Internship Master Project M/W

5-6 months (Starting in Feb. – March 2025)

How to apply:
Send your cover letter and detailed resume with the following reference 2025-01/DMO/ECR to recruitment@mercator-ocean.fr

Date of publication: 08/01/2025

Project title (for a Master 2 student internship): Evaluation of Mercator Ocean analyses and forecasts in the Costa Rica area

About the project:

Copernicus Marine Service and coordinates the development of the European Digital Ocean Twin EDITO. In this context, Mercator Ocean develops and operates several global ocean analysis and forecasting systems (high-resolution deterministic, low-resolution ensemble, machine learning). These systems implement complex models whose trajectory is adjusted (data assimilation) to take into account satellite observations of surface temperature, sea height anomalies, ocean color, as well as in situ data of temperature and salinity profiles. Each system has its utility, and together they are complementary to meet the needs of users who need to know the environmental conditions (e.g., temperature, salinity, currents, sea ice presence, plankton concentration, oxygen, or acidity) day by day, at every point in the ocean from the surface to the bottom, their evolution over past decades, and their future evolution.

The digital twins of the ocean will allow users to dive more interactively into this vast amount of data by providing access to data services. They will have basic tools (applications, models, notebooks) to analyze the data directly on a computing platform close to the data (data lake). In 2025, Mercator Ocean is defining a new data service offer. In this context, the intern will integrate and beta test a decision support tool to evaluate and compare Mercator Ocean analyses and forecasts in an ocean area. The test area for this internship will be the exclusive economic zone of Costa Rica, co-organizer with France of the United Nations Ocean Conference in June 2025 in Nice.

The intern will handle digital tools developed in Python, perform calculations and visualizations on a cloud platform, develop a workflow integrating existing Python tools, and contribute to defining the service offer of the EDITO digital ocean twin. The intern will also contribute to setting up service demos for the UNOC conference.

Internship Goals:

- Integrate a data service application into the EDITO European digital ocean twin
- Compare Mercator Ocean products with different types of ocean observations
- Contribute to defining the EDITO service
- Improve the existing validation metrics base for Mercator Ocean analyses and forecasts (Lellouche et al 2013, Hernandez et al 2015)
- Master a Python research tool and ensure its transfer to operational production on EDITO

Skills to succeed:

- Master's degree in computer science, preferably applied to geosciences, mathematics, or applied mathematics
- Knowledge of programming languages (Python, Fortran...) and the Linux environment
- Knowledge in oceanography
- Knowledge in signal processing and numerical analysis
- Good command of English

Supervisors:

Aurore BIARDEAU (abiardeau@mercator-ocean.fr)
Charly REGNIER (cregnier@mercator-ocean.fr)
Quentin GAUDEL (qgaudel@mercator-ocean.fr)

Useful references:

1.Lellouche, J.-M. et al. Evaluation of global monitoring and forecasting systems at Mercator Océan. Ocean Sci. 9, 57–81 (2013).

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2.Hernandez, F. et al. Recent progress in performance evaluations and near real-time assessment of operational ocean products. J. Oper. Oceanogr. 8, s221–s238 (2015).

Who are we?

Mercator Ocean International has been developing operational oceanography activities for nearly 30 years, as part of its public interest mission to preserve the ocean.

Many scientific and societal challenges must be met to ensure a sustainable ocean, whether they concern the environment, biodiversity, climate change, the blue economy or education. To meet these challenges, Mercator Ocean designs, develops, operates and maintains state-of-the-art digital systems capable of describing, analysing and forecasting the state of the ocean in 3D, continuously and in real time. The scientific information is then translated to be accessible to all, whether they are public or commercial services, political decision makers, industrialists, associations, NGOs, teachers or citizens. Mercator Ocean International thus combines scientific excellence and social commitment on a daily basis.

As a non-profit company under multinational governance (ES, FR, GB, IT, NO), we work in a climate of trust with our ten shareholder partners, all key players in the development of European oceanography.

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