Fresh Blue Carbon: The control of freshwater carbon emissions by pelagic food webs

Supervisory Team

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Scientific background

Freshwater ecosystems are recognised "hotspots" of biogeochemical activity and play an important role in global carbon cycling. Recently, the view that carbon emissions from freshwaters – due to variation in Net Ecosystem Productivity (NEP) are dominated by what happens in benthic habitats has been challenged. Carbon flux from pelagic habitats could be as or more important. Unlike a focus on NEP which could benefit from increased phytoplankton, the main management objective in reservoirs is to produce cost effective drinking water – which is challenged by high algal biomass. There is therefore an urgent need to understand the multiple interacting drivers of freshwater carbon flux, year round, in the context of multiple models of management – whether for NEP, drinking water or recreational use of wetlands in highly populated areas of the UK.

Research methodology

The focus of this project is on southern UK reservoirs and combines field based mesocosm experiments with in-situ manipulated studies of NEP and climate gas flux in large reservoirs. Due to a diverse academic and stakeholder network – there will be opportunities to develop replicated studies in other UK, European and Canadian wetlands. Areas of interest include benthic-pelagic coupling of nutrient (C, N) cycling, pelagic production of methane and how fish management influences nutrient availability and top-down control of algal biomass.

Training

The candidate will join the Ecology and Environmental Microbiology Group at Essex with further training at QMUL. The project is multi-disciplinary, and as such, the student will receive a broad skillset and training in aquatic food webs, freshwater taxonomy, and molecular microbiology. The student will be involved in High throughput sequencing and bioinformatics for investigating microbial communities in relation to nutrient cycling. Students will also utilise state of the art equipment (e.g. Licor gas flux chambers, Picarro GasScouter) to measure gas flux. Students will be encouraged to develop interests in quantitative biology including R coding.

Person specification

We are looking for a candidate who is enthusiastic about climate science, freshwater biology and water management preferably with a background in microbial/ aquatic ecology, environmental sciences or geography. Candidates will gain experience in aquatic fieldwork, working with stakeholders.

References

Tranvik, LJ., JA Downing, JB Cotner, SA Loiselle, RG Striegl, TJ Ballatore et al. (2009) Lakes and reservoirs as regulators of carbon cycling and climate. *Limnology and Oceanography* 54 (6part2), 2298-2314

Ten Brink, H; AKA Mazumdar; J Huddart; L Persson; TC **Cameron** (2014) Direct interspecific and not indirect intraspecific interactions determine the response of an aquatic community to multiple size-selective predators*. Journal of Animal Ecology* doi: 10.1111/1365-2656.12305.

Lansdown K, McKew BA, **Whitby C**, Dumbrell AJ, Heppell CM, Binley A, Olde, L, **Trimmer M** (2016). Importance and controls of anaerobic ammonium oxidation influenced by riverbed geology. *Nature Geosciences* 9 (5): 357-360

Key Information

- This project has been shortlisted for funding by the ARIES NERC Doctoral Training Partnership (www.aries-dtp.ac.uk).
- Successful candidates who meet UKRI's eligibility criteria will be awarded a NERC studentship - in 2018/19 the stipend is £14,777.
- Undertaking a PhD with ARIES will involve attendance at training events.

- ARIES is committed to equality & diversity, and inclusion of students of any and all backgrounds. All ARIES Universities have Athena Swan Bronze status as a minimum.
- Applicants from quantitative disciplines who may have limited environmental science experience may be considered for an additional 3-month stipend to take appropriate advanced-level courses.
- Usually only UK and EU nationals who have been resident in the UK for 3 years are eligible for a stipend. The closing date for applications is 23:59 on 8th January 2019. Shortlisted applicants will be interviewed on 26th/27th February 2019

How to Apply

Please apply by sending a CV (including contact details of two academic referees) and a cover letter explaining your motivation and suitability for the PhD to Emma Revill ariesapp@essex.ac.uk by 8th Jan 2019. If you have any questions please feel free to contact any member of the supervisory team.