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High methane flux from an arctic floodplain (Indigirka lowlands, Eastern Siberia).

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We measured methane fluxes from tundra soils on a river terrace and floodplain of a tributary of the Indygyrka river in Northeastern Siberia. The river terrace is underlain by shallow permafrost and shows a pattern of ice wedge polygons and a varied vegetation. The adjacent floodplain is characterized by frequent flooding, active sedimentation of silt and organics, a thicker vegetation and a more uniform vegetation of sedges and grasses. The methane fluxes measured on the river terrace compare well values found in other studies on tundra methane fluxes, with an average of 4.3 $mg.m^{-2}.hr^{-1}$, for wet sites 7.2 $mg.m^{-2}.hr^{-1}$ and for dry sites 0.18 . Many dry sites show negative fluxes, down to -1.0 $mg.m^{-2}.hr^{-1}$. The fluxes from floodplain sites are considerably higher, on average 12.5 $mg.m^{-2}.hr^{-1}$, for dry sites 1.6 $mg.m^{-2}.hr^{-1}$ and for wet sites 23.4 $mg.m^{-2}.hr^{-1}$. We hypothesize that the large flux differences between river terrace and floodplain sites are caused by higher primary production of the floodplain vegetation, stimulated by nutrient and organic matter addition during flooding. Our results indicate that changes in fluvial discharge and organic matter transport of arctic rivers may have a considerable effect on arctic methane fluxes.