5. Change in surface methane flux after a forest fire in West Siberia

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Abstract

Temporal variation in methane (CH₄) exchange between soil and the atmosphere after a forest fire was measured in this study. The study site was located in a boreal forest in the West Siberian plain and experienced a severe fire in the summer of 1998. The surface of the burned area was classified into bare soil, open water, and recovered herbaceous plants; the fractional coverage of these elements has changed seasonally and interannually since the fire. In August 1999, June 2000, and September 2000, we measured CH₄ fluxes using a closed-chamber method and environmental variables, such as soil temperature and soil water content, at each of the three surface types in the burned area and in the unburned area. The unburned forest soils were kept very dry and CH₄ oxidation (mean CH₄ flux was _3.9 mg C m⁻² d⁻¹; the negative value indicates CH₄ consumption) dominated there during the entire study period. In contrast, CH₄ fluxes in the burned area were highly variable mainly due to the surface moisture conditions; CH₄ flux varied between _0.48 and 30 mg C m⁻² d⁻¹. We found that surface soil had become extremely wet since the fire, and therefore soil has changed from a consumer to a net emitter of CH₄ after the fire disturbance.