

# Enhancing the integration of in-situ Atlantic Ocean observation data and services to users

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The targeted European data system within AtlantOS project is not a new system but integrates existing data systems, these being enhanced to ingest and deliver more in-situ observation data on Atlantic Ocean and to better serve the users, in a harmonized way across the systems. The existing data systems are diverse in-situ observing network systems operating in the Atlantic Ocean and existing European and international data infrastructures and portals, termed integrators (e.g. Copernicus INS TAC, SeaDataNet NODCs, EMODnet, ICES, EurOBIS, GEOSS).

The actors of such integrated system are overall mature systems with long-term experience and established procedures for data collection and management often agreed at international level. Consequently, trying to implement a sovereign and rigid set of rules for all the actors to comply with, would be highly challenging and not in the best interest for an efficient Atlantic Ocean observing system able to deliver appropriate products to users. Therefore, the AtlantOS community recommended to

- Rely on existing European and international standards and protocols, first focussing on metadata by implementing a minimum set of mandatory information and using agreed vocabularies at all level of the processing chain (Common Vocabulary for parameters, Common Unique ID for Platform and code for Institution, etc.) that allows easier traceability of the observations along the processing and distribution dataflow.
- Encourage open and free data policy.
- Focus on data quality by implementing a set of common near Real Time QC procedures for 7 Essential Variables (Temperature, Salinity, Current,

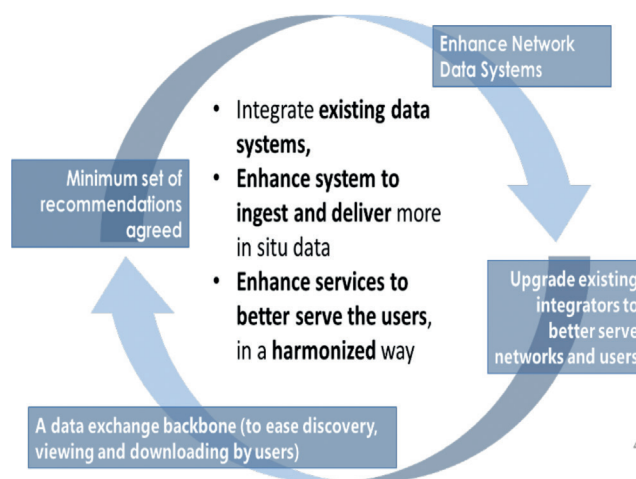


Fig. 1 - Integrated data system of AtlantOS.

Sea-Level, Oxygen, Chlorophyll, Nitrate and Carbon) acquired in near real time (distributed within a few hours to several days).

- Enhance access to network data by setting up a unique entry point to discover and download existing data, either by integrating the data in existing international network Global Data Centres or by setting up new ones.
- Connect to existing integrators.
- Enhance monitoring facilities offered by JCOMMOPS.
- Document the existing services through a catalogue that describes the existing network and integrator services and allows connection to the Global Earth Observation System of Systems (GEOSS).

To move toward the integrated data system, the roadmap setup for networks is to implement the recommendations for harmonization across networks and facilitate access to their data. Improvements are underway in most networks although some actions will probably last beyond the AtlantOS project. The major advances are : (1) setting up two GDACs (Global Data Assembly Centres) for Drifters, one in Europe and one in Canada, as central points of data access in Near Real Time and for the best Delayed Mode version; (2) UK and Norwegian data integration underway in the GDAC for Gliders, to improve access to ADCP data for GO-SHIP (with the long-term goal to set up a GDAC); (3) setting up nodes underway in the SeaDataNet infrastructure (SOCAT carbon data from VOS/SOOP and GO-SHIP networks, physical data from CPR network, planned direct GDAC data flow connection to SeaDataNet for Argo, Gliders, Drifters and OceanSITES networks); (4) integration of data from European Tracking Network in EMODnet Biology.

The image displays two panels of the AtlantOS catalogue interface. The left panel, titled "Discovering", features a search bar at the top, a world map with a highlighted region in the North Atlantic, and a filter sidebar. The sidebar includes "ELEMENTS OF THE INTEGRATED SYSTEM" with "Networks (4)" selected, and "ESSENTIAL VARIABLES" with "Carbonate system (4)" selected, along with other options like "Air humidity (3)", "Air temperature (3)", "Atmospheric pressure (3)", "Chlorophyll-a and fluorescence (3)", and "Nutrients (2)". A "Reset filters" button is at the bottom of the sidebar. The right panel, titled "& facilitating access to data services", shows a grid of data services. The top navigation includes "CATALOG", "MAP", and "MY DOWNLOADS". Below the navigation, it displays "Results 1 to 4 on 4 : 20 by page" and "Sort by: Popularity". The grid contains four service cards: "Data from repeat hydrography (GO-SHIP)", "OceanSITES, a worldwide system of deepwater reference station", "Marine biogeochemistry data from the Voluntary Observing Ships or Ships of Opportuni...", and "European database for underway data from FerryBoxes". Each card includes a logo, a brief description, the source, and a share/download icon.

Fig. 2 - AtlantOS catalogue.

For integrators, the roadmap is to enhance their services on network side (ingestion tools to integrate more data, cross network assessments and feedback to networks) and enhance the services on the side of data providers and users (viewing, downloading and traceability/monitoring). Improvements are underway in all integrators where more network data are integrated, and enhanced services are developed. In this framework, the HF Radars have been already integrated in EMODnet Physics and they are going to be integrated in Copernicus INS TAC. The Copernicus INS TAC scope will also include CO<sub>2</sub> even after AtlantOS.

Also common services designed within AtlantOS project are made available to users. On the one hand, a catalogue (<https://www.atlantos-h2020.eu/project-information/atlantos-catalogue>) provides the users with a discovery service of the networks, integrators and products related to Atlantic Ocean, and it facilitates the access to services (viewing, downloading and monitoring) of the existing data systems.

The sustainability at European level of such catalogue beyond AtlantOS will be achieved through GEOSS and EuroGOOS. Catalog content, services, data and products available in the integrated system are progressing as existing systems move forward in achieving the goals of data harmonization and integration.

On the other hand, monitoring services designed under the EuroGOOS and JCOMMOPS umbrellas are made available (monitoring dashboard <http://www.emodnet-physics.eu/atlantos/dashboard> , browser of monthly status maps of all operational JCOMMOPS platforms on the Atlantic Ocean <http://www.jcommops.org/board/wa/Archives?t=JCOMMOPS&availableMaps=jcommops-atlantic&displayedMap=jcommops-atlantic>), and also traceability services that aim to give visibility on data usage to data providers.