# Assimilation of future ocean-current measurements from satellites

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Accurate forecasting of the velocity of ocean currents is essential for many applications, including routing of ships, modelling of oil spills and construction of offshore platforms. However very few observations of these current velocities exist and so their values must be inferred from other information. This will change in the coming years, with space agencies set to launch satellite instruments that can measure ocean surface current velocities from space. This has the potential to improve greatly both forecasts of the ocean itself, and weather forecasts through modelling of the coupling between the ocean and the atmosphere. To get the most information out of these observations it is necessary to ingest them into computer model forecasts, using a mathematical technique known as data assimilation. Data assimilation is a fundamental part of all modern weather and ocean forecasting systems and is used on a daily basis to update forecasts with the latest observations. However, applying data assimilation to future ocean-current measurements will not be straightforward. In order to relate the measurements to the model variables we need to apply numerical methods to solve a large system of elliptic equations. This is already done in atmospheric data assimilation, but the presence of coastal boundaries in the ocean makes the problem much more complicated. Before we can use any measurements of ocean current velocities we need new numerical methods able to solve elliptic equations with such complex boundary conditions. The aim of this project is to develop these methods for the assimilation of future satellite measurements. During the project you will design appropriate numerical methods for use in ocean data assimilation and demonstrate their usefulness using an idealized data assimilation system.
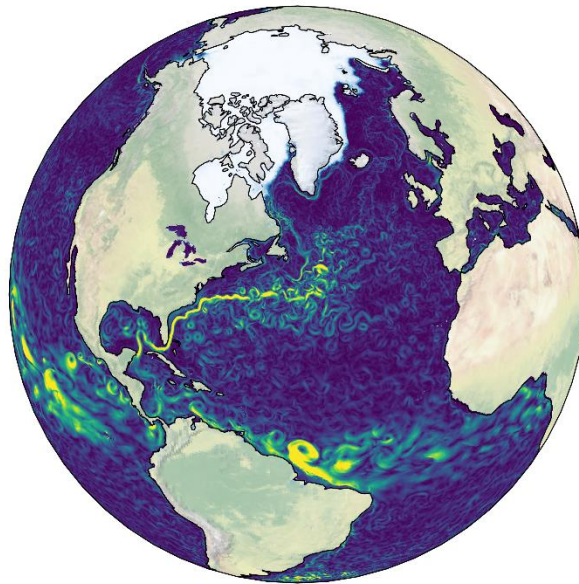
Training opportunities:
This is a joint project with the Met Office, Exeter, and the CERFACS research institute in Toulouse, France. You will have the opportunity of short placements at both institutes. You will also have the opportunity to attend training courses on data assimilation at ECMWF and at CERFACS, and advanced training courses at Reading organized by the Data Assimilation Research Centre. You will be affiliated to the National Centre for Earth Observation (NCEO), enabling you to attend NCEO training events for early career researchers.

Student profile:
The candidate should have a good honours degree in a subject with strong mathematical content.

https://research.reading.ac.uk/scenario/