5.150 Wetland classification and methane emission inventory for West Siberia.

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Abstract:

High latitude wetlands are important for understanding climate change risks because these environments sink carbon and emit methane. West Siberian Plain is the biggest peatland area in Eurasia and is situated in the high latitudes experiencing enhanced rate of climate change. Fine scale heterogeneity of wetland landscapes pose challenges for producing the greenhouse gas flux inventories based on point observations. We mapped wetlands in the taiga zone of West Siberia (WS) on a scene-by-scene basis using a supervised classification of Landsat imagery. The training datasets were based on high-resolution images and ground truth data collected for more than 10 years of fieldwork in West Siberia summarized in an extensive dataset of botanical descriptions and field photos from 40 study areas. Classification scheme was targeting methane inventory applications and included seven wetland ecosystem types composing nine wetland complexes in different proportions. Accuracy assessment based on 1082 validation polygons indicated an overall map accuracy of 79%. Methane emission rates vary strongly among the wetland ecosystems. While the highest amounts are emitted by waterlogged hollows followed by fens, elevated environments as forested bogs and ridges emit at the lowest rates. The later account for only 2% of the regional total emissions, while occupying almost 40% of the wetland area. The oligotrophic and waterlogged hollows as parts of patterned bogs cover a third of the mire territory accounting for 60% of the total CH_4 emission. Concerning zonal distribution, taiga contribute 85% to regional methane flux and tundra only 8%, however ebullition in lakes was not directly measured. Applying the new map resulted in total regional methane emissions of 4.62 $TgCH_4$/yr, which is 72% higher than the estimate based on the same emission dataset and a map by Peregon et al. (2009). The increase resulted from the changes in fractional coverages of methane emitting ecosystems.