

3-year PhD Scholarship available in New Zealand

Date of posting: 15 August 2019
Deadline for applications: Monday 16 September 2019

PhD Title: Next-generation observation, modelling and forecasting of microbial community composition and function in the Southern Ocean.

The Southern Ocean helps regulate the Earth's climate system and supports unique and biodiverse ecosystems. The microbial communities of the Southern Ocean - bacteria, phytoplankton, and microzooplankton - are the foundation of Antarctic marine ecosystems and play a pivotal role in its biogeochemical and trophic functioning. However, our ability to observe and forecast change to microbial community structure and processes in the Southern Ocean is currently poor.

We are looking for a PhD student to work between New Zealand's National Institute for Water and Atmospheric Research (NIWA, Wellington, New Zealand) and the University of Otago (Dunedin, New Zealand) with the objective of **characterising Southern Ocean microbial ecosystems to improve observation, modelling and forecasting of the biogeochemistry of the Ross Sea region.**

This PhD opportunity is part of a 5-year New Zealand project (2017–2022) called Ross-RAMP, which aims to develop improved biogeochemical models of the Ross Sea region to understand the conservation value of the Ross Sea region Marine Protected Area.

We currently have information to characterise the microbial community between New Zealand and the Ross Sea from two 45-day New Zealand research voyages in 2018 and 2019 as well as data from earlier research voyages. We anticipate future Antarctic research voyages on the New Zealand research vessel *Tangaroa* in 2021 and 2023. The PhD student will work on the analysis of samples and data from 2018 and 2019 voyages, and would be expected to participate in the 2021 voyage and potentially the 2023 voyage to the Ross Sea, Antarctica.

The broad outline of the work envisaged is as follows:

- 1- Characterising the microbial community biomass composition and structure of the Southern Ocean and its relationship with environmental conditions. In situ measurements used will include microscopy, pigment, flow-cytometry, and DNA-analysis.
- 2- Quantifying microbial function (e.g. production and consumption rates) and relationships with environmental conditions and community structure. Rates and flows will be experimentally determined from incubations (bacterial production, ¹⁴C-incorporation, microzooplankton grazing) and measurements of photosynthetic rate (Fast Repetition Rate fluorometry) and net community production (Membrane Inlet Mass Spectrophotometry)
- 3- Integrating in situ data with biogeochemical models. A high resolution hydrodynamic model of the Ross Sea region has been developed and research at NIWA is currently adding biogeochemical component to this model. The PhD studentship will work with established biogeochemical and physical modellers at NIWA to use in situ measurements to advance and validate the biogeochemical (lower food web) modelling.
- 4- Contributing to the development of locally-tuned satellite methods to observed phytoplankton functional groups (diatoms vs. prymnesiophytes) and estimate primary

production in the Southern Ocean. This research will use satellite products and bio-optical data (e.g., water hyperspectral reflectance and absorption).

The PhD student will be based at the Wellington NIWA campus (New Zealand) and will be involved with the University of Otago through courses and activities associated to the doctorate programme. NIWA PhD scholarship will cover the annual tuition fees of NZ\$ 7,845 per year and provide an annual stipend to the student of NZ\$ 22,000 per year for 3 years.

The student is expected to apply for University of Otago Doctoral Scholarship (worth NZ\$27,000 and tuition waiver). If successful, this will be available to the student in addition to the NIWA scholarship. More information on the University of Otago Doctoral Scholarship is available here: <https://www.otago.ac.nz/study/scholarships/database/otago014687.html>

Application procedure

If you are interested in applying or you would like further information on the position and science project please contact Dr Matt Pinkerton (Matt.Pinkerton@niwa.co.nz), Dr Andres Gutierrez Rodriguez (Andres.Gutierrez@niwa.co.nz) and Professor Cliff Law (cliff.law@niwa.co.nz).

Applicants should send a CV, cover letter explaining why they are applying and highlighting relevant experience, a transcript of their academic grades, and at least 2 academic references before Monday 16 September 2019. We will shortlist candidates, interview selected candidates by Skype, and aim to make an appointment by the end of September 2019. The successful candidate will be helped to obtain a New Zealand study visa and would begin work in New Zealand as soon as possible, but certainly by January 2020.