PhD opportunity: Quantifying the cooling potential of internal waves and how it will change under climate change (Physical Oceanography)

Supervisors: Dr Robert Smith (University of Otago; robert.smith@otago.ac.nz), Dr Erik Behrens (NIWA) and Prof Craig Stevens (NIWA / University of Auckland)

Location: University of Otago, Department of Marine Science, Dunedin, New Zealand

Closing date: Jan 18th, 2025

About the Project

The Department of Marine Science at the University of Otago (New Zealand) and the National Institute of Water and Atmospheric Research (NIWA) seek applicants for a PhD study on ocean internal waves (Physical Oceanography) starting first quarter 2025. Internal waves generated by tides are found throughout the ocean. They have far-reaching physical and biological impacts on marine ecosystems. Notably, internal waves can regularly transport cooler waters to shallow areas on continental shelves and islands as they shoal shoreward, potentially reducing thermal stress for coastal ecosystems and offering climate refuges from ocean warming.

We are seeking a skilled and ambitious PhD candidate to work on the MBIE Endeavour Smart Ideas funded project: "*Mitigating climate risks – Identifying ocean internal wave hotspots and their cooling potential*". The PhD candidate's research will involve: (1) Analysing ocean observations and output from high-resolution numerical models (CROCCO) to assess present-day internal wave contribution to local cooling at two case study regions (Tawhiti Rahi / Poor Knights Islands and Rakiura / Stewart Island) and (2) Analysing non-hydrostatic model simulations to quantify future changes to internal waves and their cooling potential in the case study regions. Both New Zealand case study regions are known internal wave hotspots and findings from this project are envisaged to be applicable to other global internal wave hotspots.

The candidate will be based at the University of Otago, collaborating with a team from NIWA, the Australian National University (ANU), and an advisory group including tangata whenua and government agencies.

About the PhD Position

The PhD position is supported by funding of at least NZ$43,0000 per year for 3.0 years. This includes a tax-free stipend / scholarship of NZ$35,000 per year and a full university tuition fee waiver. Funding is also available for some expenses, including travel to collaborators and national / international conferences.

The position is open to all nationalities (i.e., the successful applicants do not have to be an NZ or Australian citizen). An international candidate (i.e., non-NZ or non-Australian) will be required to apply for an NZ student visa to be allowed to study in NZ. Where English is not an applicant's first or native language, evidence of English language proficiency that meets the requirements for Postgraduate Study at the University of Otago (https://www.otago.ac.nz/study/entry-requirements/language-requirements) will be required.

About the PhD Candidate

Applicants must have completed an MSc and/or BSc (Hons) degree in one or more of the following disciplines: oceanography, physics, mathematics or computer science. Strong skills in data analysis, written and oral communication and coding in MATLAB, Python and/or Fortran are also essential. We are keen to hear from applicants excited by opportunities to incorporate mātauranga Māori (Māori knowledge) in their research.

Interested applicants should contact Dr Robert Smith at robert.smith@otago.ac.nz and attach:
(i) a Curriculum Vitae,
(ii) a copy of your academic transcript(s),
(iii) a brief statement of research experience and interests,
(iv) an indication of your potential start date.

Shortlisted applicants will also be requested to provide the names and contact details of two academic referee willing to provide confidential comments on your suitability for the project.

The **Department of Marine Science** was established in 1992, but we have a long history of marine research and teaching at the University of Otago. We are a multidisciplinary department with research strengths in both biological and physical marine sciences. We offer undergraduate and postgraduate degrees focusing on pure and applied marine science, and aquaculture. Information about the Department of Marine Science, its staff, current teaching and research, can be obtained from http://www.otago.ac.nz/marinescience

The **National Institute for Water and Atmospheric Research (NIWA)** is a Crown Research Institute in New Zealand. It specializes in environmental research and consultancy in water, atmospheric, and marine sciences. Established in 1992, NIWA focuses on providing scientific knowledge and solutions for environmental management, sustainable resource use, and understanding climate and weather patterns. Its work supports decision-making in areas such as climate change, biodiversity conservation, water quality, and natural hazard resilience. NIWA operates specialized, computing facilities, research vessels, atmospheric monitoring facilities, and a network of environmental monitoring stations across New Zealand. Further information about NIWA is available from https://niwa.co.nz.