



Tundra methane emission is moderated by methane oxidation by symbiotic methanotrophs in *Sphagnum*

J. van Huissteden (1), C. Berrittella (1), N. Kip (2), F.J.W. Parmentier (1), H.J.M. op den Camp (2), M.S.M. Jetten (2), A.J. Dolman (1), and T.C. Maximov (3)

(1) Vrije Universiteit Faculty of Earth and Life Sciences, Hydrology and Geo-Environmental Sciences, Amsterdam, Netherlands (ko.van.huissteden@geo.falw.vu.nl, 31 20 5989940), (2) Radboud University Nijmegen, Faculty of Science, Department of Microbiology, Nijmegen, Netherlands (n.kip@science.ru.nl, 31 24 3652940), (3) Russian Academy of Sciences Institute for Biological Problems of the Criolithozone (IBPC), Yakutsk, Russia (t.c.maximov@ibpc.yasn.ru)

CH₄ emission from arctic wetlands is a potential positive feedback to climate change. However, these emissions show a strong spatial variation. In a northeast Siberian tundra area spatial variation over an order of magnitude (1-60 mg CH₄ m²hr⁻¹) has been observed in wetland vegetations with a similar water table. These spatial differences are related to vegetation type. Emission increases in the order submerged *Sphagnum* hollows > *Carex/Eriophorum* meadows > Floodplain sedge and grasses vegetation.

We present evidence that the low emission of *Sphagnum* vegetations is at least partly caused by within-plant oxidation of CH₄ by symbiotic methanotrophic bacteria. Observed oxidation rates in *Sphagnum* samples are 0.5 and 80 micromol CH₄g⁻¹ d⁻¹ on a dry weight basis. Samples from submerged sites show the highest oxidation rates, while samples from *Sphagnum* hummocks show negligible oxidation. Since *Sphagnum* vegetation covers large areas of arctic wetlands, emission estimates should take symbiotic CH₄ oxidation into account.

Next to CH₄ oxidation, the differences in emission can be attributed to differences in ecosystem net primary production (NPP) which is probably lowest in the oligotrophic *Sphagnum* sites and highest on the floodplain where flood water adds nutrients to the ecosystem.