

Nitrogen fixation and phytoplankton blooms in the southwest Indian Ocean

August 14 2009

Observations made by Southampton scientists help understand the massive blooms of microscopic marine algae - phytoplankton - in the seas around Madagascar and its effect on the biogeochemistry of the southwest Indian Ocean.

The observations were made by researchers based at the National Oceanography Centre, Southampton (NOCS) during a 2005 hydrographic survey south and east of Madagascar while aboard the royal research ship RRS Discovery. The fully analysed results are published in the journal [Geophysical Research Letters](#).

Nitrogen-fixing bacteria convert atmospheric nitrogen into nitrogen compounds that organisms can then use as food. This process is thought to be important in areas of the ocean where nitrogen-based nutrients are otherwise in short supply, and the researchers confirm that this is indeed the case in the region south of Madagascar.

But there were some surprises. Previously, it has been thought that the large-scale autumn bloom that develops in this region is driven by nitrogen-fixing blue-green algae, or cyanobacteria, called *Trichodesmium*, colonies of which the researchers found to be abundant. However, the 2005 bloom was dominated by a diatom - a type of phytoplankton - the cells of which play host to another nitrogen-fixing cyanobacterium called *Richella intracellularis*, with *Trichodesmium* apparently playing second fiddle.

Diatoms have relatively large cells, and when they die they sink down the water column, carrying with them carbon that is ultimately derived from [carbon dioxide](#) drawn from the atmosphere through the process of [photosynthesis](#). "Carbon dioxide is a greenhouse gas, and enhanced export of carbon to the deep ocean in the bodies of diatoms is an important natural mechanism by which the ocean regulates atmospheric carbon dioxide and our climate," says team member Dr Alex Poulton of NOCS.

The researchers believe that their findings will have an impact on modelling and satellite studies of the Madagascar bloom. "Future research will also need to account for the magnitude of carbon export associated with diatoms and their nitrogen-fixing guests in the southwest Indian Ocean, and indeed other subtropical oceanic settings," says Dr Poulton.

More information: Poulton, A. J., Stinchcombe, M. C. & Quartly, G. D. High numbers of Trichodesmium and diazotrophic diatoms in the southwest Indian [Ocean](#), *Geophys. Res. Lett.*, 36, L15610, (2009. [doi:10.1029/2009GL039719](https://doi.org/10.1029/2009GL039719)).

Source: National Oceanography Centre, Southampton

Citation: Nitrogen fixation and phytoplankton blooms in the southwest Indian Ocean (2009, August 14) retrieved 9 April 2024 from <https://phys.org/news/2009-08-nitrogen-fixation-phytoplankton-blooms-southwest.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.