



Methane emissions from tundra wetlands in West Siberia

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Tundra wetlands are one of the less studied wetlands in West Siberia. We investigated methane fluxes in oligotrophic and mezotrophic wetlands in tundra near Tazovskiy (Southern tundra) and near Gida (Typical tundra) settlements. Flux measurements were made during summer of 2009 and 2010 and winter of 2009. We used static chambers with base size of 40x40 cm and height of 30 cm and 40 cm with stainless steel collars (in summer) or directly inserted 15 cm into the snow (in winter). Each observation included collecting 4 samples with a 7-10 minute time step for lakes and 10-20 minute time step for wetlands. Methane concentrations in samples were determined with the GC-FID. Concentration trend during exposure and fluxes were calculated with linear regression with weights of concentration versus time. Environmental factors (pH, EC and temperature profile) were measured at each site. Mean fluxes by eco-region and corresponding statistics were obtained (see table 1).

Table 1. Methane fluxes statistics, $\text{mgC-CH}_4 \cdot \text{m}^{-2} \cdot \text{h}^{-1}$

Wetland or wetland landscape type	Number of sites	1st quartile	Median	3rd quartile
Southern tundra				
Lake	10	0,17	0,32	0,65
Mezotrophic bog	8	0,22	2,18	3,69
Oligotrophic bog	7	0,00	0,22	0,74
Peat mat	3	0,99	2,42	3,24
Oligotrophic bog (winter)	4	-0,04	0,00	0,12
Typical tundra				
Lake	4	0,12	0,18	0,28
Mezotrophic bog	3	0,63	1,20	1,72
Oligotrophic bog	1	0,83	0,93	1,02

Observed emission rates vary along with a eco-region, except lakes. Probably, eco-region type connects with temperature. For oligotrophic bogs summer emission rate dependence on permafrost level has minimum at 25-30 cm. Methane uptake was found in winter, when snow cover and low temperatures likely rule out any explanation by biological processes. Therefore, we assume that CH_4 is adsorbed by the snow. The regional annual CH_4 flux from Western Siberian tundra was estimated to be 0.14 Mt CH_4 by Bc8 model, representing 4% of the flux from all Western Siberian wetlands. Our data concur with previous report by (Christensen et al, 1995), who observed fluxes at two sites in tundra of Yamal peninsula.

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References:

Christensen, T., S. Jonasson, T. Callaghan, and M. Havström (1995), Spatial variation in high latitude methane flux along a transect across Siberian and European tundra environments, *J. Geophys. Res.*, 100(D10), 21035-21045.