

Changing Seasonality in Arctic Stream Networks (CSASN) Three Ph.D. Opportunities in Collaborative, Integrated Research

The Arctic System Science program of the National Science Foundation has funded a collaborative and integrated project to address the question “How does changing seasonality affect the capacity of arctic stream networks to influence nutrient fluxes from the landscape to the ocean?” As the arctic region warms in the future the synchrony among soil microbial processes (driven largely by warming temperatures) and terrestrial plant processes (driven by an unchanged light regime) will become increasingly out of phase. We expect that this growing asynchrony in arctic seasonality will have important impacts on the seasonal patterns of in-stream nutrient processing that ultimately control the flux of carbon, nitrogen, and phosphorus from the arctic landscape to the Arctic Ocean via river networks. The primary goal of our project is to quantify the relative influences of throughflow, lateral inputs, and hyporheic regeneration on the seasonal fluxes C, N, and P in an arctic river network, and to determine how these influences will shift under seasonal conditions that are likely to be substantially different in the future. To address this goal, we seek three, motivated, self-starting, and experienced graduate students who are excited about the prospect of working on a multi-disciplinary and multi-institutional research project. The three research opportunities and the respective mentors and institutions are:

Biogeochemical dynamics in arctic streams (*Breck Bowden, University of Vermont*) - This student will focus on the seasonal dynamics of nutrient uptake and regeneration as influenced by changing hydrodynamics in arctic streams. A background in stream ecology with a good foundation in basic biology, chemistry, and statistics is important. The ideal candidate would have research experience in methods used to measure stream solute dynamics and primary production. Experience using ¹⁵N isotopes would be an important advantage. Preference will be given to Ph.D. applicants, however, well-prepared and experienced M.S. applicants will be considered. The successful applicant will be a member of the Aquatic Ecology and Watershed Science (Natural Resources) program in the Rubenstein School of Environment and Natural Resources at the University of Vermont, Burlington, VT and should apply to that graduate program (<http://www.uvm.edu/~gradcoll/>). Contact Breck Bowden at breck.bowden@uvm.edu and see <http://www.uvm.edu/~wbowden> for additional information.

Stream Solute Transport and Fate (*Mike Gooseff, Pennsylvania State University*) - This student will focus on the seasonal dynamics of solute transport as a function of the changing relative influence of hydrodynamics processes in arctic streams. A solid background in mathematics and hydrology is essential. The ideal candidate would have experience conducting field work in demanding situations and experience in numerical modeling. Preference will be given to PhD applicants, although well prepared and experienced M.S. applicants will be considered. The successful candidate will be a member of the graduate program in Civil & Environmental Engineering at Pennsylvania State University and should apply to that graduate program (<http://gradsch.psu.edu/>). Please contact Dr. Michael Gooseff at mng2@psu.edu and see <http://water.engr.psu.edu/gooseff> for additional information.

Modeling Arctic Stream Biogeochemistry (*Wil Wollheim, University of New Hampshire*) - This student will develop a stream reach-scale model that integrates a dynamic hyporheic zone, a critical area of biogeochemical activity that is expected to change as the arctic climate warms. The model will build on existing frameworks and will utilize data generated by the two collaborating graduate students. A background in mathematics and hydrology or other environmental science is essential. The successful candidate must have strong quantitative skills, preferably with a programming background. Preference will be given to PhD applicants, although well prepared and experienced M.S. applicants will be considered. The successful candidate will be a member of the Natural Resources and Earth System Science (PhD) or Earth Science (M.S.) graduate program at the University of New Hampshire and should apply to one of those graduate programs (<http://www.gradschool.unh.edu>). Please contact Dr. Wilfred Wollheim at wil.wollheim@unh.edu and see <http://www.wsag.unh.edu/> for more information.

All three successful candidates will be expected to be an integral part of the larger interdisciplinary research team, able to conduct extensive field work in arctic streams in spring, summer, and fall conditions. All three students will be expected to work independently but collaborate freely with their colleagues on this project. Interested applicants should send an expression of interest and a CV to one (or more) of the mentors identified above, as soon as possible. Expressions of interest will be considered until the three successful applicants are identified. Interested students will need to separately apply to the relevant graduate program and should consider doing so *as soon as possible* to ensure that their qualifications are in order should they be offered one of these positions. Ideally students should be ready to begin work on these projects as early as January 2010 and no later than 1 June 2010. Contact the relevant mentor if you have questions. For additional information see our project website at: <http://water.engr.psu.edu/csasn/>.

All three institutions are equal-opportunity employers.