Quantifying impact of seasonal variations in backscatter on soil moisture retrieval in high latitude permafrost areas

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Knowledge of surface hydrology has important implications for many application areas, including those aiming to improve our understanding of permafrost response and feedback in a changing climate. Validation of global hydrological land-surface models in high latitude permafrost regions is challenging due to e.g. scarcity of observation based data and spatial variability of hydrological properties. Today, advances in remote sensing techniques and retrieval algorithms can provide a range of landsurface parameters, including soil moisture products. Comparisons of remotely sensed soil moisture with large scale model output, as well as reanalyzes between Metop ASCAT and ENVISAT ASAR GM data, were recently done, recognizing that pond rich areas show low correlation. However, it has previously been pointed out that soil moisture retrieval, by the remote sensing technique referred to in this study, can be challenging in high latitudes due to e.g. frozen ground conditions, landscape heterogeneity and seasonal variations in landcover type. This study investigates whether low correlation can be linked to issues in the remote sensing product rather than model output or reanalyzes data. Effects of issues specific for the arctic, with focus on seasonal variations in water bodies, are investigated and the effects on backscatter quantified over relevant areas in high latitudes. Lake ice cover is identified as one mayor contributor to backscatter differences in these areas.