EGU21-15680
https://doi.org/10.5194/egusphere-egu21-15680
EGU General Assembly 2021

Sensitivity of evapotranspiration and surface conductance to vapour pressure deficit across high latitude climatic gradients.

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Evapotranspiration links the energy, water and carbon budgets of wetlands, a key ecosystem in high latitudes. While the evapotranspiration in high latitude wetlands is largely controlled by available energy, the surface also exerts a non-negligible control. The surface control on evapotranspiration, often represented by the surface conductance, is sensitive to environmental variables such as vapour pressure deficit (VPD). Previous studies have shown that higher surface conductance leads to higher evapotranspiration from high latitude wetlands than from high latitude forests during periods of high VDP. However, it is unclear how the surface conductance-VPD relation varies across climatic gradients. To study the sensitivity of surface conductance to increasing values of VPD, we use data from three recently established eddy covariance sites in Norway, situated along high latitude climatic gradients. The sites included are Hisåsen (680 m.a.s.l., N 61.11°, E 12.24°), Finse (1200 m.a.s.l., N 60.59°, E 7.53°) and Iškoras (360 m.a.s.l, N 69.34°, E 25.29°). We first estimate surface conductance from the eddy covariance data, by inverting the Penman-Monteith equation. We then apply a boundary line analysis to assess the sensitivity of the surface conductance to VPD. Our preliminary results show a lower sensitivity of surface conductance to VPD on the northernmost site, compared to the two sites at lower latitude. Further work is needed to relate the observed variations in surface conductance-VPD relation to surface characteristic, and we hypothesize that the observered lower sensitivity in surface conductance is related to lower values of leaf area index. This work is a contribution to the Strategic Research Initiative ‘Land Atmosphere Interaction in Cold Environments’ (LATICE) of the University of Oslo.