Phase 1 HP include (6)…

- Estimation of active layer temperature using L and P (In) SAR backscatter
- Retrieval of ALT properties using P band – SOM and below ground biomass
- Mapping open water extent using AIRSWOT
- Mapping and monitor ALT and SM properties using gas measurements/fluxes at Bonanaza Creek
- Thermokarst dynamics
- Landscape change impacts on hydrology and biochemistry in Old Crow Flats.

Phase 2 HP projects include (3)…

- Using hydrologic datasets coupled with methane observations to upscale methane estimates
- Wetland mapping across NWT, extending phase 1 methods to incorporate UAVSAR to improve estimates.
- Merging low frequency radar with 1D process modeling to estimate and extrapolate active layer properties and dynamics across the domain (50 m – 1 km).

Protocols/Data Access/Data Gaps

Uncertainty regarding which active layer field measurements (soil moisture, T, dielectric, bulk density, SOM) have been collected and are available. Needed for model and RS cal/val and site data synthesis.

The ABOVE Data Tool – was one way to show other projects where and what data the various projects have collected or are still planned. Other agencies also collect in situ soil data – **Need to revisit these data** tools to ensure that all available data are represented for discovery.

Two pronged issue, **one** getting phase 1 data into the DAAC and available, and **two** making them known to phase 2 projects.

- **Recommend** soil properties (moisture, dielectric, ALT, T, OM, mineral texture, bulk density) inventory to assess what we have, and then decide on next steps to make the data more useable; assess gaps and potential sampling strategies to fill gaps.

    If it exists, it's not well integrated

    Seasonal vs continuous measurements

    limited standardization between different groups collecting SM.

    Dedicated technician and/or post doc may be needed to acquire and inventory data

- Identify who is working under which flight paths. ID agencies and PIs with ground sites within flight paths.

- **Potential synthesis activity:** Analysis of in situ soil properties data; e.g. characterizing spatial gradients; linkages to disturbance recovery, vegetation dynamics, snow properties, land cover, climate, etc. to contribute towards a synthesis –
    - Adds additional science justification to inventory, process and harmonize in situ data observations across networks, projects, etc...
    - Will also inform potential additional data collections to fill gaps.

Data Gaps

- Priority measurements for cal/val
  - Active Layer temperature, soil dielectric, OM, root biomass, soil mineral and hydraulic properties. Further, SM data gaps are amplified by the potential end of US array, funded for augmentation in Phase 1; NSF funds ends next year.

- Water chemistry measurements -> links to a phase 2
  - DOC,POC, major ions, N, O18, deuterium
  - Recommendation to integrate water measurements – water chemistry measurements – potential data gap as part of a larger synthesis effort to characterize lateral transport of materials (C, N, contaminants); cross cutting link with other WGs (e.g. ecosystems, carbon) and Phase2 objectives (societal impacts).
  - Might be augmented by Arctic-COLORS

- Difficult and important hydrologic parameters: Snow properties (timing, distribution, depth, SWE, density) with desired spatial and temporal attributes for local-landscape relevant studies.

Potential synthesis

- Several projects identified thermokarst as an activity for cross-site comparisons; e.g. patterns and drivers, links to permafrost degradation – try to coordinate/synthesize the ground and air observations across different group's (5) results to help learn more about thermokarst across the ABOVE domain.

    Lidar, hyperspectral, SWOT, flown over old crow flats and Bonanza creek.

Potential synthesis

- Recognize snow is important cross-cutting topic with other WGs – support activities to enhance and exploit in situ observations for detailed monitoring of snow properties (depth, area, density, SWE).

    Coordinate work with SnowEx regional campaigns.

    Coordinate with Canadian efforts to maximize data collection efficiency

    Combine ABOVE and SnowEx data to create coincident observations; emphasize existing flight lines with overlapping observations spanning environmental gradients.

    Recognize the different agendas between ABOVE and SnowEx

Potential synthesis

- 2017/18 anomalously high snowpack – interior Alaska to Seward. How will active layer look after a record snow year?
- Consider spatial environmental gradients and a space for time substitution.

    Biomes and/or elevation gradients – permafrost and active layer

    Ties together well with wildlife and wetlands