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Nelson Mandela University Ocean Science Campus

Opportunities for Post-Graduate Studies in Marine Science 2018

NELSON MANDELA
UNIVERSITY



In association with



National
Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL



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GCRF
Global Challenges Research Fund

Opportunities to study ocean science are now available starting in February 2018 at the newly opened *Ocean Science Campus* (OSC) located at the Nelson Mandela University in Port Elizabeth, South Africa. Phase 1 of the OSC was completed in September 2017 (above pics). The regional facility embraces state-of-the-art physical oceanography work spaces, laboratories, post graduate offices, board and lecture rooms, experimental aquaria and a scientific diving and training centre — all of which support a range of disciplines including ocean physics, biogeochemistry, phytoplankton, zooplankton, trophic assemblages and ecology, and fisheries across estuaries, coastal, shelf and deep ocean waters. The OSC is a post graduate facility specialising in the impacts of climate change on western Indian Ocean (WIO) marine ecosystems. It is strongly allied with the *International Indian Ocean Expedition 2 (IIOE2)* (<http://www.iioe-2.incois.gov.in/>) initiative and the Sustained Indian Ocean Biogeochemistry and Ecosystem Research (SIBER — <http://www.incois.gov.in/portal/siber/index.jsp>). As the OSC is focused on regional research, post graduate students studying for MSc and PhD degrees and Post-Doctoral candidates are placed in international, multidisciplinary teams which explore and model the varying ecosystems of the WIO. This not only broadens their knowledge base in ocean science and linkages but also prepares early career scientists for the working environment where teamwork is essential to study large, complex earth systems. Ship-based and robotic sampling forms a key component of all research projects. Research and outputs are strongly aligned with food security and science to governance.



This advert for five study positions initiates the South African part of a new, largescale, 4-year international project (2018-21) which investigates ecosystem functioning in the domains of the East African Coastal Current (Kenya and Tanzania) and the Agulhas Bank (South Africa), with reference to climate change and food security. Referred to as SOLSTICE-WIO (*Sustainable Oceans, Livelihoods and food Security Through Increased Capacity in Ecosystem research in the Western Indian Ocean* — <http://solstice-wio.org/>), the project aims to also build research capability in the WIO and hence student training and early career

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advancement is of great importance. Funding for SOLSTICE is provided by the UK Global Challenge Research Fund (GCRF) with scientific expertise from the National Oceanography Centre in Southampton, United Kingdom.

The chosen Post Graduate students will be based at the OSC but will also be required to travel to the National Oceanography Centre (NOC) in Southampton (UK) for training and co-supervision during their study period, and therefore must meet UK visa criteria. These visits will provide exposure to international standards for research. They will be part of a transdisciplinary team based between these institutes and will need to work as part of the SOLSTICE team. Students must be highly motivated and determined to succeed as the SOLSTICE team will depend on their results which will be published in peer-reviewed international journals. Scholarships from the Nelson Mandela University will be provided for the duration of study (3 years maximum).

Closing date for applications: 15 February 2018

SOLSTICE Projects and positions

The South African component of SOLSTICE, led by the Nelson Mandela University, is focused on the collapse of the squid fishery in 2013-14, and the underlying ecosystem shifts that might have been responsible. The study encompasses physical and biological oceanography (incl. biogeochemistry) as well as socio-economic aspects of the collapse of squid fishery.

The following are offered as of February 2018.

Composition, dynamics and role of Benthic Nepheloid Layers (BNLs) on the Agulhas Bank: This project aims to understand the formation and decay of the BNL on the eastern Agulhas Bank. The BNL is responsible for water clarity near the seabed which appears to play an important role in squid spawning behaviour. Suspended organic bottom particles also support bottom filter-feeders and nutrient regeneration making them key components of the ecosystem. The project will involve going to sea on large and small vessels to collect water samples containing marine snow using a "snow catcher" and analysing these for particulate organic matter (POM) composition and settling rates. Experimentation both in situ and in the laboratory will also be undertaken to determine microbial decomposition rates and products. This work will be undertaken in tandem with another PhD study that uses moorings to measure and monitor the occurrence and intensity of BNLs. Expected level of study will be a PhD with the student have strong skills in microbiology or marine biology, statistical analyses and communications (good English, written and spoken). Candidates with previous experience in experimental set-up and biological oceanography will be an advantage.

Short title: Marine snow Agulhas Bank

Start date: February 2018

[For official purposes: Student # 3]

Agulhas Bank circulation and long-term variability: This project investigates the circulation (ocean currents) on the eastern and central Agulhas Bank with special attention given to a feature known as the cold ridge. Acoustic Doppler Current Profiler (ADCP) moorings will be deployed from a ship for 12 months off the Tsitsikamma-Knynsa coast in early 2018. Moorings will be serviced after 6 months with first data uploaded. Surface satellite-tracked drifters will be released from a ship during deployment, service and recovery of the moorings. Ship collected ADCP data will augment mooring and drifter

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measurements. The student will be expected to go to sea to participate in all activities. Historical ADCP data as well as satellite altimetry measurements will be analysed in the first 6 months of the project. The research output will be a quantitative understanding of the circulation on the eastern and central Agulhas Bank, with insights on the formation of the Cold Ridge. This will be used to validate an ocean model. Expected level of study will be a PhD with the student have strong skills in physics or physical oceanography, programming (Matlab), excellent analytical skills, and good communications skills (written and spoken English).

Short title: Agulhas Bank circulation
Start date: February 2018
[For official purposes: Student # 4]

SST—chlorophyll structures and variability on the Agulhas Bank using earth observations: This study needs to start as soon as possible as it underpins several of the projects listed. It requires workup of historical daily composite ocean colour and SST products at 1 km resolution from MODIS, VIIRS, Envisat and Sentinel-3 satellite missions to ascertain spatial, seasonal and inter-annual trends for various regions of the Agulhas Bank, including upwelling off Port Alfred and the Cold Ridge. The student will work closely with the SOLSTICE team at the National Oceanography Centre and the Plymouth Marine Laboratory (PML) in the UK. Emphasis will be placed on the spatial structure of these features so that mooring locations and cruises can be planned and configured. These data will link with all projects listed in this advert involving case study support, and model validation. The project will also provide near-real time products to guide cruise and glider operations to take place in February 2019. Long term data from coastal underwater temperature recorders (UTRs) will be used to validate remote sensing SST products. Expected level of study will be a MSc/PhD with the student have strong skills in physics or physical oceanography, programming (Matlab), excellent analytical skills, and good communications skills (written and spoken English).

Short title: Earth observation Agulhas Bank
Start date: February 2018
[For official purposes: Student #: 5]

Physical processes affecting the evolution and structure of the Cold Ridge: This study investigates the evolution and structure of the Cold Ridge on the Central Agulhas Bank — a feature thought to be an upwelling filament emanating from upwelling along the Tsitsikamma coast. The Cold Ridge is expected to be a major source of nutrients and therefore a stimulus for production, and hence an important feeding area for squid paralarvae. The study will include elements of modelling, remote sensing and *in situ* sampling using a ship and gliders. While acquiring skill sets in the first 10 months, the student will first investigate historical ship-collected data in preparation for a 14 day cruise. While the ship survey data will provide the subsurface structure of the Cold Ridge, the gliders will investigate sub-mesoscale processes, particularly near the feature's boundary, thought to be responsible for the observed patchiness of plankton. A prototype state-of-the-art nutrient micro-sensor will be deployed on one of the gliders for this purpose. Depending on the progress made and availability of instrumentation, microstructure turbulence may also be investigated. This project, owing to the advanced technology used, will be strongly supported by the NOC Robotics team, but the student will be expected to go on small and large vessels to assist operations. Expected level of study will be a PhD with the student have strong skills in physics or physical oceanography, programming (Matlab), excellent analytical skills and good communications skills (written and spoken English).

Short title: Cold Ridge evolution
Start date: February 2018
[For official purposes: Student # 6]

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Zooplankton dynamics of the eastern and central Agulhas Bank: This project investigates the productivity of zooplankton of the eastern and central Agulhas Bank and will comprise historical sample analysis along with new ship-collected samples and experiments. Special emphasis will be placed on the Cold Ridge and their importance in the Agulhas Bank ecosystem. The student will be expected to work in the lab using instrumentation such as a Zooscan, as well as to go to sea for sample collection and experiments using both small and large vessels. Zooplankton samples with hydrological data have been collected since 1988 on the Agulhas Bank during spring and autumn during DAFF fisheries surveys. These collections are still intact in formalin. Analysis of these will comprise assemblage composition, biomass, ecology and trends. New samples will be collected during a 14-day cruise in February 2019 updating the zooplankton data set, but also focusing on the ecology and community dynamics — the latter including experimentation. Expected level of study will be a PhD with the student have strong skills in ecology, marine biology or biological oceanography. Excellent numerical (incl. multivariate analyses) and statistical skills are required. Programming experience in Matlab or R would be a benefit.

Short title: Agulhas Bank Zooplankton
Start date: February 2018
[For official purposes: Student # 7]

Enquires and Applications

Interested students should electronically submit:

1. CV with university courses and grades
2. A letter of motivation of why you want to do the project
3. Copy of ID/passport

These should be sent to:

Dr Margaux Noyon
Ocean Science Campus
Nelson Mandela University
Email: Margaux.Noyon@mandela.ac.za