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The energy budget of West Siberian wetland in summer

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This observational study reports variations of surface fluxes (turbulent, radiative, and soil heat) and ancillary atmospheric/surface/soil data based on in-situ measurements conducted at Mukhrino field station located in the middle taiga zone of the West Siberian Lowland. We estimated carbon dioxide flux and energy budget in a typical wetland of the western Siberian based on July measurements in 2019. Turbulent fluxes of momentum, sensible and latent heat, and CO_2 were measured with the eddy covariance technique. The footprint of measured fluxes consisted of a homogeneous surface with tree-covered and smooth moss-covered surface. Measurements in the atmosphere were supplemented by measurements of heat flux through the soil, net radiation components and soil temperature at several depths. Turbulent heat fluxes (sensible and latent) show a diurnal variation typical of land ecosystems, being in phase with net radiation. Most of the available energy is released as latent heat flux, while maximum sensible heat fluxes are more than 3 times lower. Net CO_2 sink was high but was typical for a wetland area. The influence of moss cover on the temperature regime of soil is considered. Based on soil temperature and heat flux measurements the thermal conductivity of moss layer was estimated. The thermal and dynamic roughness lengths of the moss-covered surface in the summer were also studied. The dependence of the dynamic roughness length on the atmospheric stability is established, and the coefficients relating the ratio of thermal and dynamic roughness length to the roughness Reynolds number are determined. The parametrizations obtained in this work can be used in Earth System models to represent wetland surfaces. The work was supported by RFBR grant 18-05-60126.