PhD scholarships in aquatic greenhouse gas biogeochemistry in Australia

1. Nitrogen cycling and nitrous oxide emissions from tidal wetlands

Anthropogenic disruption of the nitrogen cycle is the second most important global scale environmental issue. The coastal zone plays a disproportionately large role in the downstream removal of terrestrial nitrogen and the global emissions of N_2O (a potent greenhouse gas). The coastal zone is a mosaic of hydrologically connected open water and vegetated aquatic ecosystems, but little is known about how this complex landscape controls anammox-denitrification trade-offs that maximise nitrogen removal but minimise N_2O emissions under current and future climates. This Australian Research Council funded Linkage project brings together coastal nitrogen process and N_2O emission measurements, including surface water-groundwater interactions, and hydrodynamic-biogeochemical modelling to quantify and model nitrogen removal and N_2O emissions under current and future climates.

We are currently seeking a PhD student to focus on tidal and seasonal effects on N_2O emissions, and controlling processes in Australian tidal wetlands. This project will use a combination of different techniques such as stable isotopes, cavity ring down spectroscopy, process measurements and benthic and floating chambers. You will work as part of a multidisciplinary team of post-graduate, post-doctoral and senior biogeochemists, groundwater hydrologists and biogeochemical modellers across several institutions.

2. Carbon cycling and methane emissions from tidal wetlands

The coastal zone is a hotspot for carbon production and burial and associated CH_4 emissions. Little is known about how the complex hydrological connection between inland, coastal and oceanic water and tidal wetlands controls trade-offs that maximise carbon burial but minimise CH_4 emissions under current and future climates. This project brings together coastal carbon process and CH_4 emission measurements, including surface water-groundwater interactions, and hydrodynamic-biogeochemical modelling to quantify and model carbon burial and CH_4 emissions under current and future climates.

We are currently seeking a PhD student to focus on tidal and seasonal effects on CH_4 emissions, and controlling processes in Australian tidal wetlands. This project will use a combination of different techniques such as stable isotopes, cavity ring down spectroscopy, process measurements and benthic and floating chambers. You will work as part of a multidisciplinary team of post-graduate, post-doctoral and senior biogeochemists, groundwater hydrologists and biogeochemical modellers across several institutions.

3. Greenhouse gas emission from Australian rivers

Rivers are globally significant sources of greenhouse gases. However, these global estimates are poorly constrained as they don't include the ~50% of streams that run dry for part of each year. Critically, Australia is a dry continent, with highly variable hydrology, and many rivers are intermittent, but little is known about greenhouse gas emissions from Australian rivers.

We are currently seeking a PhD student to help redress this knowledge gap for Australian rivers. We are working in coastal and inland rivers. The inland rivers work will require spending extended periods of field work in remote parts of Australia. This project will use a combination of different techniques such as stable isotopes, cavity ring down spectroscopy and floating chambers. You will work as part of a multidisciplinary team of post-graduate, post-doctoral and senior biogeochemists.

The candidates will be based in the Centre for Coastal Biogeochemistry (https://twitter.com/biogeochemSCU, https://www.scu.edu.au/centre-for-coastal-biogeochemistry/) at Southern Cross University (Australia). The Centre for Coastal Biogeochemistry has a world-class research group including a number of post-graduate, post-doctoral and senior researchers working in similar areas, providing an outstanding environment for intellectual stimulation and opportunities for exchange of ideas. The Centre has world-class infrastructure including access to an extensive stable isotope facility with full technical support, a membrane inlet mass spectrometer (MIMS), well equipped inorganic and organic chemistry laboratories, and a range of field equipment including benthic chambers, data sondes, Picarro Cavity Ring-down Spectrometers, Los Gatos isotope N_2O analyser and a transportable Proton Transfer Reaction-Mass Spectrometer (PTR-MS) (see http://scu.edu.au/coastal-biogeochemistry). Southern Cross University received the highest rank of 5.0 in geochemistry in the most recent national research excellence assessment.

Applicants must have an Honours or Master degree, undertaken in English, in a related field such as biogeochemistry, environmental chemistry, limnology, or closely related. The project will involve periods of intensive field measurements, laboratory work, and data processing. Experience with large data sets, stable isotopes and field work from 4WD and small boats will be viewed favourably.

Scholarships provide a tax-free annual stipend of $28,597 for 3 years (with a possible 3-month extension), and tuition fees will be exempt for 4 years. Interested applicants should send a CV and short (< 1 page) statement highlighting (1) which project they are interested in (2) their research background and interests, with respect to the criteria above, to Prof Bradley Eyre (bradley.eyre@scu.edu.au). Only short-listed applicants will be notified. Closing date for applications is October 24, 2021. Starting date is April to July 2022 (for overseas applicants this will depend on Australian boarders and getting appropriate visas).

Southern Cross University is based in Lismore, northern NSW, Australia (near Byron Bay). The region is a great place to live with a perfect sub-tropical climate (not too hot, not too cold), some the best beaches and surfing in the world, plus great fishing, scuba diving and wilderness areas. The quality of life is high and the cost of living relatively low.