

北東シベリアタイガ - ツンドラ境界域湿地土壌のメタン酸化ポテンシャル

村瀬 潤¹、杉本敦子^{2,3}、新宮原 諒³、トロフィーム・C・マキシモフ^{4,5}

¹名大院生命農学、²北大院地球環境、³北大院環境科学院、

⁴ロシア科学アカデミー寒冷圏生物学研究所、⁵北東連邦大学 BEST センター

Methane Oxidation Potential of Arctic Wetland Soil of a Taiga-Tundra Ecotone in Northeastern Siberia

Jun Murase¹, Atsuko Sugimoto^{2,3}, Ryo Shingubara³, Trofim C. Maximov^{4,5}

¹Grad. Sch. Bioagr. Sci., Nagoya Univ., Nagoya,

²Fac. Earth Environ. Sci., Hokkaido Univ., Sapporo, ³Grad. Sch. Environ. Sci., Hokkaido Univ., Sapporo

, ⁴Inst. for Biol. Problems of Cryolithozone SB RAS, Yakutsk, Russia, ⁵BEST center, NEFU, Yakutsk, Russia

Arctic wetlands are significant sources of atmospheric methane and the observed accelerated warming of the arctic causes increased methane formation in water-saturated tundra soil with deepened permafrost thawing. Methane oxidation is the key process to regulate methane emission from wetlands. In this study we determined the potential methane oxidation rate of the wetland soils of a Taiga-Tundra transition zone in Northeastern Siberia. Peat soil samples were collected in the summer from depressions that were covered with tussocks of sedges and *Sphagnum* spp. and from mounds vegetated with moss and larch trees. The potential methane oxidation rate was estimated by a bottle incubation experiment in which homogenized soil samples were incubated with methane at the initial concentration of 0.5-0.8 %v/v. Soil samples collected from depressions in the moss- and sedge-dominated zones exhibited active methane oxidation with no lag. The potential methane oxidation rates at 15 °C ranged from 270 to 190 nmol h⁻¹ g⁻¹ dw. Methane oxidation was active over the depths including the water-saturated anoxic layers. The maximum methane oxidation rate was recorded in the layer above the water-saturated layer: the surface (0-2cm) layer in the sedge-dominated zone and in the middle (4-6 cm) layer in the moss-dominated zone. The methane oxidation rate was temperature-dependent and the threshold temperature of methane oxidation was estimated to be -4 to -11 °C, which suggested methane oxidation at subzero temperatures. Soil samples collected from the frozen layer of *Sphagnum* peat also showed immediate methane consumption when incubated at 15 °C. The present results suggest that methane oxidizing bacteria keep their activity in the wetland soils even under anoxic and frozen conditions and immediately utilize methane when the conditions become favorable.