

EnvEast Doctoral Training Partnership

How will climate change affect the production of carbon dioxide by marine plankton?



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Plankton in remote ocean regions play a key role in the global cycles of carbon and oxygen. Climate change is increasing the extent of these regions, making them increasingly important to study. Until recently, due to a lack of measurements of plankton respiration, all open ocean regions were considered the same. However work by the supervisors of this project has shown that regions in the North and South Atlantic Ocean have different air-sea fluxes of CO₂, and so may react differently to a changing climate. Plankton require nutrients to grow, and so this difference may be due to a difference in availability of dissolved organic nutrients (carbon, nitrogen and phosphorus; DOCNP). This project will address this question through the first spatially and temporally representative study linking plankton respiration with DOCNP in the Atlantic Ocean.

This project will use techniques only available in the UK at the University of East Anglia to measure plankton respiration and DOCNP during the Atlantic Meridional Transect (AMT; <http://www.amt-uk.org/>) program co-ordinated by the Plymouth Marine Laboratory.

This project will determine the role of dissolved organic nutrients in modulating the variability of marine plankton respiration and thus the air-sea flux of oxygen and carbon dioxide.

The PhD student will:

- 1) participate in AMT cruises to collect samples for respiration and DOCNP, thereby learning skills in seagoing oceanography
- 2) measure DOCNP in the laboratory, thereby learning skills in analytical chemistry
- 3) produce a calibrated dataset of O₂, DOCNP and respiration, thereby learning skills in data processing
- 4) interpret the data in terms of oxygen utilisation attributable to DOC, respiration attributable to bacteria and correlations between CNP and respiration thereby learning skills in statistics
- 5) interpret the data in the context of global datasets, thereby learning skills in comparative analysis

The student will be trained in analytical techniques and microbial oceanography. They will benefit from working at both a University and a Research Centre, and within the AMT international research community. This project will suit a student with a BSc degree in environmental sciences, microbiology, chemistry or oceanography who can work independently and collaboratively at sea.

