standard data management to align with other european initiatives – interoperability standards (OGC, ISO19100).
- Link ocean observatories/initiatives to avoid duplication of effort (EuroGOOS, ARGOS, ATLANTOS, MyOcean, GEO, EMODNET, SeaDataNet.
- Understand changes;
- Improve predictions.

Support the scientific community, the industry and the society in general