Overview of CMEMS In Situ TAC: current phase, key areas of service developments, areas for ongoing and emerging collaboration with EMODnet

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Overview of the In Situ TAC, from the measurement platforms to the data management activities of the TAC

1. Platform networks are associated to GOOS international and European (ERIC, EuroGOOS) contributions when relevant.
2. Data flow from the platforms to In Situ TAC, SeaDataNet EMODnet physics and chemistry *main stream*
3. Added value provided by In Situ TAC in terms of knowledge and activities within the Copernicus marine service.

Current phase: in situ marine platforms

❑ Argo

- International programme, Euro-Argo ERIC at EU level
- profiling floats
- Measurements: temperature and salinity, completed by biogeochemical, e.g. oxygen, nitrate, chlorophyll, pH parameters

❑ Research vessels

- use of various marine platforms such as
  - XBT, XCTD, CTD, TSG (temperature and salinity measurements)
  - bottle (e.g. carbonate systems, nutrients, contaminants, oxygen, chlorophyll measurements)
  - ADCP (current measurements) ….
- GO-SHIP programme, GOSUD project

Current phase: in situ marine platforms

❑ Ships of opportunity

- Ships of opportunity e.g. fishing vessels, sailing boats, commercial vessels, passenger ferries are equipped with various in situ platforms to take advantage of their regular transits to make measurements.
- upper ocean surface measurements (temperature, salinity, current, oxygen, pCO2, phytoplankton concentration) using different in situ marine platforms such as XBT, TSG, XCTD, ADCP.
- SOOP, VOS programme, EuroGOOS FerryBox TT at EU level

❑ glider network

- Measurements are physical (temperature, salinity) and biogeochemical ones (oxygen and chlorophyll)
- OceanGlider international programme

Current phase: in situ marine platforms

- **drifting buoys**
  - marine measurements: temperature and derived currents; atmospheric measurements
  - DBCP programme

- **fixed platforms:** moored buoys and deep sea observatories.
  - The moored buoys provide marine and atmospheric physical (temperature, salinity, wave and current for the marine parameters)
    - Coordinated by the international programme OceanSITES
  - The deep observatories measure physical and biogeochemical parameters (such as temperature, salinity, current, pH, seabed movement …) on the seafloor and in the water column in near real time
    - European level, the EMSO ERIC

Current phase: in situ marine platforms

❑ tide gauges

- sea level measurement
- GLOSS programme at global level (which gathers 5 main datasets of different time modes archived in different places) and EuroGOOS tide gauges TT

❑ High frequency radar

- current measurement
- organised through the Global HF radar network. The European HFR node, coordinated by the EuroGOOS HF radar TT

❑ Animal borne

- Measurements of temperature and salinity
- AniBOS emerging international programme

Current phase: oceanographic data nodes …

In situ data observations flow (and are archived) in

GDACs –global data assembly centres

- Argo: Coriolis (Brest, France) and US-GODAE (Monterey, USA) GDACs
- Drifting buoys: Coriolis (Brest, France) and DFO -Fisheries and Oceans (Canada) GDACs
- Fixed platforms: Coriolis (Brest, France) and NDBC (USA) GDACs
- Gliders: no official GDACs but under structuration to follow such data management

European NODCs before being ingested through SeaDataNet

- The European fixed platforms (delayed mode data with additional QC)
- And the data collected by research cruises vessels

Other are available thanks to a EuroGOOS TT

- HF radar that is managed by the EuroGOOS HF radar TT
- And the ferry box data managed by the EuroGOOS FerryBox TT

And tide gauges are dispatched to several databases of the GLOSS community (data mode, frequency)

Current phase: oceanographic data nodes …

- Argo, gliders and drifting buoys near real time are also available on the GTS where they can be harvested when necessary

- SeaDataNet data is in delayed mode (most recent data has 1 year delay from near real time).

  In situ data from (European and international) cruise research vessels can also be found in ICES that hosts several databases of the North Atlantic and in the data publisher PANGAEA

Current phase: … and European integrators

Near real time data harvested continuously by **In Situ TAC**

- Argo profilers, gliders, drifting buoys and fixed platforms from Coriolis (GDAC) database
- HF radar, the European tide gauges and the FerryBox data thanks to the support of the EuroGOOS TT
- research vessels data from the regional in Situ TAC leaders.

Delayed mode research vessels data is collected once a year from SeaDataNet for the global region.

Key areas of service developments

In Situ TAC
Through Copernicus, this group shares its expertise and works together on

- Duplicate management.
- Quality control (QC). A light QC in the near real time in situ products; an additional and more advanced QC on delayed mode data
- Integration of the whole time series available from a platform and completion of missing periods when possible.
- Collaboration with external partners, with the in situ platforms communities to altogether get the data and beneficiate from their knowledge. On their side, the communities request some visibility within the in situ Copernicus marine products

Key areas of service developments

In addition and this is true for all the Copernicus marine TACs and MFCs

- cross cutting product quality/validation between products is a source of enhancement and adjustment of in situ products
- All products independently of their source (model, satellite, in situ) proposed through a unique catalogue which implies some homogenisation in terms of information (and documentation as the PUM and QuID) and access (including metadata and formats) that definitely improves the user uptake
- Copernicus marine operational engagements, increase the robustness of the service and provide confidence to the users

With EMODnet physics

For NRT, process

- As soon as data available somewhere, it is ingested in EMODnet physics (technical work done and available) with EMODnet ingestion
- In Situ TAC is informed
- In situ TAC ingests the data as well or installs a collaboration with providers
- When ingested, In situ TAC qualifies the data before adding it in the catalogue
- EMODnet physics harvest the last version of data from in situ TAC

MIC group has clarified this process
+ allow to share the first contact with providers (for NRT, for historical data)

Ongoing activities

EMODnet chemistry

All delayed mode data QCed by EMODnet chemistry harvested in In Situ TAC

Ongoing activities

EMODnet physics

Additional variables : wind, river flow, underwater noise

→ In situ TAC to provide information to EMODnet physics

Technical development on EMODnet physics side

Collaboration with providers on In Situ TAC side

→ To share the outputs? By informing the providers from beginning

EMODnet chemistry

QCed delayed mode data fully harvested in In Situ TAC. Data mainly from SeaDataNet

→ In situ TAC to provide additional data from other sources?

→ To work together to add NRT data in the process?

Possible emerging collaboration

Conclusion

- Some overview of data flow from the providers to the European data integrators
  - Still need be refined and agreed between us (EMODnet, Copernicus and SeaDataNet)
- Collaboration between EMODnet physics & ingestion and In Situ TAC –through the MIC is increasing and clearer with time
  - Needs be enhanced with EMODnet chemistry. Needs and interaction are different dealing mainly with historical data
  - Needs also be enhanced with EuroGOOS. Some work to be done with new person involved
- To continue to work on coastal areas
- Might have some possible collaborations with EDMOdnet biology (start with plankton?)

Conclusion

Overall objectives:

- To clarify the data flow (e.g. avoid to do 2 times the same things or the user to take not QCed data)
- To ease the access and understanding of users for the marine data & offer et European scale