The Permafrost Dynamics Observatory (PDO)
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Overview

Summary: Combine InSAR using the L-band UAVSAR with backscatter from the P-band AirMoss to simultaneously estimate Active layer Thickness (ALT) and soil moisture.

Figure 1: We will process these six pilot patches first to test our algorithms, and then process all 90 swaths simultaneously.

Figure 2: ALT around Barrow based on satellite L-band from ALOS (a) and the ABoVE interferogram (b). The circles indicate features seen in the satellite data, but not the ABoVE data, and visa versa.

Figure 3: Estimated soil moisture from AirMoss for Happy Valley, south of Deadhorse. Ridge tops show lower soil moisture than ravines due to drainage.

Anaktuvuk Fire

(a) Seasonal Subsidence after fire
(b) InSAR Coherence Loss

Figure 8: Seasonal subsidence increased after the Anaktuvuk Fire (a). Coherence is the correlation in radar phase between SAR images and is a measure of burn severity (b).

Yukon Kuskokwim Delta

Figure 7: The 2015 fires in the Yukon-Kuskokwim Delta (lines) show up very clearly in the L-band interferogram based on images obtained on the spring and fall airborne campaigns.

Validation

Figure 6: The SAR working group is organizing field data into a validation dataset. We used Ground Penetrating Radar (GPR) and the Hydrosense II to collect in situ measurements of ALT and soil moisture. We have ~40 km of survey data at 50 sites in Alaska.

UAVSAR

Spring Fall Interferogram Seasonal Subsidence

AirMoss

Scattering Model Backscatter