Poster #1-28

Understanding Controls on Soil Moisture Using In-Situ TDR, Airborne SAR and UAS Lidar Data at the NGEE-Arctic Teller Field Site

Julian Dann[1], Cathy Wilson[1*], Christian Andresen[2], W. Robert Bolton[3], Emma Lathrop[1], Dea Musa[1], and Stan Wullschleger[4]

[1] Los Alamos National Laboratory, Los Alamos, NM;
[2] University of Wisconsin, Madison, WI;
[3] University of Alaska, Fairbanks, AK;
[4] Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN

Contact: jdann@lanl.gov

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NGEE-Arctic scientists are analyzing in-situ and multi-scale remote sensing data to understand interactions between surface and subsurface landscape structure and the spatial distribution of soil moisture across the NGEE Arctic Teller road field site. The work aims to demonstrate an approach to extend local soil moisture observations to watershed and regional scales for use as model benchmark datasets. We co-analyzed simultaneous observations from NASA's Arctic Boreal Vulnerability Experiment (ABoVE) airborne synthetic aperture radar (SAR) August 2017 campaign, with NGEE-Arctic's unmanned aerial system (UAS) lidar intensity data and *in-situ* measurements of soil moisture to produce a high-resolution map of distributed soil moisture. We further examined how local geomorphology, topography, climate and vegetation properties interact with soil moisture patterns within the watershed. In situ soil moisture data was collected with a Hydrosense-II soil-water sensor and data logger which uses time domain reflectometry (TDR) and the dielectric properties of the soil to estimate volumetric moisture content. Data were collected along transects located within 100m by 100m plots following a standard ABoVE protocol. UAS lidar intensity data shows a unique signature for standing water, and provides a watershed-wide, high-resolution (0.1m) map of potential saturated areas. The spatially sparse in- situ data was combined with the spatially coherent lidar intensity data to interpret and convert Airborne SAR data into a map of spatially distributed soil moisture. This analysis provides a unique benchmark dataset with which to test predictions of spatial variation and temporal evolution of soil moisture in local and regional permafrost models.