

The Leibniz Centre for Tropical Marine Research ([ZMT](#)) in Bremen is a member of the Leibniz Association, which is supported by the German Federal and State Governments. Through its research, ZMT contributes to developing strategies for sustainable use of tropical coastal systems.

The Systems Ecology Group is looking for a

Doctoral candidate (f/m/d)

(Reference number: 210-N2FIX)

Modelling N₂-fixation in the global ocean (N2FIX): Understanding of the role of tropical regions in the global nitrogen cycle

Supervisors: Subhendu Chakraborty & Agostino Merico

Nitrogen is an essential element for all living organisms but its availability often limits the growth and productivity of terrestrial and aquatic ecosystems. Although molecular dinitrogen gas (N₂) is highly abundant both in the atmosphere and the sea, only specific and highly specialized micro-organisms can convert (or, more technically, fix) N₂ into a biologically usable form of nitrogen. N₂ fixation maintains the inventory of biologically available nitrogen in the open oceans, which fuels primary production and thereby affects the global biogeochemical cycles of both nitrogen and carbon, with relevant implications for the global climate. N₂ fixation is believed to be restricted within the sunlit and oligotrophic layers of the tropical and subtropical oceans. Recent observations reveal that the distribution of micro-organisms able to fix N₂ is geographically widespread and has important contributions to marine biological productivity in many parts of the globe. *Trichodesmium* and UCYN-A are likely the two most abundant N₂-fixing cyanobacteria in the open ocean. High abundances of *Trichodesmium* occurs in highly stratified, low-nutrient waters at tropical and subtropical latitudes. In contrast, high abundances of UCYN-A can be found at substantially higher latitudes and in deeper waters than *Trichodesmium*. The environmental and ecological factors that leads to variations in the distribution of *Trichodesmium* and UCYN-A are largely unknown. Understanding these factors would help clarify the geographic extent and magnitude of N₂ fixation rates and the relative contributions of the two groups to these fixation rates, with relevant implications for the global nitrogen budget. In this project, the Ph.D. student will either modify an existing trait-based competition model for N₂ fixing bacteria or develop a new model. The model will be appropriately engineered for studying the effects of different environmental conditions on organisms and their N₂ fixing abilities. The model will then be used in combination with different observational data to (1) understand the mechanisms driving N₂ fixation rates among different N₂-fixing organisms, (2) investigate how different environmental conditions affect N₂ fixation rates in different organisms, (3) understand the environmental niches for *Trichodesmium* and UCYN-A, and (4) disentangle the contributions between tropical and temperate regions to the global nitrogen budget.

Requirements:

Applicants must hold a Master degree in one of the following disciplines: applied mathematics, physics, computational sciences, marine biogeochemistry, physical oceanography, environmental sciences, theoretical ecology, or similar quantitative or numerical disciplines. Furthermore, candidates should have good programming skills and a keen interest in biogeochemical processes of global scale relevance. We are looking for highly motivated students with good communication and scientific writing skills. A good level of written and oral English is required.

This PhD project is part of a cooperation between the Systems Ecology Group (Dr. Subhendu Chakraborty & Prof. Agostino Merico) and the Centre for Ocean Life of the Technical University of Denmark (Prof. Ken Andersen) and thus travels to Copenhagen to discuss progress with our partner are expected.

Please contact Prof. Dr. Agostino Merico (agostino.merico@leibniz-zmt.de) or Dr. Subhendu Chakraborty (subhendu.chakraborty@leibniz-zmt.de) for further information.

We offer:

- An exciting working environment in an interdisciplinary and internationally oriented institute
- A highly motivated, solution oriented and inspiring group of colleagues
- Embedding in a large consortium within the German Marine Science landscape
- A family-friendly diverse working environment

The position should be filled from February 1st 2022. The contract will be limited to 36 months. Salary will be paid according to the German TV-L EG 13 (2/3 of a fulltime position). ZMT is an equal opportunity employer. Applicants with a migration background are welcome. Disabled persons with comparable qualification receive preferential status.

Please send your application by November 30th, 2021 **as a single pdf file** with the reference number "210- N2FIX" to Ms. Lena Oehlmann, E-Mail: bewerbung@leibniz-zmt.de. Note, however, that applications will be considered also after the deadline if a suitable candidate is not found by that date. We will be happy to accept your documents without a photo.

Leibniz Centre for Tropical Marine Research (ZMT), Fahrenheitstraße 6, D-28359 Bremen.

