

## The RESILIENCE cruise on the Marion Dufresne

The RESILIENCE oceanographic cruise will take place in the Indian Ocean from April 19 to May 24, 2022. About 50 international scientists, led by Jean-François TERNON (IRD researcher at UMR MARBEC) will embark on the research vessel Marion Dufresne, from Reunion Island, to study the interactions between ocean physics and biology at "small scale" (~10km). The scientists will study oceanic fronts on the edge of eddies in the Mozambique Channel and on the east coast of South Africa. The RESILIENCE cruise is part on the long term established scientific collaboration between the teams of Prof Mike Roberts from Nelson Mandela University and the IRD in South Africa, which both actively contribute to the cruise organisation and its achievements.



Scientists from France (MARBEC, ENTROPIE, LEMAR, LOCEAN, LOG, LOPS, MIO), South Africa (3 Universities – Nelson Mandela, Cape Town, Stellenbosch), Mozambique (Eduardo Mondlane University), UK and USA will welcome a « floating university » (20 students and 2 supervisors, from the University of Bretagne Occidentale (UBO), of the Littoral Côte d'Opale (ULCO) and Côte d'Azur (UCA)).

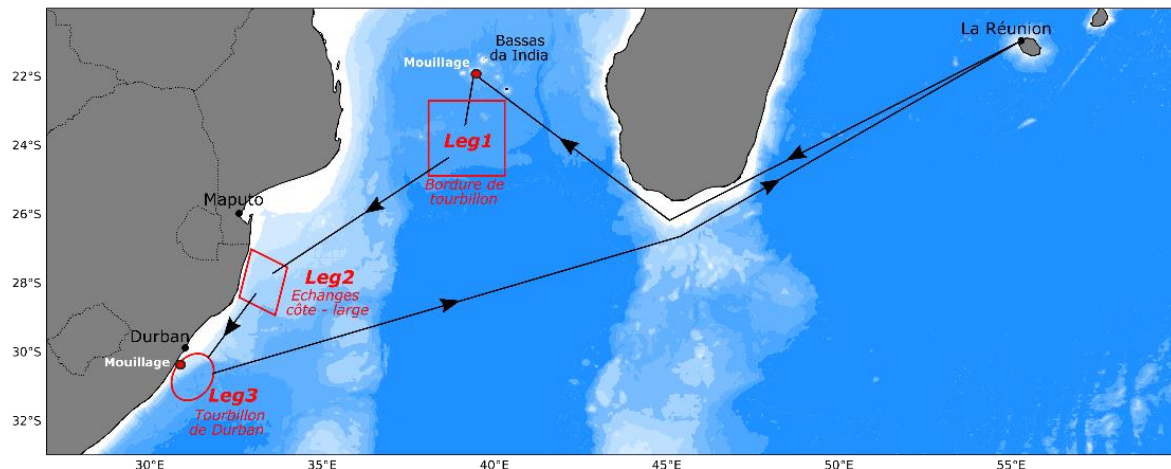


Research vessel Marion Dufresne  
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### Understanding the role of eddies in biological productivity and ecosystem structuring

The main objective of the RESILIENCE cruise is to study the physical and biological interactions at small scales (~1-10 km), especially in the fronts around mesoscale eddies (~100 km diameter), in the Mozambique Channel. The goal of the cruise is to understand the role of physical processes (vertical exchanges in particular) at small scales - well described by modelling but difficult to observe at sea - on biological productivity and the structure of the pelagic ecosystem. Coupled measurements of different parameters will help to answer these questions. Oceanic fronts are often located where aggregations of fish, birds and marine mammals occur; and in the context of climate change, it is predicted that the intensity of these fronts will vary in the future with possible consequences on these ecosystems. *"The results of the cruise will therefore contribute to better understand the consequences of these changes on the exploited ecosystems in the area (food security issue for the riparian countries)"* explains Jean-François TERNON. The selected sampling areas are the centre of the Mozambique Channel and the east coast of South Africa due to the intense eddy activity that exists in these regions, but also because of their contrasting hydrodynamic contexts (numerous fronts in the centre of the Mozambique Channel, eddy-coast interactions off the north-east coast of South Africa, semi-permanent eddy south of Durban, located between the coast and the Agulhas Current).

The eddies studied being in nature mobile structures, the sampling plan will be constantly adapted on board, using real-time analysis of satellite data (altimetry, ocean colour).



The route taken during the RESILIENCE cruise with the three study sites: South of the Mozambique Channel, north of the east coast of South Africa and south of Durban.

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## A wide variety of measurements and topics



Rosette used for RESILIENCE

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In essence, RESILIENCE is a multidisciplinary (and international) cruise that will cover a wide variety of measurements at sea. Fine-scale observations will be made using a towed undulating system (MVP, between 0 and 300 m) equipped with sensors of interest. These observations will be complemented by vertical profiles (CTD) on station during which seawater samples will be taken (biogeochemical measurements) as well as plankton (phyto- and zooplankton) at different depths. Modern plankton sampling and analysis techniques will be used on board, including continuous

underway measurements (CytoSense, Fluoroprobe) and vertical imaging (UVP for zooplankton and particles). Acoustic measurements (multi-frequency sounder) will be carried out continuously (ship moored echo sounder) and on station (AZFP, WBat) to characterize the distribution of large zooplankton and micronekton (intermediate trophic level). They will be supplemented with plankton tows and meso-pelagic trawls. The deployment - and the recovery two weeks later - of a mooring line (current meter and "Wire Walker") is planned off Durban. A second mooring line (current meters and acoustic sounders) will be deployed off Bassas da India (one of the Scattered Islands in the Mozambique Channel) for a period of one year.

*"Additional themes will be addressed during the cruise: trace metal analyses at the surface, birds and marine mammals' observations - from the ship and using in-flight devices, environmental DNA measurements, measurement of CO<sub>2</sub> cycle parameters, study of biological connectivity (zooplankton) off the coast of South Africa, atmospheric radiosounding"* adds Margaux Noyon, researcher at Nelson Mandela University and co-leader of the project.

The capacity of the Marion Dufresne has made it possible to host a Floating University (FU) during the RESILIENCE cruise. The FU will constitute one of the training components of the cruise, which also hosts several students (master, thesis, post-doc) among the fifty scientists on board, from countries of the study area (South Africa, Mozambique, Mauritius, Reunion).

### The floating university

Twenty masters' students from three French universities (UBO, ULCO, UCA), all members of the Network of Marine Universities (RUM) will also join the scientific team of the RESILIENCE cruise as part of the Floating University. The objective is for the students, from various disciplines, to get involved in the research conducted during RESILIENCE (chemistry, biology, marine ecology or conservation) and to give them a chance to experience a real-life scientific expedition, close to the researchers, thereby benefiting from their expertise and accompanying them in their daily activities at sea. The students will be supervised by a lecturer and a research engineer from two of the three member universities (UCA and UBO) who will be exclusively dedicated to pedagogical supervision, the coordination of the master students' activities, in harmony with the scientific team and the crew, and in parallel with a lecturer from the third member university (ULCO), who is part of the scientific team. In addition to the active participation in the scientific research activities, the students will be in charge of the scientific communication on the ship and towards the general public, through the organization of scientific seminars and activities' daily reports. They will also make summaries of scientific methods and tools that are being utilised, as well as career profiles of people on board. These outputs will be disseminated, throughout the cruise through various media (blog, posters, social media) to share this experience at sea with as many people as possible. By their participation in the research activities and their effort to highlight the work of the scientists on board the Marion Dufresne, using innovative communication tools, the students of the Floating University will contribute to the development and the visibility of this cruise. Two students from Nelson Mandela University (Gqeberha, SA) and members of the scientific team have already joined the Floating University project, for an even more international group; all that remains is to pull up the anchor and set sail!

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### To follow the cruise

Journalists, specialists or simply curious, you can follow the RESILIENCE cruise, in English or in French, on <https://www.isblue.fr/universite-flottante-campagne-resilience-2022/>, with the hashtag `resilience_science` and by subscribing to the following Twitter and Instagram ↓

Twitter : [https://twitter.com/UF\\_Resilience](https://twitter.com/UF_Resilience) @UF\_Resilience

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## Funders



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## Learn more:

["RESILIENCE : interactions physique-biologie à petite échelle dans le sud-ouest de l'océan Indien" \(in French\)](#)

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