

A powerful source of data to advance ocean science

Argo floats' data go through a sophisticated network of processing and management systems that certify its quality and make it easily accessible.

The Argo floats' data are meant to be quickly and easily used by users all around the world. Each time an Argo float finishes one of its observation cycles, it transmits its measurements via satellite to data assembly centers, or DACs. There are two duplicated Global DACs: one in the United States, and one in France near Euro-Argo's headquarters. The Argo community has developed and maintains a data system that can process and manage data in real time. Another Argo data stream can detect and correct drifting issues in delayed mode.

"We have privileged access to the data and can thoroughly look at the measurements to detect potential problems", explains Claire Gourcuff, science officer at Euro-Argo, who's in charge of data monitoring. Argo data experts recently noticed drifting issues with some salinity sensors for instance, a common problem for sensors. This is where Claire and her international colleagues' expertise as oceanographers comes in handy. "If the float shows a weird reading, that means that either the sensor is malfunctioning or, on the contrary, the sensor works perfectly and it has sampled an exceptional phenomenon," she says. "In these cases, it's really important to know the ocean's properties in the regions where the float was deployed."

"Since the beginning, Euro-Argo and the international Argo community have been using standards recommended by the International Oceanographic Data and Information Exchange (IODE)", says Sylvie Pouliquen, Euro-Argo former director. "Euro-Argo has been a leader in designing and implementing the Argo data system, and is operating two of the data portals that provide free and open access to all the Argo data". Euro-Argo has also been a pioneer in integrating FAIR (for findable, accessible, interoperable and reusable) data services in the Argo data system. "In 4 years, with the support of the European Commission, Argo data system has gone from FAIR for humans, to FAIR for machines with the creation of the Argo Vocabulary Server and new machine-to-machine services", Sylvie Pouliquen states.



The international Argo Data Management Team comes together once a year, Villefranche-sur-mer, France © IMEV

In order to make its data even more accessible, Euro-Argo collaborates with partners such as the European Marine Observation and Data Network, or EMODnet, an initiative funded by the European Union, under the oversight of the European Commission Directorate-General for Maritime Affairs and Fisheries (DG MARE).

“EMODnet is a key public service for in-situ marine data”, states Kate Larkin, deputy head of the EMODnet secretariat. “It gathers all of the marine environmental variables that you can imagine: from the surface to the sea floor, from chemistry, biology, bathymetry, geology, physics, seabeds, habitats and human activities.” This network of experts is composed of 120 organizations across Europe specializing in data management and marine data products and services. EMODnet assembles, harmonizes and standardizes can be interoperable, that is, universally usable.

Access to Argo data is free and open



One of the two Global Data Assembly Centers is hosted by Ifremer, France © Inua Production

“Ocean science infrastructures like Euro-Argo are important data providers for EMODnet,” explains Kate Larkin. EMODnet uses European and international data standards to make sure that this data can be used as very high-resolution data layers. “Euro-Argo works with EMODnet on data accessibility, sharing information about improvements made in the Argo data System and about new available services,” explains Sylvie Pouliquen.

“Euro-Argo also collaborates with EMODnet on biogeochemical variables data quality in relationship with EMODnet-chemistry and with Copernicus Marine to allow the use of Argo data in the value-added products generated by EMODnet and Copernicus Marine.”

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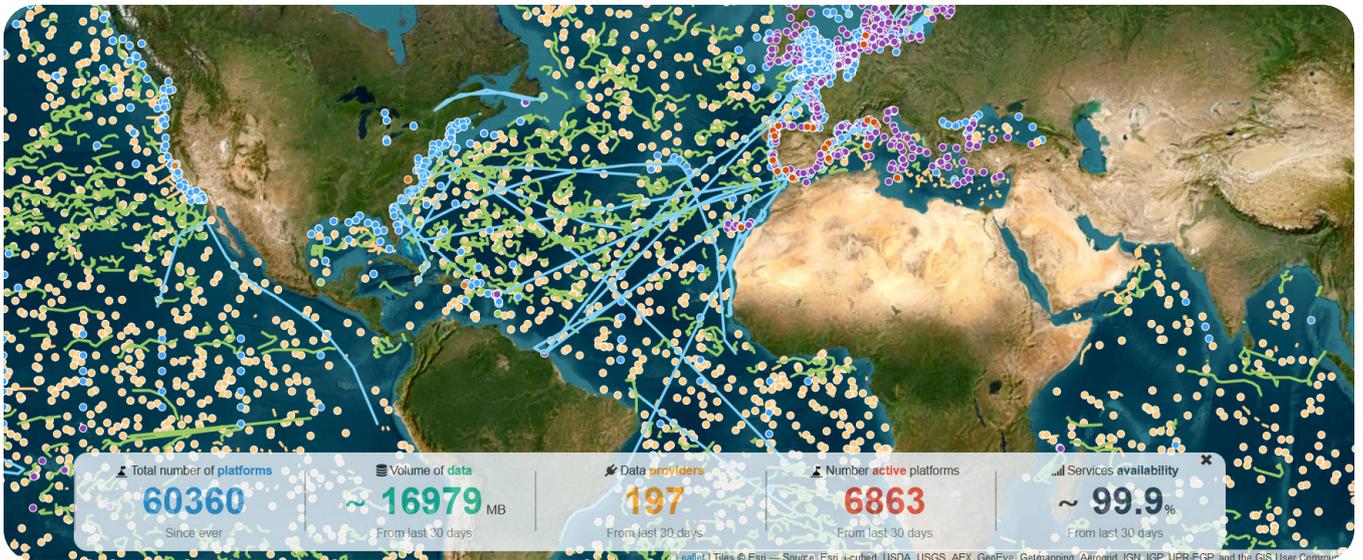
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Network visualization dashboard of Copernicus Marine's In Situ Thematic Assembly Centre, integrating data from almost 200 in situ data providers, including Argo profiling floats (indicated by the orange dots in the image above)

EMODnet has been built during the last two decades or more in parallel with the Copernicus Marine Service. The latter is one of the six services of the European Union Copernicus Earth Observation program. The Copernicus Marine Service, implemented by Mercator Ocean International, provides an operational monitoring and forecasting of the global ocean and European regional seas.

The two programs are complementary. EMODnet focuses on distributing harmonized, standardized and integrated in situ data whereas Copernicus Marine processes in-situ data together with satellite data and models for operational oceanography purposes.

At a global scale, the Copernicus Marine Service, through its in situ Thematic Assembly Centre (TAC), receives in-situ observations from infrastructures such as Euro-Argo. Thanks to this data, the in-situ TAC produces validated and integrated data products needed to improve ocean forecasting models, validate satellite observations or for research and downstream applications. "We now have outstanding examples that show how combining satellite data with Argo data substantially improves our ability to describe the inner layers of the ocean and to predict how the state of the oceans can evolve," says Pierre-Yves Le Traon, the scientific director of Mercator Ocean International. "Argo by itself is already a huge success, but combined with satellite data (such as altimetry) and models, it is even more compelling."



Sylvie Pouliquen

Euro-Argo ERIC former program manager



Claire Gourcuff

Science Officer, Euro-Argo ERIC



Kate Larkin

Deputy Head of the EMODnet secretariat



Pierre-Yves Le Traon

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The article was produced by Anh-Hoa Truong, an independent scientific journalist/ INUA Prod in close collaboration with Lillian Diarra (Mercator Ocean International) and Marine Bollard (Euro-Argo). It is one of a series of 10 articles showcasing Euro-Argo and its unique contribution to the international Argo program and the global ocean observing system, and how it is transforming ocean research and our understanding of the ocean.

This article is part of the EU4OceanObs Ocean Observing Awareness Campaign | Part 1: Euro-Argo.



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Find out more

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- Euro-Argo: www.euro-argo.eu
- Copernicus Marine Service: marine.copernicus.eu
- European Marine Observation and Data Network (EMODnet): emodnet.ec.europa.eu
- Deep Argo: argo.ucsd.edu/expansion/deep-argo-mission
- Biogeochemical Argo (BGC-Argo): biogeochemical-argo.org
- European Global Ocean Observing System (EuroGOOS): eurogoos.eu
- OceanOps: www.ocean-ops.org
- International Argo Program: argo.ucsd.edu
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