Internship Master Project - W/M

5-6 months (starting early 2026)

How to apply:
 Send your cover letter and detailed resume with the following reference 2025-10/R&D/GLONET to recruitment@mercator-ocean.fr

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Project title: Regional Fine-Tuning of GLONET: Adapting a Global Machine Learning Ocean Forecasting System to the IBI region at 1/36°.

In the framework of the Copernicus Marine Service (https://marine.copernicus.eu/fr), Mercator Ocean International leads the Iberian-Biscay-Ireland (IBI) Marine Forecasting Center, which is responsible for designing, operating, and producing near real-time forecasting system and reanalysis.

By the end of 2025, the service will evolve by delivering new reanalysis product at 1/36° (called IBIRYS36), replacing the current 1/12° product. Covering the period from 1993 onwards, the new reanalysis will provide an extensive dataset that can be used to explore the feasibility of developing an AI-based regional forecasting system.

The objective of the internship is to assess whether such an approach - faster to run and less demanding in terms of computational resources - could serve as a viable alternative to the current operational forecasting system. The AI-based forecasts will be compared against the existing prediction system, which relies on numerical model and data assimilation method and currently delivers products at 1/36°.

Objective

The internship will be dedicated to the regional fine-tuning of GLONET, a state-of-the-art machine learning–based global ocean forecasting system. While GLONET has been developed to operate at global scale, one of the current research frontiers is to assess its adaptability and performance when constrained to specific regions of interest. The focus will be on the IBI region, which is of particular scientific and societal importance and relevance for climate and ecosystem dynamics. The overarching objective of the internship is to adapt the existing GLONET training pipeline so that it can be efficiently applied at regional scales, providing improved predictive skill and allowing for a more detailed understanding of the system's capabilities.

The methodological tasks will include the pre-processing of high-resolution oceanographic model outputs (e.g., temperature, salinity, currents, and sea surface height) into machine learning-ready formats, while ensuring data quality, consistency, and representativeness of regional features. The candidate will also be in charge of developing and validating a dedicated data loading pipeline that can orchestrate and efficiently feed large spatiotemporal datasets into the model training workflow. Once established, these components will be integrated into the training loop of the pre-existing GLONET architecture, enabling systematic fine-tuning and performance evaluation in the IBI context.

Prerequisites:

The successful candidate is expected to have a background in machine learning and/or computer vision, with proficiency in Python and PyTorch. Prior experience in training different models, handling various datasets is desired.

The internship will provide the opportunity to contribute to the development of next-generation AI-based ocean forecasting tools at the interface of machine learning, high-performance computing, and ocean science, offering a scientifically rich and technically challenging experience.

Supervisors:
 Anass El Aouni (aelaouni@mercator-ocean.fr)
 Guillaume Reffray (greffray@mercator-ocean.fr)

Useful reference:
 El Aouni, Anass, et al. "GLONET: Mercator's end-to-end neural Global Ocean forecasting system." Journal of Geophysical Research: Machine Learning and Computation 2.3 (2025): e2025JH000686.

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.