

Media Relations

UNH Scientists Help Show Potent GHG Emissions Are Three Times Estimated Levels

December 20, 2010

DURHAM, N.H. – In a study published today in the Proceedings of the National Academy Sciences (PNAS), a team of researchers including University of New Hampshire scientists Wilfred Wollheim, William McDowell, and Jody Potter details findings that show emissions of the potent greenhouse gas nitrous oxide from global rivers and streams are three times previous estimates used by the Intergovernmental Panel on Climate Change – the leading international body for the assessment of climate change.

Waterways receiving nitrogen from human activities such as agriculture and urbanization are significant sources of nitrous oxide, a byproduct of a microbial process known as denitrification that occurs in rivers and streams and converts nitrogen into the greenhouse gas. When summed across the globe, river networks represent at least 10 percent of human-caused nitrous oxide emissions to the atmosphere. Nitrous oxide contributes to climate change and is the leading human-caused threat to stratospheric ozone destruction, the authors believe.

“We measured nitrous oxide production rates from denitrification in 72 streams draining multiple land-use and ecosystem types across the United States as part of a cross-site study of nitrogen processing in streams,” says Wollheim of the Institute for the Study of Earth, Oceans, and Space (EOS). Wollheim, McDowell, and Potter are among 27 co-authors of the PNAS paper. The study was funded by the National Science Foundation (NSF).

For the study, Wollheim, co-director of the Water Systems Analysis Group (WSAG) within EOS and an assistant professor in the department of natural resources and the environment, estimated the nitrous oxide production globally using a powerful river network model developed at WSAG, without which the surprising new estimate could not have been made.

All three UNH investigators conducted experiments at sites within the NSF’s Long Term Ecological Research (LTER) Network. Wollheim and Potter worked in nine sites at the Plum Island (Mass.) LTER where Wollheim serves as co-principal investigator, while McDowell and Potter ran experiments at the Luquillo, Puerto Rico LTER where McDowell is co-principal investigator. The work from the Puerto Rico LTER was Potter’s master’s thesis; he is now lab manager of the New Hampshire Water Resources Research Center at UNH, which McDowell directs.

“Although we found that streams are not very efficient at producing nitrous oxide, instead making more of the innocuous dinitrogen during denitrification, they are still important producers at the global scale,” says McDowell, professor of natural resources and the environment. “If continued high loading of nitrogen occurs, it’s possible the streams could start leaking out more nitrous oxide.”

Adds lead author Jake Beaulieu of the University of Notre Dame and the U.S. Environmental Protection Agency in Cincinnati, Ohio, “Changes in agricultural and land-use practices that result in less nitrogen being delivered to streams would reduce nitrous oxide emissions from river networks.”

McDowell notes that their findings point to the need for continued scientific study of the drivers of climate change.

“The story is not yet told of how our manipulations of carbon and nitrogen cycles are affecting global patterns of climate and Earth system functions,” he says. “There’s a lot more to learn.”

The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea, and space-grant university, UNH is the state’s flagship

 
SHARE
 Print
 Email
 Subscribe
Facebook
Tweet
<input type="text"/>

public institution, enrolling 12,200 undergraduate and 2,200 graduate students.

-30-

Editors and reporters: *Wilfred Wollheim can be reached at (603) 862-0812 or wil.wollheim@unh.edu, and William McDowell can be reached by cell phone at (603) 781-3561 or at Bill.McDowell@unh.edu.*

Media Contact: [David Sims](#) | 603-862-5369 | Science Writer
Institute for the Study of Earth, Oceans, and Space

Researcher Contact: [Beth Potier](#) | 603-862-1566 | UNH Media Relations



T-hall

Copyright © 2012 UNH Media Relations, 15 Strafford Ave, University of New Hampshire, Durham, NH 03824.
UNH is part of the University System of New Hampshire.
[ADA Acknowledgement](#) | [Privacy Policy](#) | [UNH Home](#) | [E-mail Webmaster](#)