



One of the two Global Data Assembly Centers is hosted by Ifremer, France.

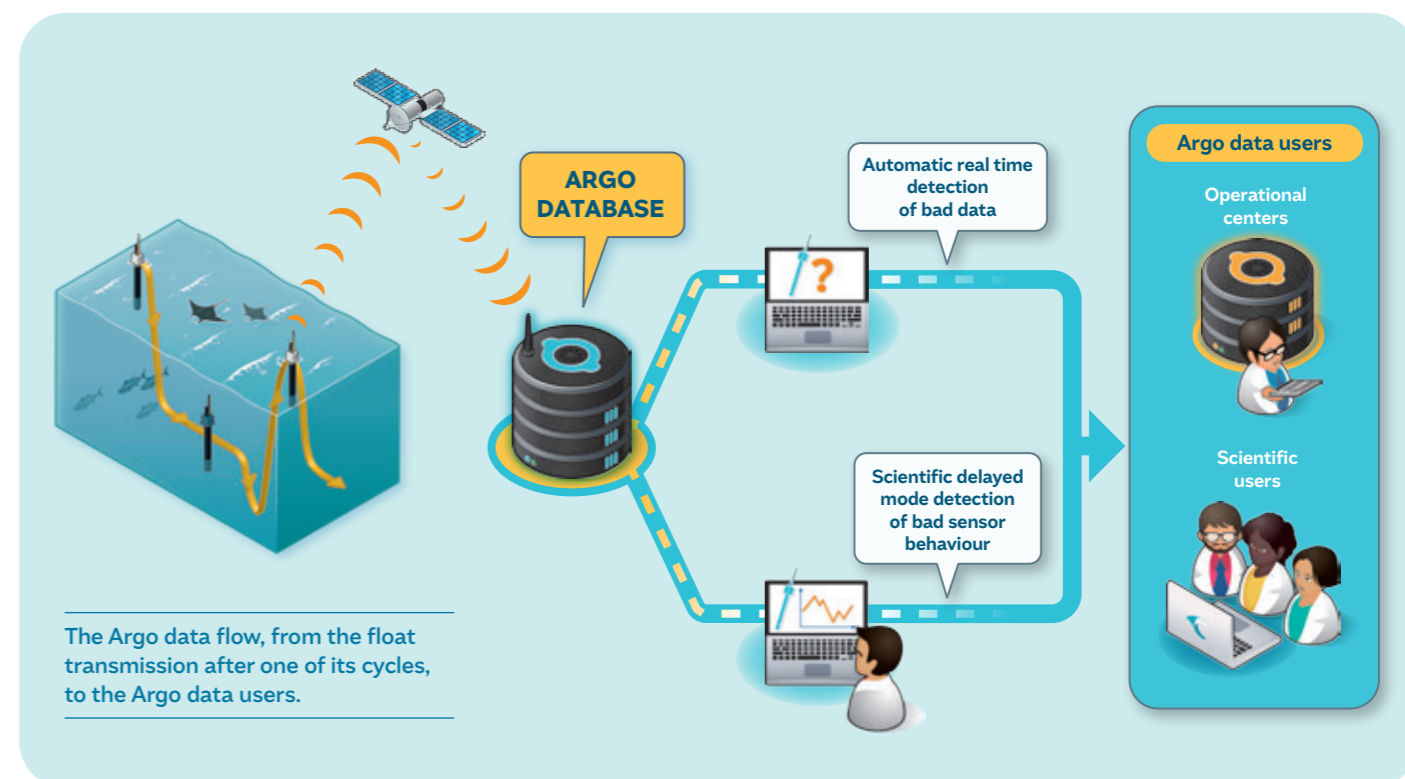
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## 5 A POWERFUL SOURCE OF DATA TO ADVANCE OCEAN SCIENCE

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

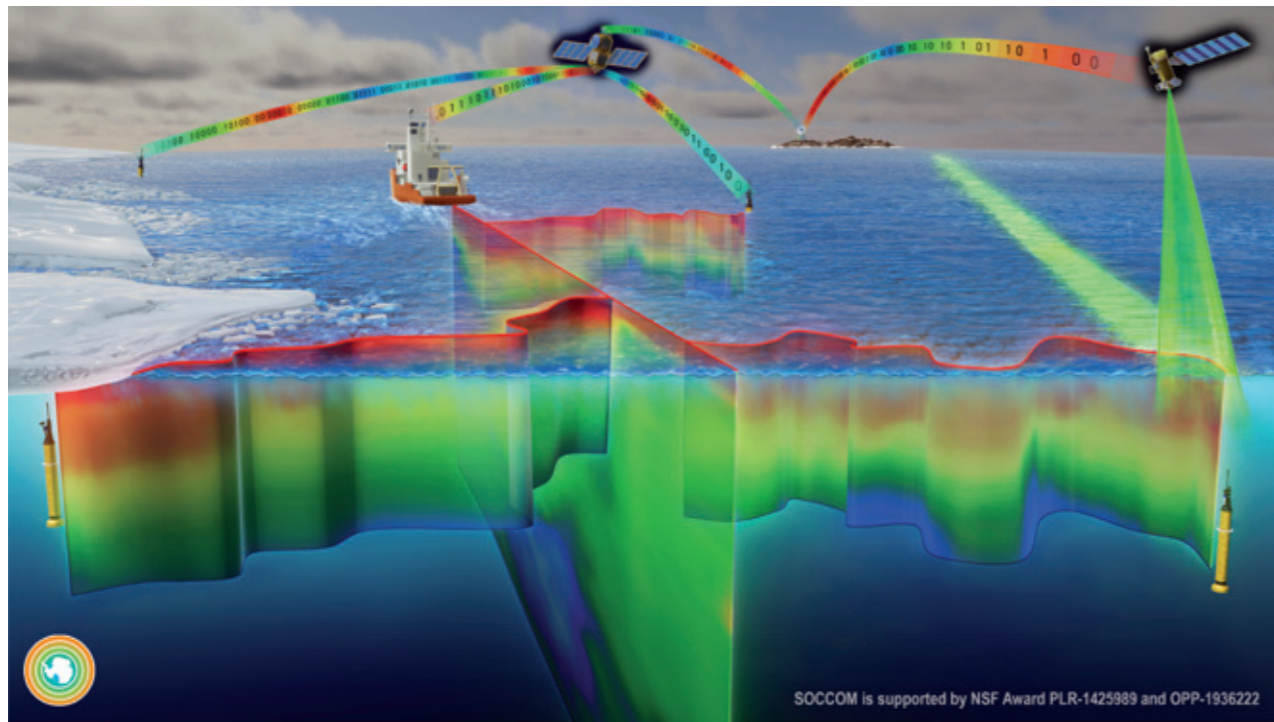
The Argo floats' data is intended to be quickly and easily used by researchers around the world for a wide range of applications. Each time an Argo float completes one of its observation cycles, it transmits its measurements via satellite to Data Assembly Centers, or DACs. Two synchronised Global Data Center provide access to the same Argo data: one in the United States, and one in France near Euro-Argo's headquarters. The Argo community has developed and maintains a data system capable of processing and managing data in real time. A second Argo data stream enables detecting and correcting fine sensor drift in delayed mode.

"We have privileged access to the data and can scrutinise the measurements to detect potential problems," explains Claire Gourcuff, Science Officer at Euro-Argo, who is in charge of data monitoring. Argo data experts recently noticed drifting issues with certain salinity sensors for instance, a common problem for this kind of sensors. This is where Claire Gourcuff and her international colleagues' expertise as oceanographers comes in handy. "If the float shows a weird reading, this means that either the sensor is malfunctioning or, on the contrary, the sensor works perfectly and 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 is traveling."



The Argo data flow, from the float transmission after one of its cycles, to the Argo data users.

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Euro-Argo delivers critical data complementary to satellite observations for assimilation in ocean analysis and forecasting models, as well as in weather and climate forecasting.

## WHAT IS ARGO?

Argo is an international programme that collects information from inside the ocean using a fleet of robotic instruments that drift with the ocean currents and move up and down between the surface and down to 6 000 metres deep. Each instrument, called float, spends almost all its lifetime below the surface.

## WHAT IS AN ERIC?

The European Research Infrastructure Consortium (ERIC) is a specific legal form that facilitates the establishment and operation, on a non-economic basis, of Research Infrastructures with European interest. The ERIC membership is made up, on a voluntary base, of EU Member States and associated countries. By 2022, 24 research infrastructures have been established as ERIC in fields as various as Energy, Environment, Health & Food, Physical Sciences & Engineering, and Social & Cultural Innovation. Euro-Argo ERIC was created in 2014 to coordinate and foster the collaboration between national Argo programmes.

“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 Programme Manager. “Euro-Argo has been a leader in designing and implementing the Argo data system, and is operating two of the main data access portal services that facilitate 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 four 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.

Euro-Argo is one of the most important *in situ* infrastructure delivering required data for the Copernicus Marine Service (CMS), one of the six services of the European Union Copernicus Earth Observation programme. Mercator Ocean International has been entrusted by the European Commission to implement the CMS, which provides an operational monitoring and forecasting of the global ocean and European regional seas.

At a global scale, the Copernicus Marine Service, through its *in situ* Thematic Assembly Centre (TAC), receives observations from infrastructures such as Euro-Argo. Thanks to this data, the *in situ* TAC pro-

duces some new value-added data, called “data products” that have been validated and harmonised with the observations from other networks”. Those data products are needed to improve various applications of operational oceanography, such as ocean forecasting models, but also to validate satellite observations or carry out climate research. “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 might 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.”

In order to make its data even more accessible, Euro-Argo also 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 conceivable marine environmental variables: from

the surface to the sea floor, from chemistry, biology, bathymetry, geology, physics, seabeds, habitats and human activities.” EMODnet relies on a network of 120 expert organisations across Europe specialising in data management and marine data products and services. EMODnet assembles, harmonizes and standardizes the data so that they can be interoperable, that is, universally usable.

“Ocean science infrastructures like Euro-Argo are important data providers for EMODnet,” explains Kate Larkin. EMODnet uses European and international data standards to ensure that this data is usable by a wider community, especially those using Global Information system (GIS) tools to map it in combination with other information such as ice-covered areas.

“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, who adds: “Euro-Argo also collaborates with EMODnet Chemistry on biogeochemical variables data quality to contribute to the monitoring of the impacts of global warming and in particular to better assess the capacity of the ocean to be a carbon sink.”

## FIND OUT MORE

- **Video “Euro-Argo: Transforming Global Ocean Observation”:** <https://youtu.be/im4HVIK4hVU>
- **Euro-Argo data access:** <https://www.euro-argo.eu/Argo-Data-access>
- **Argo data management:** <http://www.argodatamgt.org/>
- **EMODnet:** <https://emodnet.ec.europa.eu/en>
- **EMODnet Chemistry:** <https://emodnet.ec.europa.eu/en/chemistry>
- **Copernicus Marine Service:** <https://marine.copernicus.eu/>
- **Dashboard - Copernicus Marine In Situ TAC:** <http://marineinsitu.eu/dashboard/>
- **International oceanographic data and information exchange (IODE):** <https://www.iode.org/>

The article was produced by Anh-Hoa Truong, an independent scientific journalist/ INUA Prod in close collaboration with Marine Bollard (Euro-Argo ERIC) and Lillian Diarra (Mercator Ocean International). This article is part of the EU4OceanObs Ocean Observing Awareness Campaign | Part 1: Euro-Argo.

<https://www.eu4oceanobs.eu/oceanobserving-awareness/ocean-observing-awareness-euro-argo/>



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