

# 6 OPERATIONAL ENGINEERS: THE BACKBONE OF THE ARGO REVOLUTION

As they organise procurement, test, coordinate deployment and monitor floats, operational engineers play an essential role in the Argo programme.



A Deep Argo float tested at the Ifremer facility.

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Argo float tested at the Ifremer facility by Romain Cancouët, who is in charge of all operational tasks at Euro-Argo ERIC, and Delphine Dobler, data scientist at Euro-Argo ERIC.

One thing that makes Argo floats such unique Ocean Observation assets is that they are totally autonomous. Once they are deployed and during their typical five-year lifetime, these instruments are programmed to go through diving cycles and will seldomly require human intervention. This also means that if one of these floats is launched while not functioning correctly, this 20 000 to 150 000 euros piece of equipment could be lost for good. Making sure that floats are working smoothly before, during and after their deployment, is part of the job of operational engineers.

“We first set contracts with the manufacturers to procure platforms and sensors that will fulfill technical specificities required by the scientists and their research,” explains Romain Cancouët who is in charge of all operational tasks close to the Euro-Argo ERIC (European Research Infrastructure Consortium). “There are

many benefits for being a Euro-Argo member: reduced prices as we purchase floats in bulk, centralised purchase and after-sales management, access to storage in our facility and stock management,” he notes.

The floats undergo a series of tests in a unique facility: a 20-metre deep basin at the Euro-Argo headquarters located on the French Research Institute for Exploitation of the Sea (Ifremer) campus in France. “We check if they dive and ascend correctly, if they transmit their data via satellite and also test if the sensors are working properly,” Romain Cancouët says. For Deep Argo floats that can dive to a depth of 4 000 metres, engineers use a hyperbaric chamber available at the Ifremer premises to simulate the extremely high pressures of the abyssal zone. If there are any defects, returning a float is also made easy for Euro-Argo members since the current equipment provider is located near the consortium headquarters.





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Argo float ready to be deployed.

## 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.

Once the floats have been tested, they are shipped to seaports all around Europe and the world. Argo floats can be deployed from a diverse array of ships: public or private science vessels, opportunity ships such as merchant ships, sailing boats, tourism vessels, cable-ships, etc. These vessels are either regular or on-and-off partners of Euro-Argo. “We have created tutorials and simple guides to train the ships’ crew how to deploy an Argo float,” explains Noé Poffa, an Instrumentation Engineer at Argo France, the country launching the most instruments among the Euro-Argo 13 members. He sometimes supervises

deployments at sea himself. “The procedure depends on the type of boat we boarded: we drop the float in the water either manually or by using a quick-release hook or a crane,” Noé Poffa describes.

The operational engineers check the floats’ diagnostics every week. If problems occur, for instance if a float is caught in an eddy or close to enter ice-covered areas, they can communicate with the float via satellite and control them remotely.

They can modify its parameters so that it will dive and drift at different depths. If a float is defective or if its battery is empty, it is usually left to sink. But when a vessel’s trajectory happens to get close to a malfunctioning or depleted float, operational engineers will at times pilot a retrieval operation from land since they have access to the float’s coordinates in real time. “A successful retrieval depends on the know-how of the ship’s crew and also on pure luck: how agitated the sea is on that day, or how clear communications between us and the boat are,” explains Noé Poffa. “It can be nerve-wracking.” To recover and refurbish more and more floats when it’s possible or cost-effective is one of Euro-Argo’s long-term objectives.

## 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.



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Biogeochemical Argo floats tested at the Ifremer facility.

Via workshops and meetings, Romain Cancouët is getting feedback from the community of Euro-Argo users. “We want to know more about how they operate or would like to operate the floats and what their needs are,” says Romain Cancouët. “We then report back to the manufacturers so that they can implement this feedback in the next generation of floats.” Now, with new generations of Argo floats such as Deep Argo floats which can dive till the abyss and Biogeochemical Argo floats, able to measure up to six biogeochemical variables such as oxygen concentration, Romain Cancouët is working on testing new types of sensors. As part of an Horizon Europe project, he’s connecting with the communities of scientists and engineers who work with different Ocean



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Argo floats ready to be tested at the Ifremer facility.

Observation platforms that use the same sensors as these new floats, such as gliders and moorings. According to Romain Cancouët, “we are building synergies and we are getting insightful feedback about sensors’ failures and data quality control to keep improving our next floats.”

## FIND OUT MORE

- Video “Euro-Argo: Transforming Global Ocean Observation”: <https://youtu.be/im4HVIK4hVU>
- International Argo Programme: [argo.ucsd.edu](http://argo.ucsd.edu)
- Euro-Argo: [www.euro-argo.eu](http://www.euro-argo.eu)

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



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