

The RESILIENCE cruise on the Marion Dufresne

The RESILIENCE oceanographic cruise will take place in the Indian Ocean from 19 April to 24 May



2022. About fifty international scientists, led by Jean-François Ternon, IRD researcher at the UMR MARBEC, will embark on the ship Marion Dufresne, from Reunion Island, to study the interactions between physics and biology at "small scale" (~10km). The scientists will visit the front zones at the edge of eddies in the Mozambique Channel and on the east coast of South Africa.

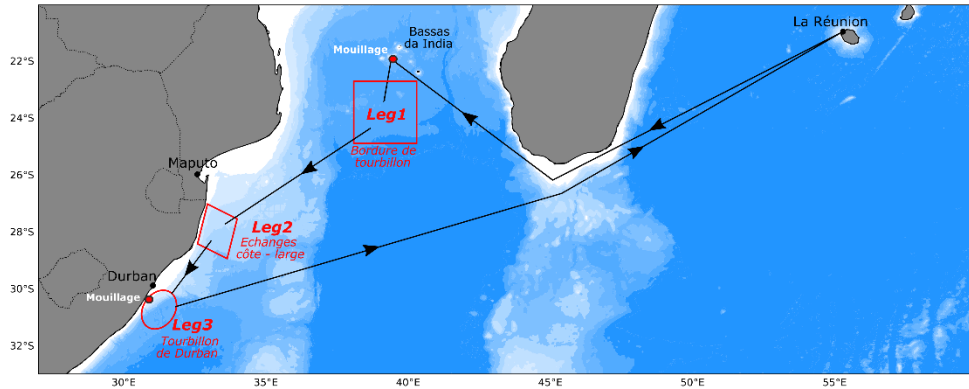
Scientists from France (MARBEC, ENTROPIE, LEMAR, LOCEAN, LOG, LOPS, MIO), South Africa (3 Universities - Qqeberha, Cape Town, Stellenbosch), Mozambique, the UK and the USA will host a Floating University (20 students and 2 supervisors, from the Universities of Bretagne Occidentale (UBO), Littoral Côte d'Opale (ULCO) and Côte d'Azur (UCA))



Ship Marion Dufresne
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Understanding the role of eddies in biological productivity and ecosystem structuring

The main objective of the RESILIENCE campaign is to study physical-biological interactions on a small scale (~1-10 km), particularly in front zones at the edge of mesoscale eddies (~100 km) that are numerous in the Mozambique Channel. The aim of the mission is to understand the role of physical processes (vertical exchanges in particular) on a small scale - well described by modelling but difficult to observe at sea - on the biological productivity and structuring of pelagic ecosystems. Coupled measurements of the various parameters will help to answer these questions. Frontal areas are often the place where fish, birds and marine mammals aggregate. In the context of climate change, it is predicted that the intensity of these fronts will vary in the future with possible consequences for these ecosystems. "The results of the campaign will therefore contribute to a study of the consequences of these changes on the exploited ecosystems of the area (food security issue for the riparian countries)," explains Jean-François Ternon. The geographical area sampled will be the centre of the Mozambique Channel and the east coast of South Africa. There are marked eddy structures in these areas, in contrasting hydrodynamic contexts (numerous fronts in the centre of the Mozambique Channel, eddy-coast interactions to the north of the east coast of South Africa, a semi-permanent eddy south of Durban, located between the coast and the Agulhas Current). As the eddies studied are by nature mobile structures, the sampling plan will be permanently adapted by real-time analysis of satellite data (altimetry, water colour) carried out on board.



RESILIENCE campaign route with the three sampling sites: southern Mozambique Channel, north of the east coast of South Africa and south of Durban
IRD

A wide variety of measures and themes



Rosette used for RESILIENCE
Catherine Kermabon, Ifremer, LOPS

In essence, RESILIENCE is a multidisciplinary (and international) mission that will cover a wide range of measurements at sea. Fine-scale observations will be made by towing an undulating system (MVP, between 0 and 300 m) equipped with sensors for the parameters of interest. These observations will be complemented by vertical profiles (CTD) at the station, during which water (biogeochemical measurements) and plankton (phyto- and zooplankton) samples will also be taken at different depths. Modern techniques for plankton sampling and analysis will be used on

board, including continuous measurements on the surface layer (CytoSense, Fluoroprobe) and imaging on the vertical (UVP for zooplankton). Acoustic measurements (multi-frequency sounder) will be carried out en route (echosounder) and on station (AZFP, WBat) to characterise the distribution of zooplankton and micronekton (intermediate trophic level). These will be complemented by plankton net and mesopelagic trawl tows. The deployment - and recovery 2 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 de India (one of the Eparses Islands) for a period of one year.

"Additional themes will be addressed during the campaign: analysis of trace metals at the surface, observation of birds and marine mammals - from the ship and using in-flight devices, environmental DNA measurements, measurement of CO₂ cycle parameters, study of biological connectivity (zooplankton) off the coast of South Africa, and atmospheric radiosounding," adds Pierrick Penven, IRD researcher at LOPS and mission co-leader.

The capacity of the Marion Dufresne makes it possible to propose the creation of a Floating University (FU) during RESILIENCE. The FU will complete the training component of the campaign, which also hosts several students (master's degree, thesis, post-doctorate) who are part of the fifty

or so scientists on board, particularly students from countries in the study area (South Africa, Mozambique, Mauritius, Reunion).

The Floating University

Twenty Masters students from three French universities (Université de Bretagne Occidentale - UBO, Université du Littoral Côte d'Opale - ULCO, Université Côte d'Azur - UCA) members of the Réseau des Universités Marines (RUM) will also join the scientific team of the RESILIENCE campaign to take part in the Floating University operation. The aim is to offer students from various disciplines involved in the research conducted in the RESILIENCE campaign (chemistry, biology, marine ecology or conservation sciences) the chance to experience a life-size scientific experiment, as close as possible to the researchers, benefiting from their respective expertise and accompanying them on a daily basis in this experience at sea. The students will be supervised by a teacher-researcher and a research engineer from two of the three member universities (UCA and UBO) dedicated exclusively to pedagogical supervision, coordination of activities on board the Master's students, in harmony with the scientific team and the crew, and in direct contact with a teacher-researcher from the third member university (ULCO) who is part of the scientific team. In addition to actively participating in scientific research activities during the RESILIENCE campaign, the students will be responsible for a large part of the communication on board and to the general public, through the organisation of scientific seminars, daily reports on the activities on board and summaries of the methods, tools used and jobs on board. Throughout the campaign, these products will be used to provide various media (blog site, posters, twitter, Instagram) and thus share this experience at sea with as many people as possible. By participating in research activities and highlighting the work of the scientists on the boat using innovative communication tools, the students of the Floating University will contribute to the development and visibility of this campaign. Two students from the Nelson Mandela University and members of the scientific team have already joined the Floating University project, making it an ever more international group; all that remains is to pull up the anchor and set sail!

Follow the campaign

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

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

Instagram: [@uf_resilience](https://www.instagram.com/uf_resilience)

Contacts

Communication IRD, Occitanie Regional Delegation | Julie Sansoulet | julie.sansoulet@ird.fr

Communication UBO, Ecole Universitaire de Recherche ISblue | Laure de Montbron | laure.demontbron@univ-brest.fr | 06 25 42 39 24

IRD researchers, Metropolitan France

Sète : Jean-François Ternon | jean-francois.ternon@ird.fr | 06 95 34 84 55

Brest : Pierrick Penven | pierrick.penven@ird.fr | 06 34 23 51 50

Funders



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Going further :

["RESILIENCE: small-scale physical-biological interactions in the southwest Indian Ocean](#)
