Geophysical Research Abstracts,
Vol. 11, EGU2009-6978-1, 2009
EGU General Assembly 2009

Bacterial methane oxidation in peat bogs

J.F. van Winden (1), N. Kip (2), G.J. Reichart (1), M.S.M. Jetten (2), H.J.M. Op den Camp (2), J.S. Sinninghe Damsté (1,3)

(1) Utrecht University, Department of Geosciences, The Netherlands (j.vanwinden@geo.uu.nl), (2) Radboud University Nijmegen, IWWR, Department of Microbiology, The Netherlands, (3) NIOZ Royal Netherlands Institute for Sea Research, Department of Marine Organic Biogeochemistry, The Netherlands

Symbiotic methane oxidizing bacteria (methanotrophs) in peat moss (*Sphagnum*) reduce methane emissions from peat bogs and provide $CO_2$for photosynthesis, leading to effective *in situ* carbon recycling(Raghoebarsing et al., Nature, 2005). To gain further insight into this symbiosis, distinct *Sphagnum* species were collected from different microhabitats within peat bogs from various countries, including Great Britain, Russia, Canada and Argentina. We tested them for methane oxidation activity at different temperatures, and incubated selected mosses with 99% ^{13}C-labelled methane to confirm the presence of methanotrophs.

Sphagnum mosses sampled around the world showed methane oxidation activity, demonstrating the global occurrence of the symbiosis. The presence of methanotrophs was substantiated by incorporation of methane-derived label into bacterial lipids (C32-17β,21β-hopanol, liberated from tetrafunctionalised hopanoids) extracted from *Sphagnum*. The degree of labelling in pool-derived *Sphagnum* was substantially higher compared to the same *Sphagnum* species from a lawn setting. The methanotrophic activity in pools is most likely higher because of greater methane availability. Variability in label incorporation between various *Sphagnum* species derived from similar settings in different bogs was relatively small. *Sphagnum*-derived sterols also showed label incorporation when *Sphagnum* was submerged, suggesting that methane-derived CO_2 is an important carbon source under these conditions, when atmospheric CO_2 is limiting. Additionally, methanotrophic activity increased at higher temperatures, potentially providing a negative feedback to enhanced methane release as a consequence of (global) warming.