20. Methane flux from degradating permafrost in east Siberia

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Abstract

In east Siberia, there exists highly concentrated methane which was produced and stored in last Glacial Period in upper layers of permafrost. The average concentration value between 120-220cm depths is about 2000 ppm.

Once taiga severely burns, the ground surface heat budget change allows deepening the active layer. In coming heat flux to permafrost changes from 140 MJ/4months to 180 MJ/4months. Then the rate of deepening active layer is 7.5%/year. During the process of uppermost permafrost thawing, huge amounts of methane emits to the atmosphere. Preset author estimates the annual flux of methane from thawing permafrost as 1.8x1011 g. In high arctic Siberia there exists another type of permafrost degradation under the global warming. The exposures of Ice-Complex tend to thaw in large scale. As upper layers of permafrost contains highly concentrated methane. A large volume of Ice-Complex tend to thaw. Emitted methane from thawing Ice-Complex is also estimated as 3x1010g/year. These values may effect the increase of methane concentration in the atmosphere and may also accelerate future global warming as positive feedback effect.



Fig1. Methane concentration in Permafrost