



Supplement of

Assessing spatial heterogeneity of active layer thickness over Arctic-foothills tundra, North Slope Alaska

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S1. Assessing DEM Choice and Radar Data Effects on ALT Predictions

To assess the impact of DEM choice on 5 m ALT predictions, we compared drone-based DEM and ArcticDEM across the four plots. The two DEMs were highly correlated (R 0.99), though ArcticDEM showed a positive bias of approximately 5.1 m. Nevertheless, ALT predictions derived from ArcticDEM performed nearly as well as the drone-based benchmark, with RMSE increasing slightly from 6.53 cm to 7.24 cm, and correlation decreasing from 0.78 to 0.72.

It is noted that additional radar (L-band 1.26 GHz) observations from UAVSAR helped to enhance the performance of the first RF model (e.g., R increased from 0.78 to 0.81), but were not used in the subsequent scaling analysis (section 3.1.2). For the features selected for radar-based ALT predictions, red-edge reflectance (16.67 %), HV-polarized radar backscatter (16.04 %), aspect (15.33 %), and HH-polarized radar backscatter (15.04 %) contributed most to the predictions, while the red band (13.34 %), slope (11.99 %), and green band (11.57 %) observations were relatively less important. The sensitivity of radar backscatter to vegetation biomass, surface water bodies, and soil wetness likely enhanced the ALT estimation.

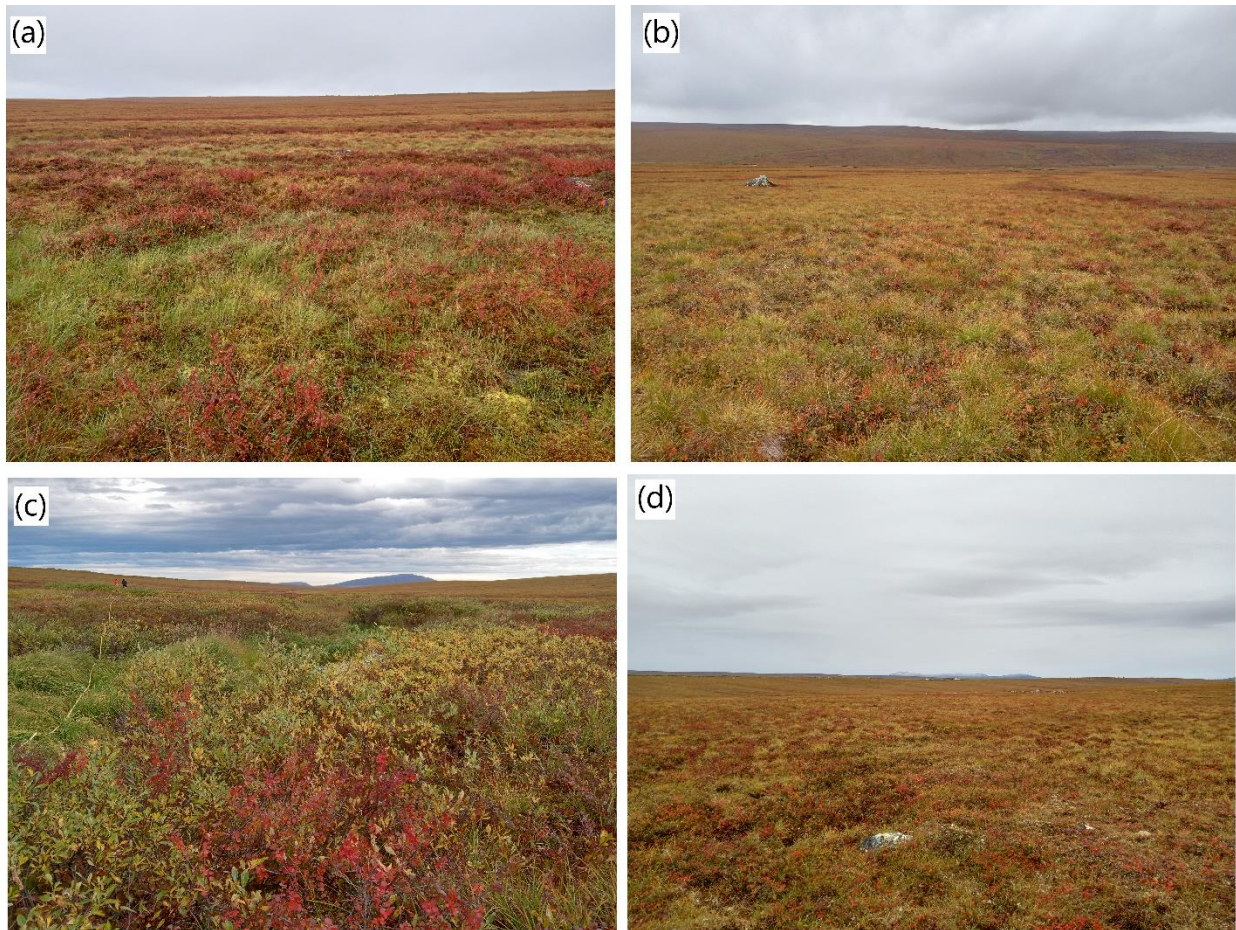


Fig. S1 On-site photos for Plot 3 (a), Plot 4 (b), Plot 5 (c) and Plot 6 (d).