Collaborations between Global Water Futures & ABoVE: *2017 Updates & Ideas for Future Activities*

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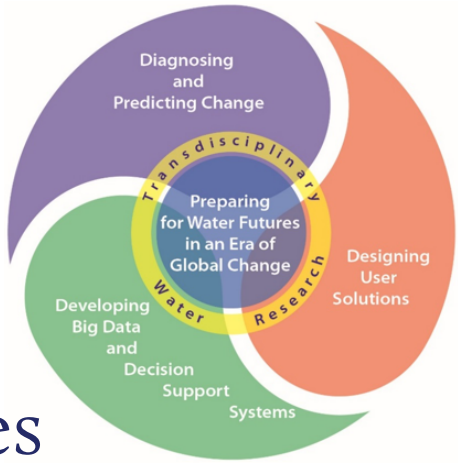
Northern Water Futures



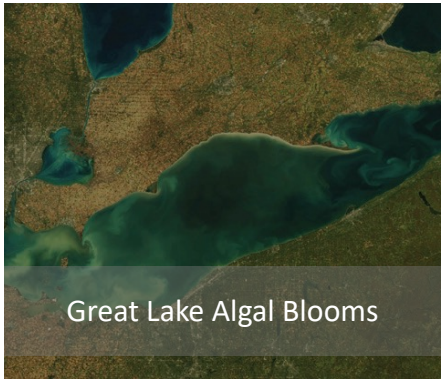
ABoVE
ARCTIC – BOREAL VULNERABILITY EXPERIMENT

Global Water Futures will position Canada as a:

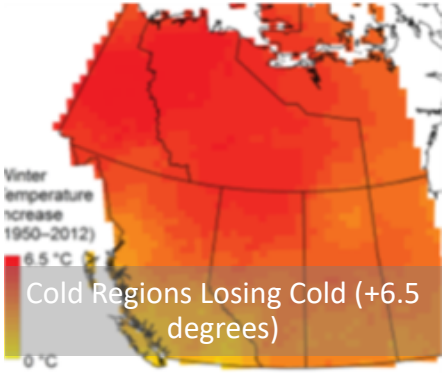
- Global leader in water science
- Global partner of choice for water research
- Provider to Canada and the world of solutions to water threats

Addressing a Broad Suite of Issues Related to Water Security


Toronto Flood (2013)

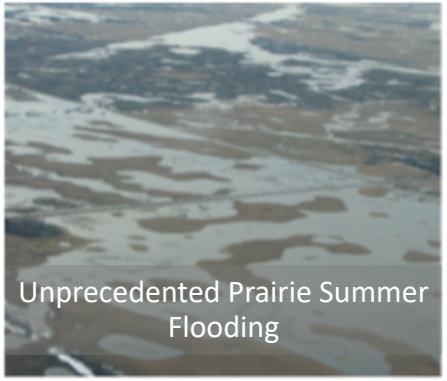

Great Lake Algal Blooms


Drought: Prairies (1999-2004)



Cold Regions Losing Cold (+6.5 degrees)


Permafrost Thaw


Unprecedented Prairie Summer Flooding


Extreme Wildfires


Yukon's Slims River Changes Flow Direction

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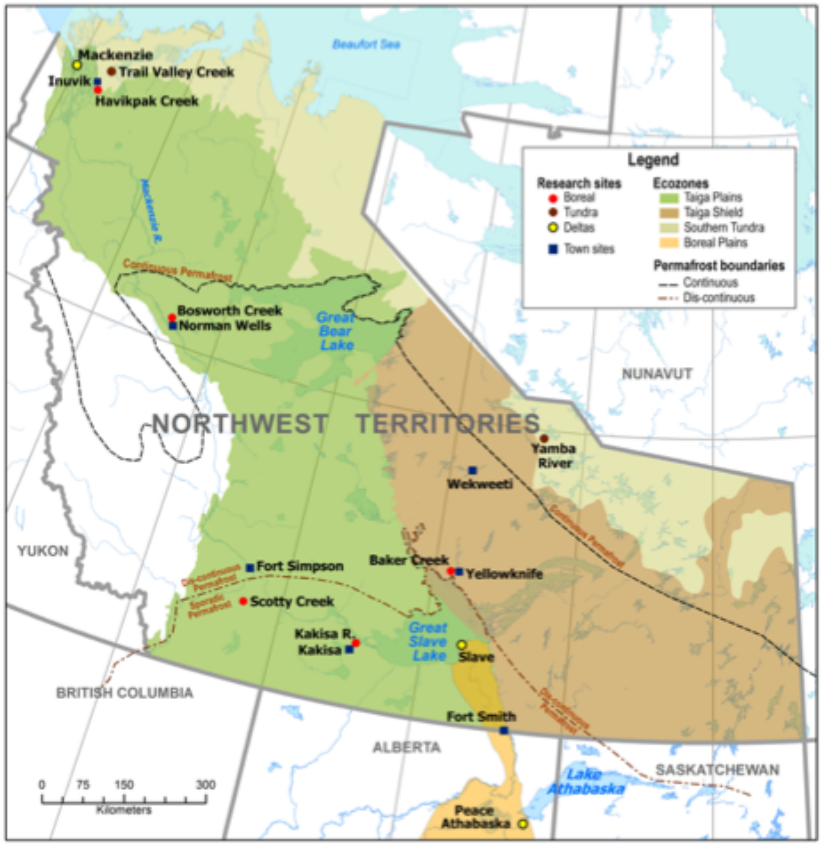

Changing Biophysical Landscape

- Hydroclimatic changes
- Wildfire
- Permafrost thaw
- Habitat loss and fragmentation

Community health and wellbeing

- Food safety and security
- Drinking water safety
- Traditional livelihoods
- Harvester Safety

Sustainable development

- Infrastructure
- Reliable energy supply
- Responsible resource extraction

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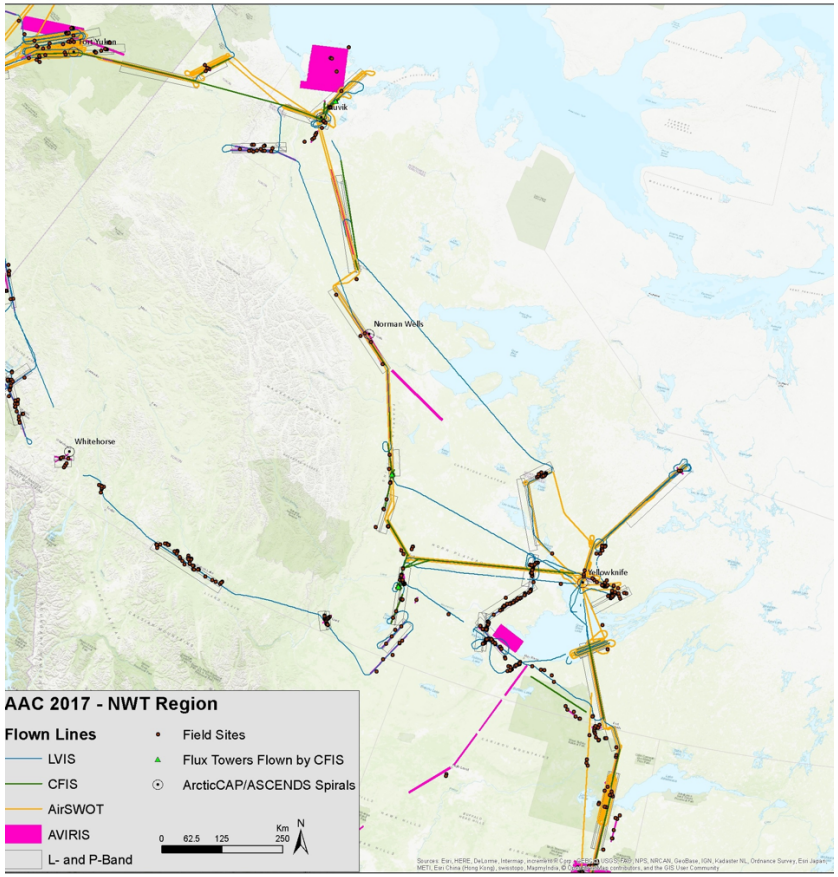

We provided ground truthing support at:

- Baker Creek
- Scotty Creek
- Trail Valley Creek
- Fire chronosequence

And helped finance ground truthing at Slave River Delta

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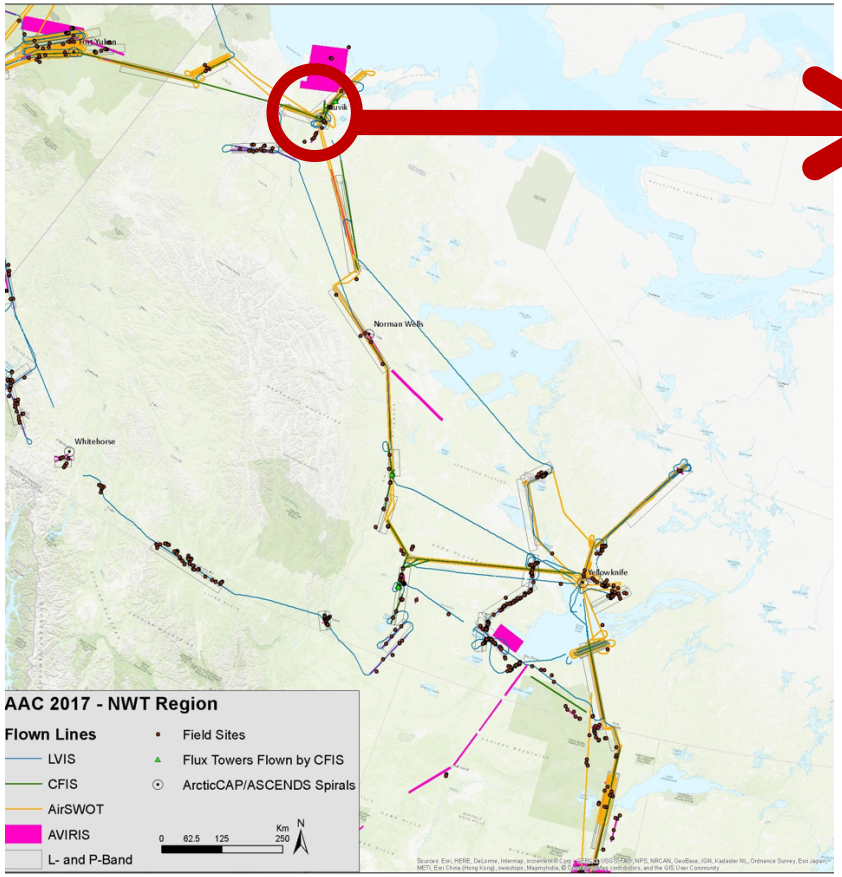
AirSWOT support at Trail Valley (Evan Wilcox, poster #102)



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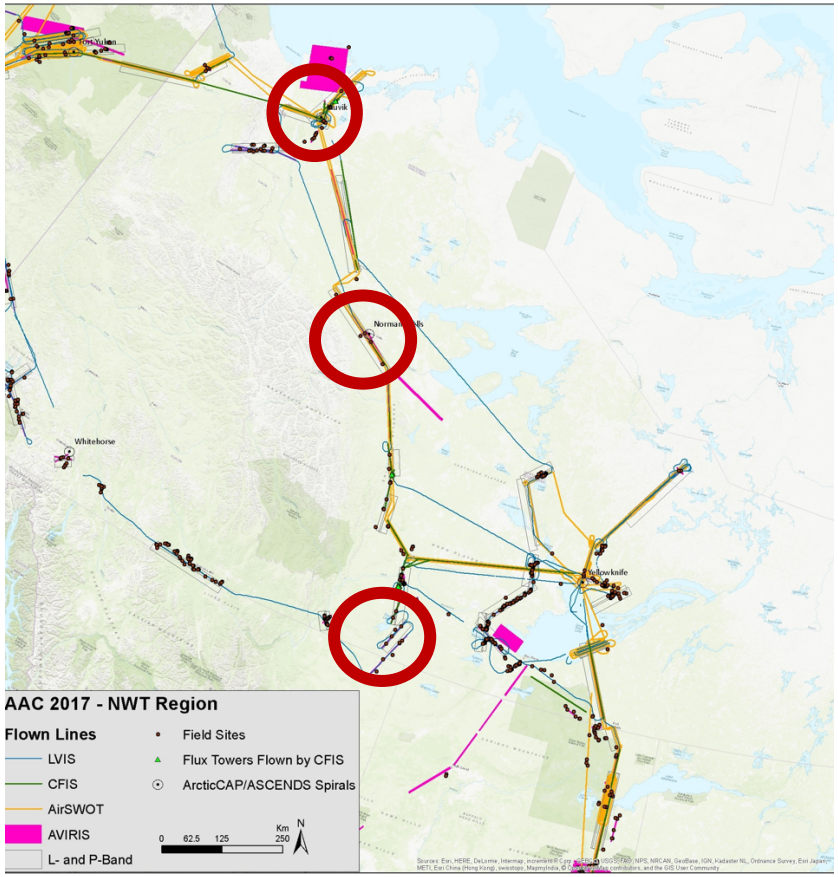
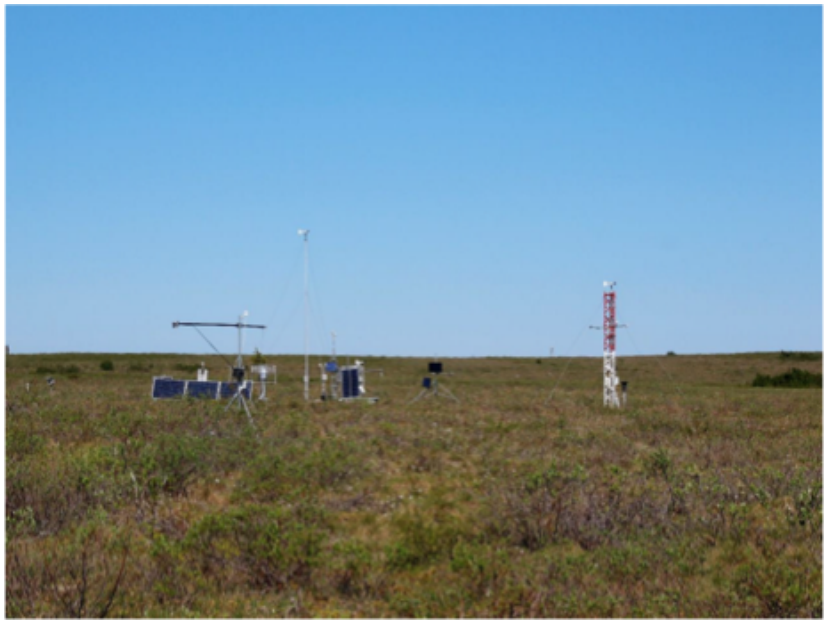
CFIS support at Sonnentag's network of eddy covariance towers (poster #51,53)





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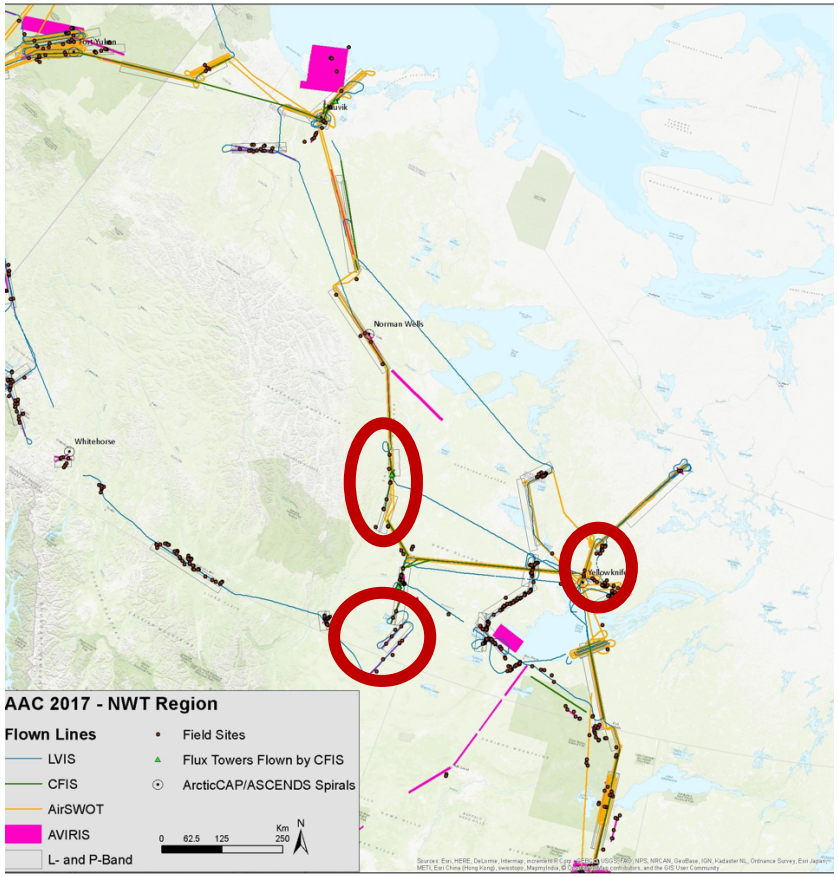
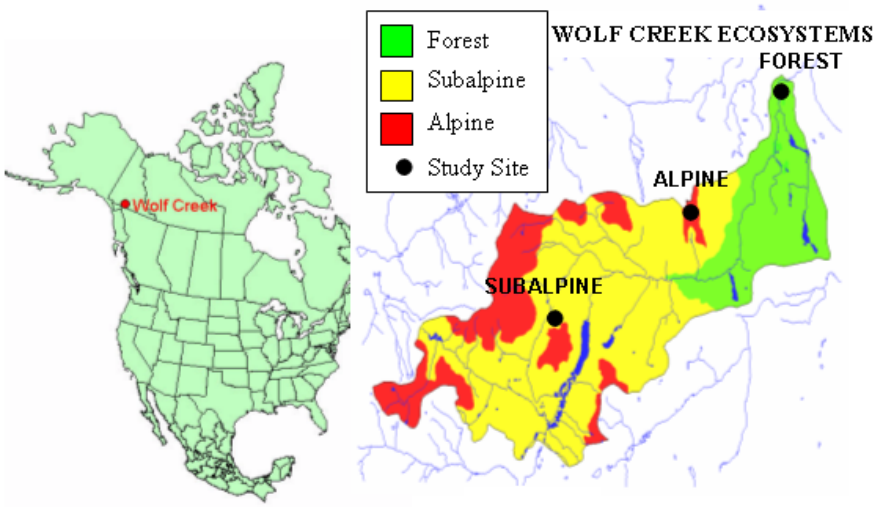
NISAR
NASA - ISRO SAR Mission



	NWT	Alaska
Biomass Plots	13	18
Mature forests	8	10
Regrowing forests	5	8
Permafrost Plots	11	13
Soil Moisture Plots	13	18
Wetland Plots	29	8

- Forest stand/vegetation characteristics
- Organic/mineral soil profiles
- Surface soil moisture at time of SAR overflights
- Inundation at time of SAR overflights
- Thaw depth at time of SAR overflights
- Soil moisture to 50 cm depth during August AirMOSS flights

Future Goal: Capitalize on Research Potential in the Yukon (See Kevin Turner's poster #67)



Red: AVARIS flight lines; Blue: UAVSAR (L,P band)

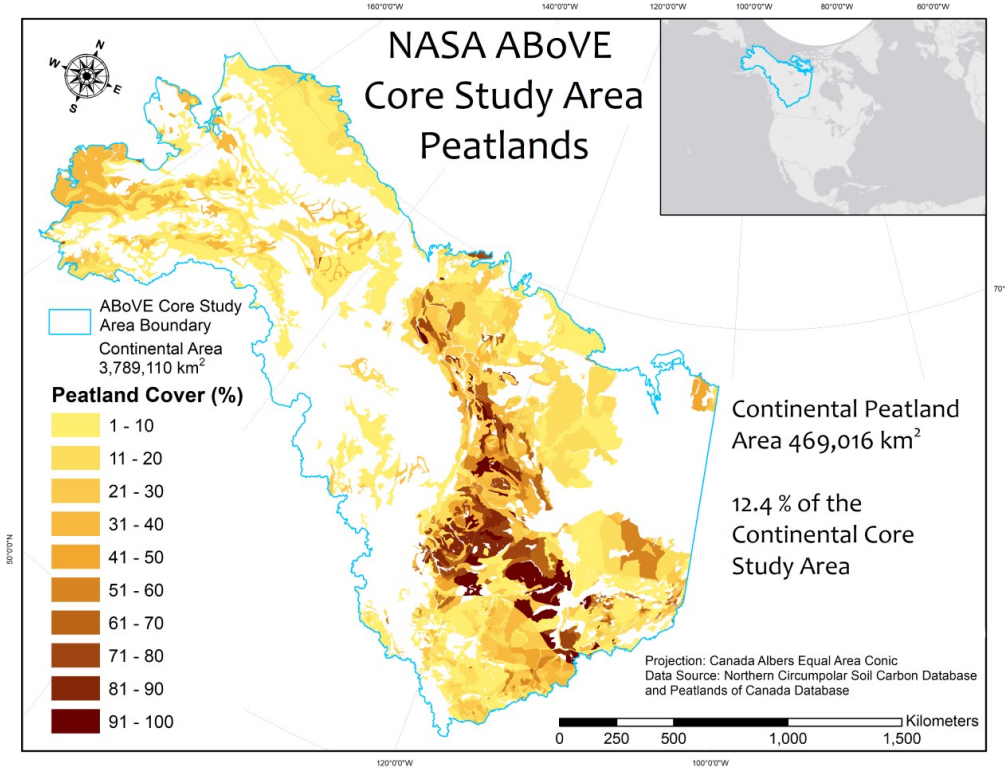
<u>Data at Wolf Creek (PI Sean Carey):</u>

- Three eddy covariance towers operating in tundra, taiga, forest. Ecosystem & micrometeorological measurements since 1993
- Frozen ground & soil moisture arrays
- Historical LiDAR & RS imagery

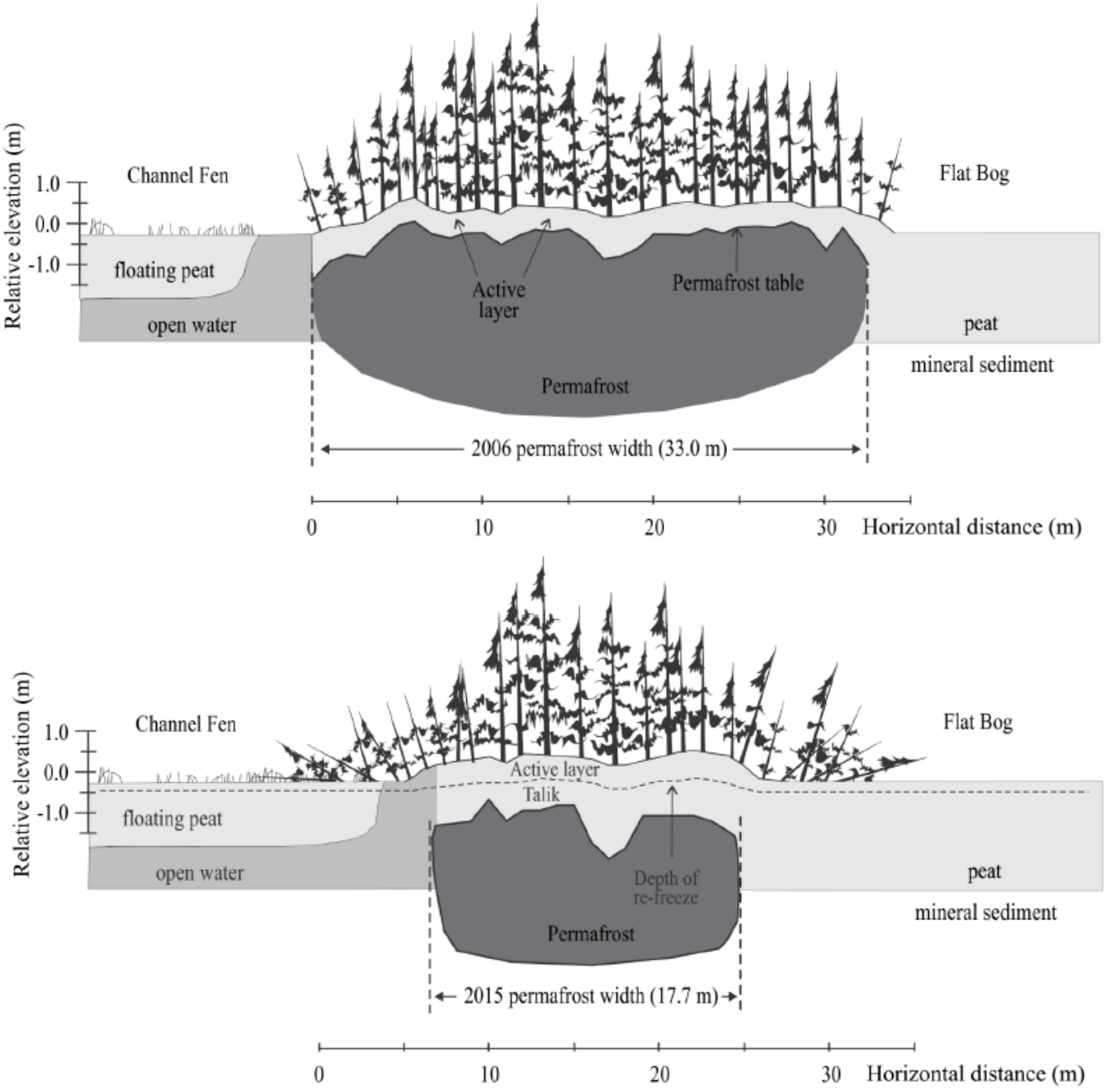
1) Can we assess ecosystem health using optical measures and scale ecosystem carbon/water flux measurements in heterogeneous, alpine (AVARIS)?
2) Can we use UAVSAR for change detection (inferometry) and wetland identification in the alpine?
3) How do UAVSAR DEM creation products compare with historical at planned TLS/SFM mission?

Future Goal: Coupled Alaska/NWT Data Syntheses

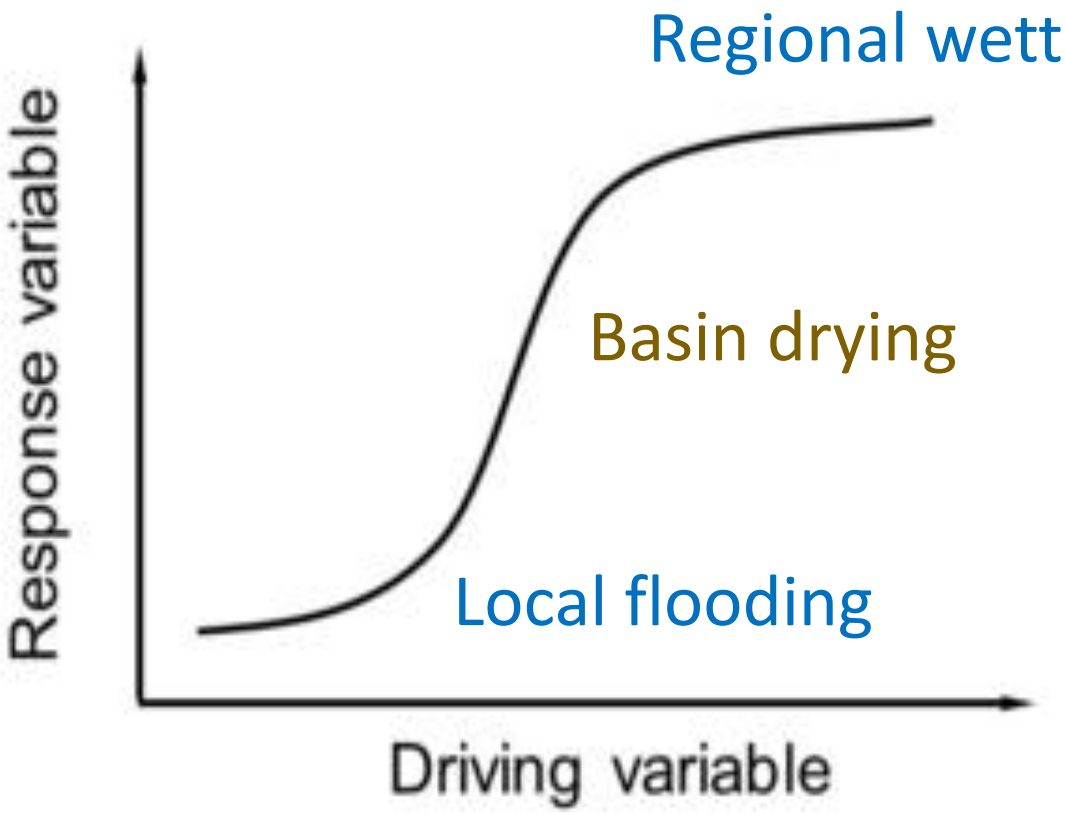
- Synthesis of long-term peatland data across the APEX/Bonanza Creek LTER and Scotty Creek peatland research stations *(Turetsky, Baltzer, Sonnentaag, Quinton, Douglas, Waldrop, Euskirchen, others…)*

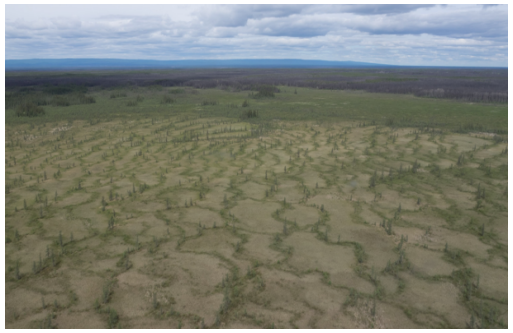


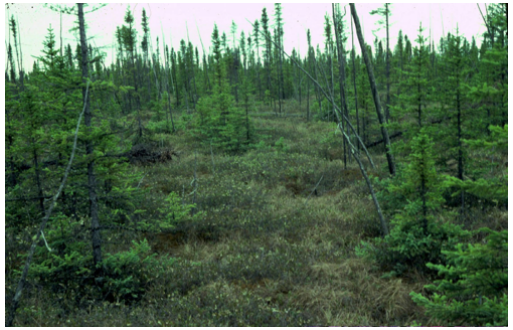
courtesy Laura Bourgeau-Chavez and Jeremy Graham, MTI


Relative elevation (m)
1.0
0.0
-1.0
Channel Fen
Flat Bog
floating peat
open water
Active layer
Permafrost table
peat
mineral sediment
Permafrost
2006 permafrost width (33.0 m)
0
10
20
30
Horizontal distance (m)
Relative elevation (m)
1.0
0.0
-1.0
Channel Fen
Flat Bog
Active layer
Talik
floating peat
open water
Depth of re-freeze
peat
mineral sediment
Permafrost
2015 permafrost width (17.7 m)
0
10
20
30
Horizontal distance (m)

Cross-scale threshold change



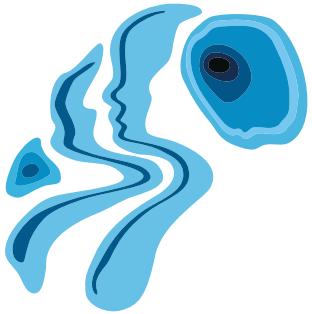




Future Goal: Coupled Alaska/NWT Data Syntheses

- Alaska/NWT synthesis of ground ice and geotechnical data *(Anna Coles, Steve Kokelj, Merritt Turetsky, Sharon Smith, Tom Douglas, others…..)*

- Capitalize on the potential for a **<u>synthesis-to-scaling</u>** knowledge pipeline



Northwest Territories

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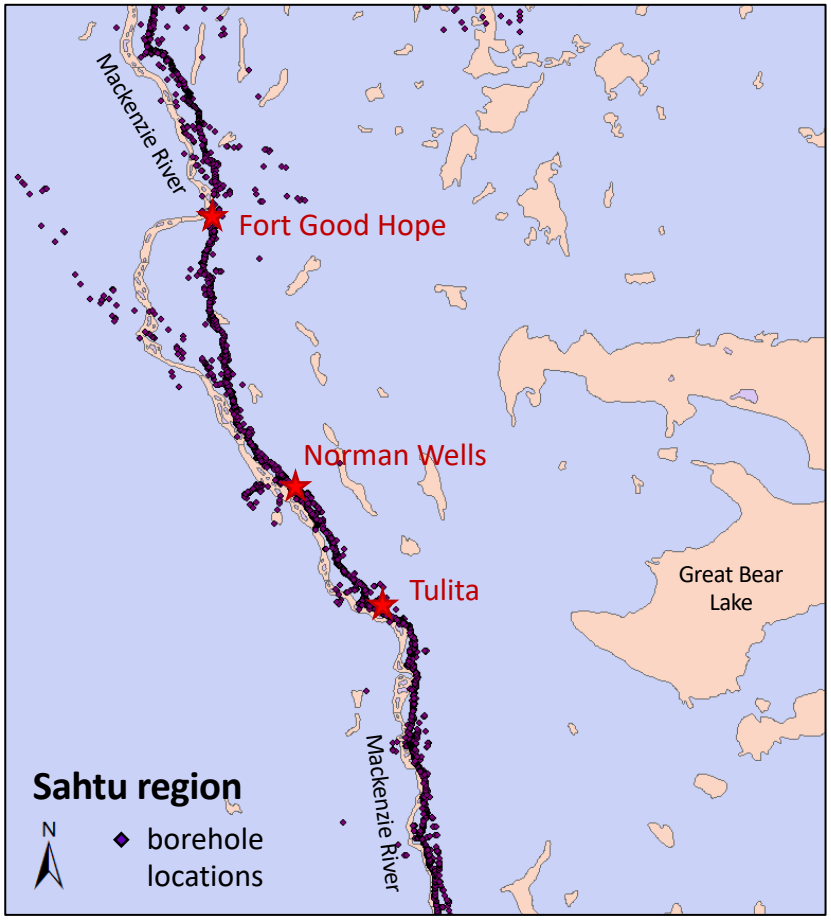
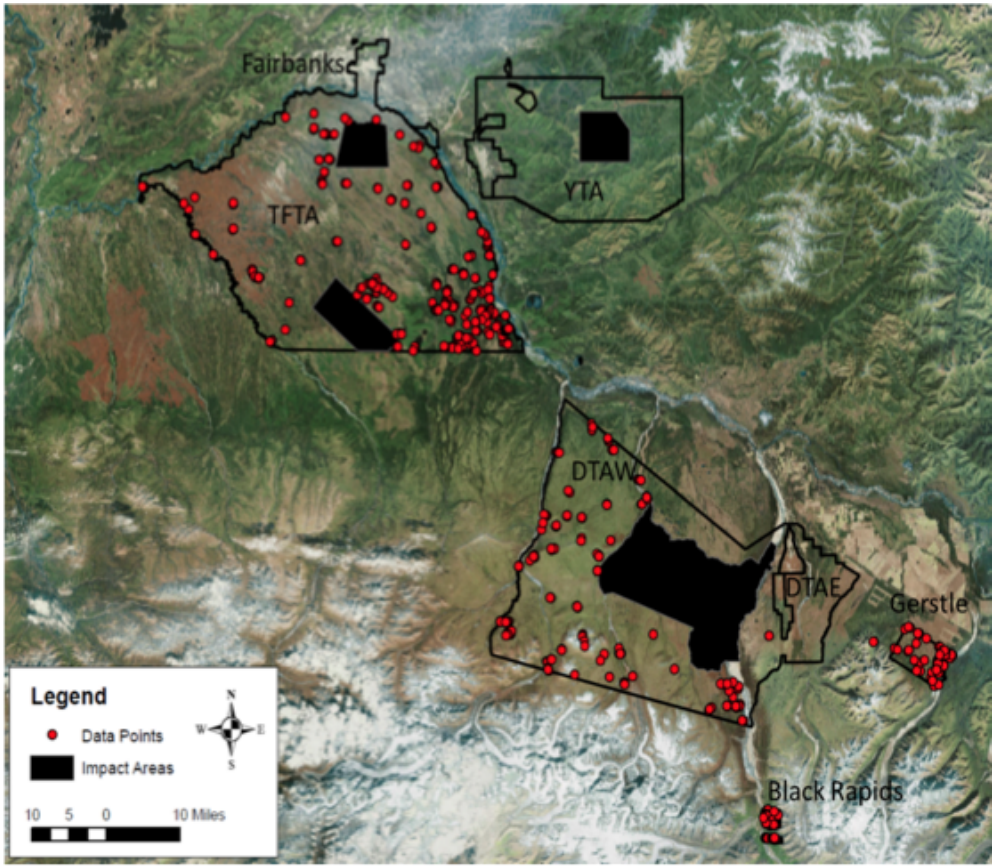
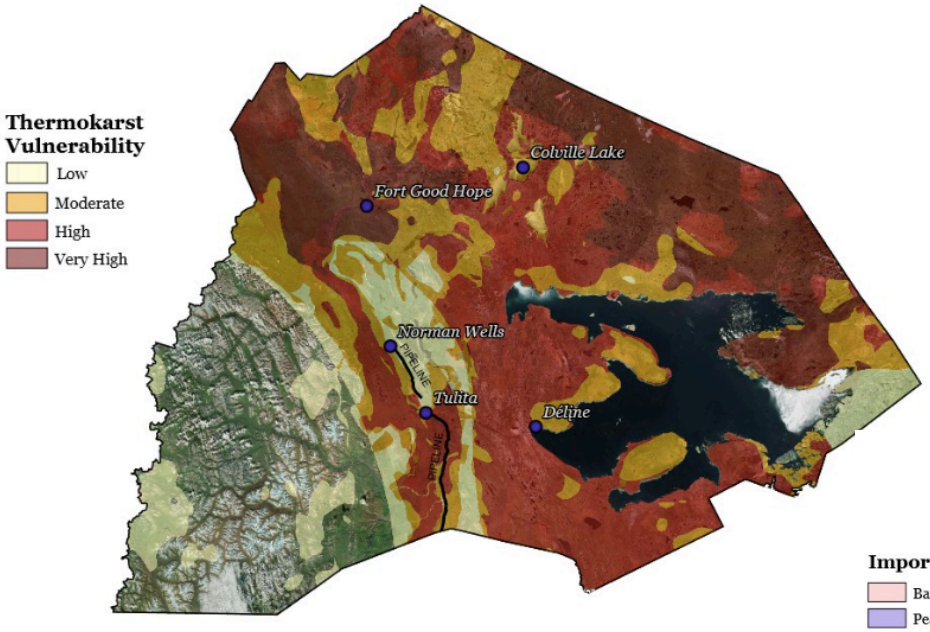


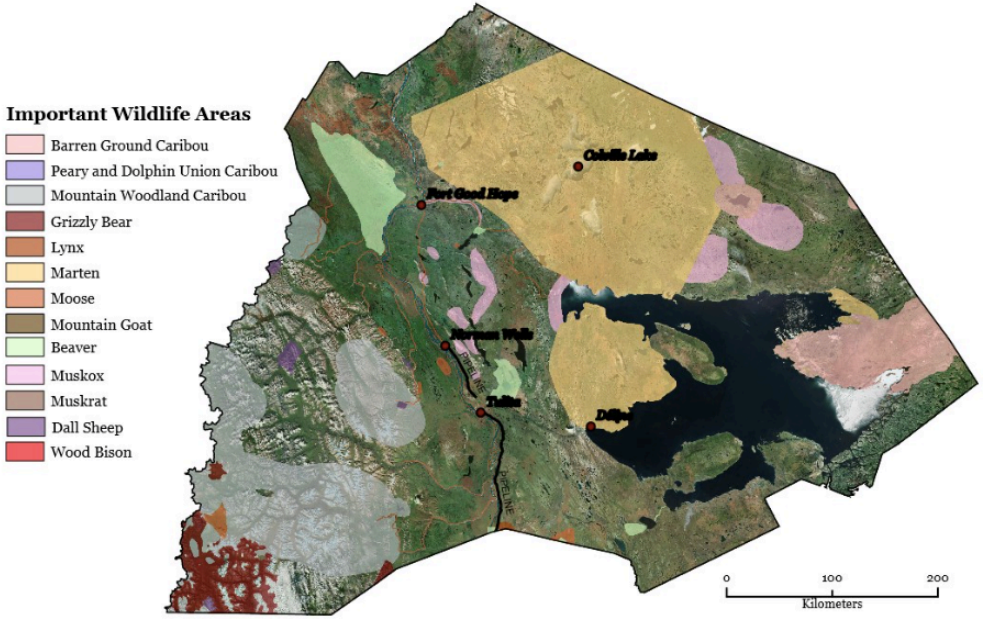


Permafrost and ground ice data on military lands in interior Alaska (NRCS)

Compiling data from >5000 boreholes drilled by the Geological Survey of Canada between 1954-2007. Initiating territory-wide EBA Tetra Tech data compilation

Tools to support communities in the Sahtú Region





Questions, comments, or ideas? Please be in touch

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