

PhD research project opportunity in biological oceanography
Between France and South Africa

Mixing it up: Bio-physical coupling in the West Indian Ocean

Full-time PhD project starting February 2022 for 3 years.

Project description: Vigorous mixing of the ocean supports marine ecosystems by regulating the availability of key resources for growth and reproduction of the plankton at the base of marine food webs. Such turbulence influences how phytoplankton attain adequate light and nutrients for photosynthesis and governs the encounter rates of these phytoplankton prey and their zooplankton predators. Our project aims to investigate the response of phytoplankton and zooplankton to mesoscale (>1 km) and sub-mesoscale (<1 km) oceanographic features ('eddies' and 'fronts') using innovative high resolution sampling techniques. Three study sites in the Southwest Indian Ocean will be investigated: the frontal zone of an eddy located in the Mozambique Channel, a filament originated from the South African enriched continental shelf and a cyclonic eddy off Durban (South Africa). These sites are significant to local marine ecosystems, supporting productive and economically important local fisheries. The successful applicant will go to sea and collect samples during a multi-disciplinary cruise. State-of-the-art high-resolution sampling (underway and in the water column) will be undertaken to determine fine-scale distribution of plankton and their ecophysiology in zones of high horizontal and vertical velocities. Plankton patchiness is complex and is rarely studied *in situ* despite its significant impact on ecosystem functioning in terms of structure, productivity, phenology, trophic transfer, and diversity. The innovative instrumentation, being combined together, include instruments to probe phytoplankton physiology and primary production (Laboratory Single Turnover Active Fluorometry) and plankton taxonomy from small cells (CytoSense) to large plankton (Laser Optical Plankton Counter and Underwater Video Profiler). This approach will give new insights into the study of plankton characterization beyond classical microscopical taxonomy (functional groups, size classes, etc.) and tackle phytoplankton dynamics and the tight coupling with complex environmental variables at fine temporal and spatial scales.

Funding: The successful applicant together with the host institutions and supervisors will submit a funding proposal to various funding sources (e.g., ARTS call (Allocations de Recherche pour une Thèse au Sud). If successful, this fellowship will cover salary and travel of the PhD candidate to France and South Africa. Some of these funding entails the PhD candidate to live and spend time in both countries (France and South Africa) during the 3-year study.

Host institutions and collaborations:

This project is a collaborative work between Nelson Mandela University (South Africa; Dr Margaux Noyon), University du Littoral Opal Coast (Wimereux, France; Dr Luis Felipe Artigas), Heriot-Watt University (Edinburgh UK; Dr Alex J. Poulton) and the MARBEC lab (Marine Biodiversity, Exploitation and Conservation, Sète, France; Dr Jean-François Ternon). The PhD candidate will work closely with all four organisations which are recognised institutions in the field of oceanography. All four research

groups have worked together for many years assuring a very stimulating and interactive work environment where the PhD candidate will be able to improve his/her skills and research expertise.

Requirements:

- Applicant must be from the Global South.
- Ideally a MSc in a relevant discipline such as oceanography, marine biology, marine ecology, botany, or zoology.
- Interest in biological oceanography and/or plankton ecology and in applying numerical techniques.
- Strong statistical skills.
- Coding in a scientific language (*e.g.* R or Python) would be an advantage.
- Strong written and oral communication skills.
- Good level of English (TOEFL: PBT – 570 overall, see <https://international.mandela.ac.za/Application-and-Admissions/Requirements-for-Postgraduate> for more details).
- Ability to work independently.
- Able to go at sea on research vessel and conduct laboratory work.
- Able to travel between France and South Africa for long period at a time.

Application and enquiries:

If you are interested in applying, please submit the following documents to Margaux Noyon (Margaux.Noyon@mandela.ac.za):

- Letter of motivation
- Academic transcripts
- A Curriculum Vitae including contact details of at least two references
- Proof of completion of MSc
- Scientific publications (if any)