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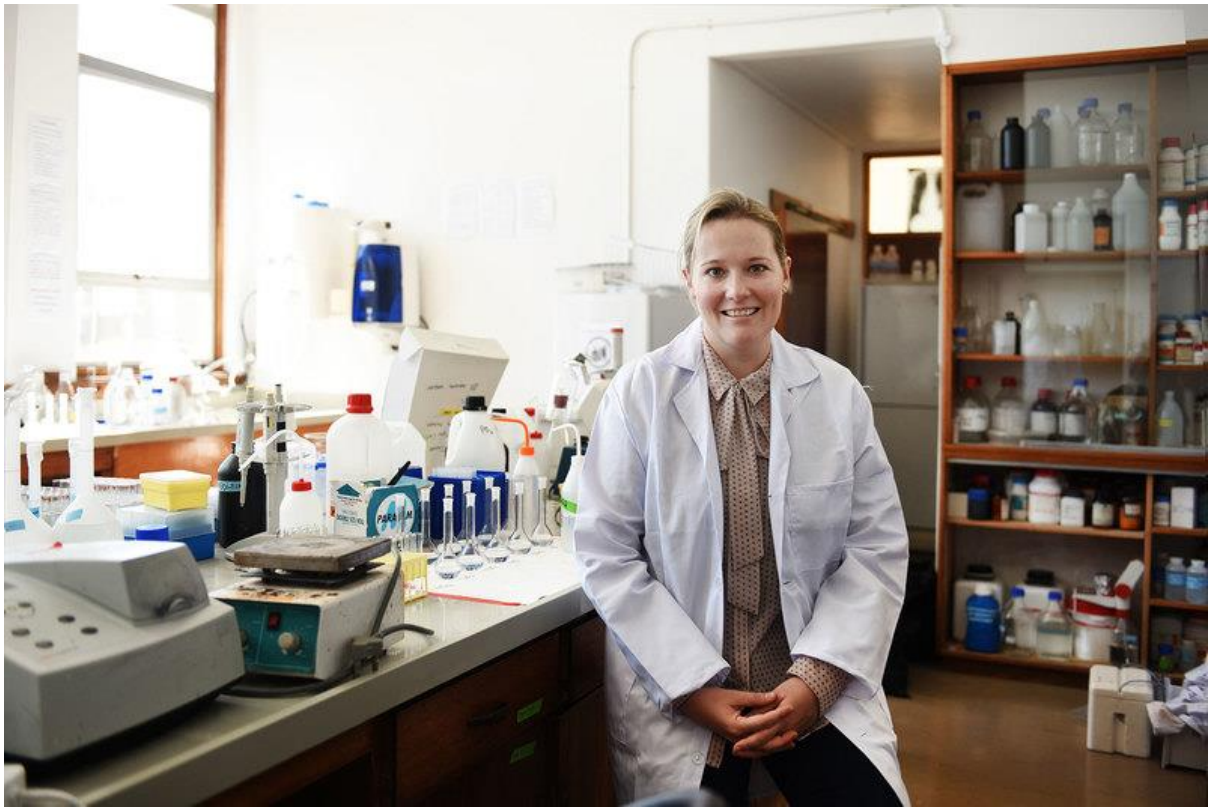
13 June 2024

UCT oceanographer awarded US$9.5 million to spearhead climate change research on ocean systems



Associate Professor Sarah Fawcett Photo: Robyn Walker

The University of Cape Town's (UCT) Associate Professor Sarah Fawcett will spearhead an effort to investigate oxygen and biogeochemical dynamics along the West African margin after being awarded US$9.5 million as part of the overall US$45 million pledged by the Ocean Biogeochemistry Virtual Institute (OBVI) to fund research over five years.

Fawcett is based in UCT's Department of Oceanography and the Marine and Antarctic Research Centre for Innovation and Sustainability (UCT-MARiS).

To fill in the gaps in ocean data and modelling efforts, five international science and technology projects have been selected to join the OBVI. This will increase the scope of research in the field and the understanding of ocean resources.

Through OBVI, Schmidt Sciences will bring together 60 scientists from 11 countries to conduct research to advance our understanding of ocean chemistry and the resilience of marine ecosystems in a rapidly warming world.

Fawcett explained: "Ocean oxygenation and productivity are particularly consequential for ocean biota and human welfare. Their future is highly uncertain; however, particularly for tropical waters and coastal upwelling systems such as [those that] occur on the west African margin. Climate models suggest that hypoxic zones (low oxygen waters) will expand in response to global warming, yet the extent of suboxia (extremely low oxygen waters) may decline."

Projections and mitigation

She added: "The coastal zones will be strongly affected by changes in oxygenation in neighbouring offshore waters, changes in local physical and biogeochemical processes, and by the increasing supply of human-derived nutrients that enhance biological production and drive local and regional deoxygenation. Poorer communities whose livelihoods depend largely on coastal ecosystem services will be most vulnerable to this uncertain future."

Together, the five selected teams will make up a global research network and receive financial support from Schmidt Sciences and access to the Schmidt Ocean Institute's research vessel, *Falkor (too)*. They will also receive expert shipboard assistance to tackle the challenges associated with collecting large amounts of biological, chemical, geological and physical oceanography data. Through this research, the teams will develop accurate models at a variety of scales that will simulate ocean system responses to predicted climate changes and support the development of mitigation strategies.

"Through a coupling of measurements and modelling, we aim to determine the inter-related controls on oxygen and productivity along the west African margin, from the tip of South Africa to the equator, and to identify implications for natural resources. This margin hosts several socio-economically important ecosystems characterised by different oxygen conditions and levels of productivity. We seek to identify the organising principles underlying the margin's oxygen dynamics to develop predictive capacity for the region – with regard to oxygen and productivity, and to the biogeochemical and ecosystem-level implications of changes in these parameters," said Fawcett.

The research will investigate the following questions:

- What are the controls on hypoxia and suboxia along the African margin? What are the respective roles of primary productivity and ocean circulation? What interactions arise between offshore processes such as the large-scale tropical circulation and margin processes such as wind-driven coastal upwelling, coastal currents, and (sub)mesoscale dynamics?

- How do these processes affect the African margin ecosystems, from planktonic assemblages to benthic and pelagic communities, at higher trophic levels, including species harvested by Africa's coastal nations?

- What are the basin and global scale consequences of west African margin processes?

"The ocean plays a profound role in regulating Earth's climate and acts as a vast repository for carbon and heat. Ocean biogeochemists have developed a broad understanding of how the ocean influences climate, [but] we lack a deeper fundamental and mechanistic understanding of the physical, chemical, biological, and geological processes that govern carbon cycling and storage. We have much to learn about the connections between carbon and other elemental cycles, and the specific roles that marine life plays in shaping those relationships," Fawcett concluded.

Fawcett will lead a team consisting of fellow UCT colleagues: Dr Kelly Ortega-Cisneros, Dr Moagabo Ragoasha and Professor Lynne Shannon, as well as Dr Sarah Nicholson (Council for Scientific and Industrial Research), and professors Laure Resplandy, Daniel Sigman, Curtis Deutsch, Bess Ward (all Princeton University). They are joined by Stellenbosch University's Professor Alakendra Roychoudhury and Namibian Ministry of Fisheries and Marine Resources senior scientist, Anja van der Plas.

Story by Kamva Somdyala, UCT News

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