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The greenhouse gas balance of a Siberian tundra site.

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The Siberian tundra is one of the last areas on the globe that has not been studied well with respect to the greenhouse gas balance. Yet, huge reservoirs of carbon are stored in and under the frozen soils. With observed accelerated warming, decomposition of soil carbon may also accelerate. The resulting increase of carbon dioxide and methane emission may form an important feedback mechanism to global warming.
To determine the greenhouse gas balance of a Siberian tundra site, since 2003 continuous micrometeorological observations have been carried out near the village of Chokurdakh along the Indigirka River in North-East Siberia. At present, permafrost at this site appears stable. A four years record of carbon dioxide fluxes during the growing season is available now. Additionally, methane measurements using closed chambers have been made since 2004. These data have been analysed for the sensitivity to interannual and daily weather variability. Solar radiation and the length of the growing season are important determinants of the annual CO_2 fluxes. Water level, hydrochemistry, geomorphology and vegetation type are important determinants of the methane fluxes. CO_2 uptake is in the order of 60 g C.m^{-2}.yr^{-1}. Comparing summer CO_2 and CH_4 fluxes, the tundra bog at the site is a greenhouse gas sink of 1.7 g CO_2-equivalents.m^{-2}.d^{-1}. Nearby floodplain wetlands may be a net greenhouse gas source (assuming similar CO_2 uptake as the tundra bog: approximately 0.8 g CO_2-eq.m^{-2}.d^{-1}) because of their relatively high CH_4 emission compared to the tundra bog. This source is highly sensitive to river discharge variation.