

Mapping the bumps in the road: Permafrost and the North Alaska Highway, Yukon

Bronwyn Benkert
Research Project Coordinator

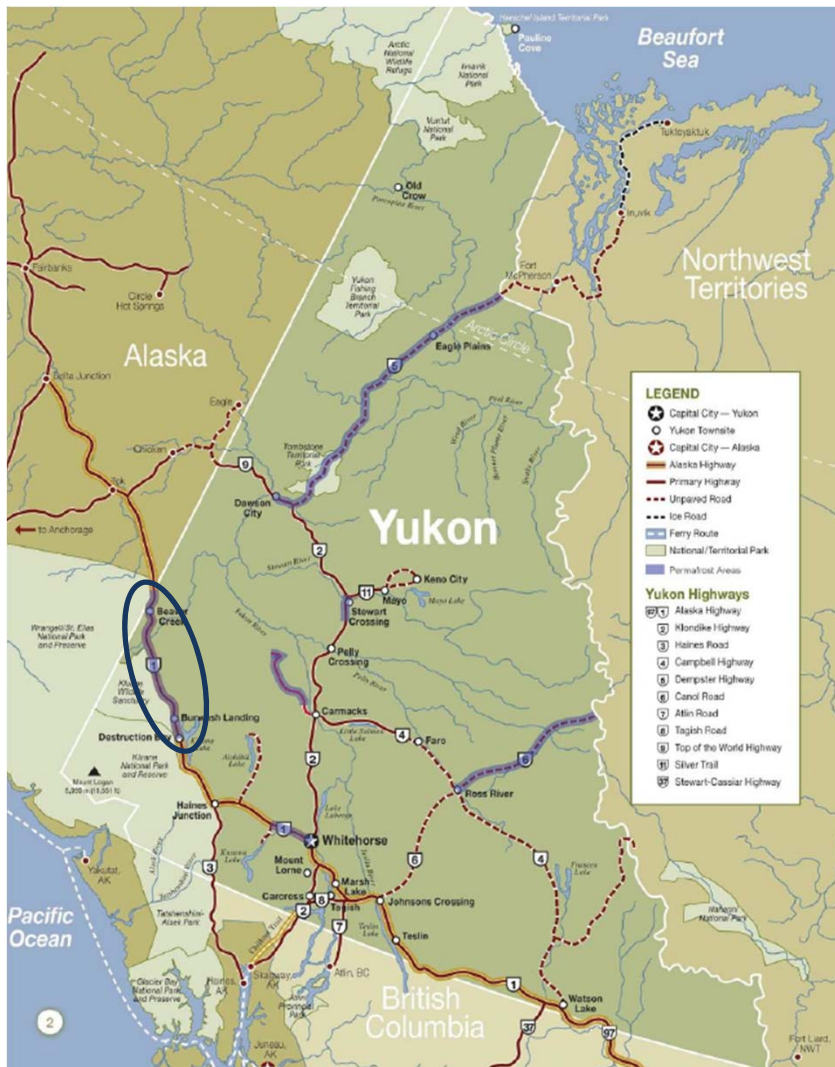
and

Fabrice Calmels
Research Associate
Northern Climate ExChange
Yukon Research Centre



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Transportation network in Yukon



Source: Highways and Public Works

Yukon snapshot

483,450 km²

35,000 residents

17 communities

Transportation focused on road
and air

4808 km maintained highways

~25% impacted by permafrost

Permafrost & the Alaska Highway



Maintenance = 10x higher than non-permafrost sections

Mapping the bumps in the road

- 3 year project
- Characterize thaw sensitivity of permafrost under northern 200 km of the Alaska Highway
- Develop climate change scenarios for the area
- Assist Highways and Public Works in planning for permafrost change

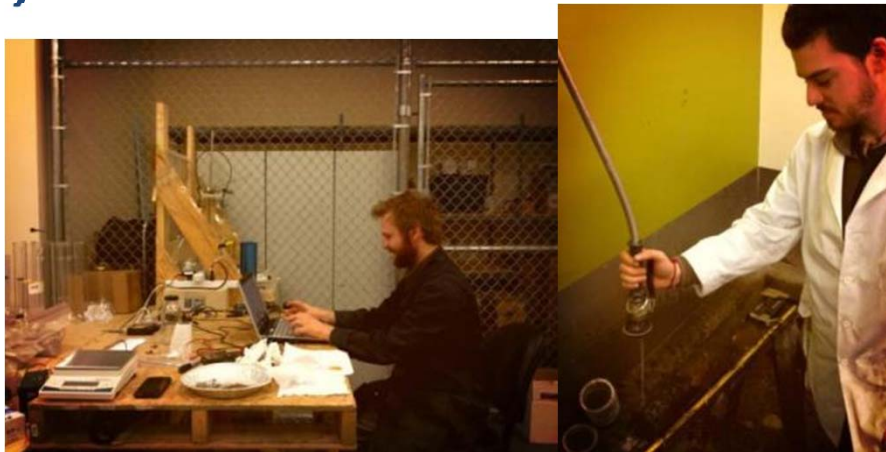


Approaches

Drilling



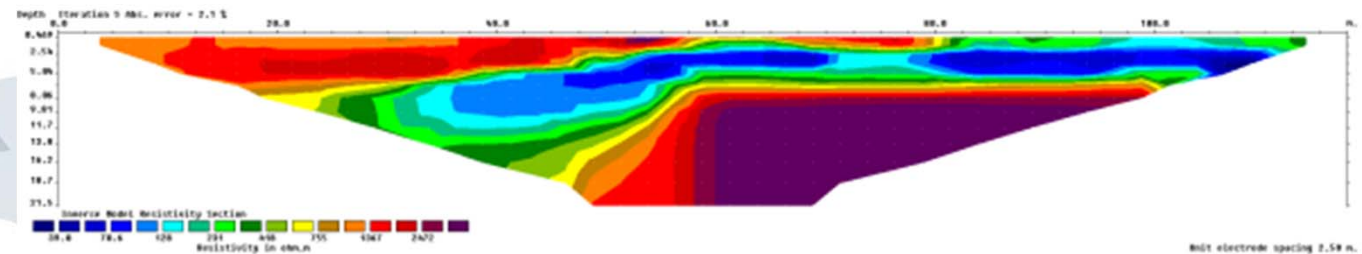
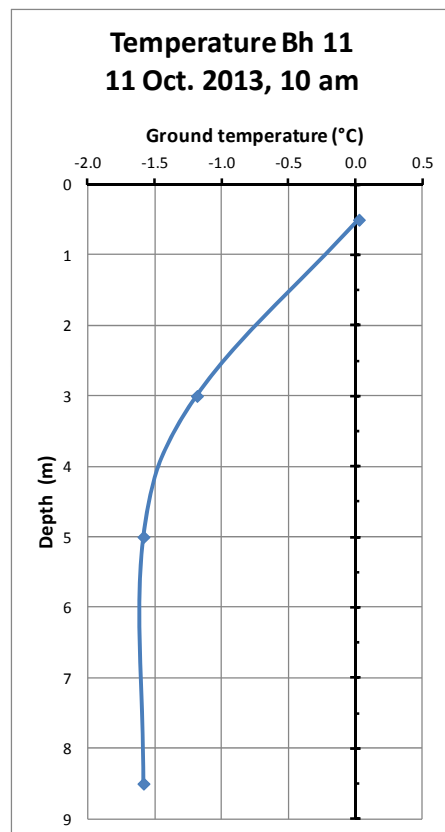
Analysis



Mapping what?

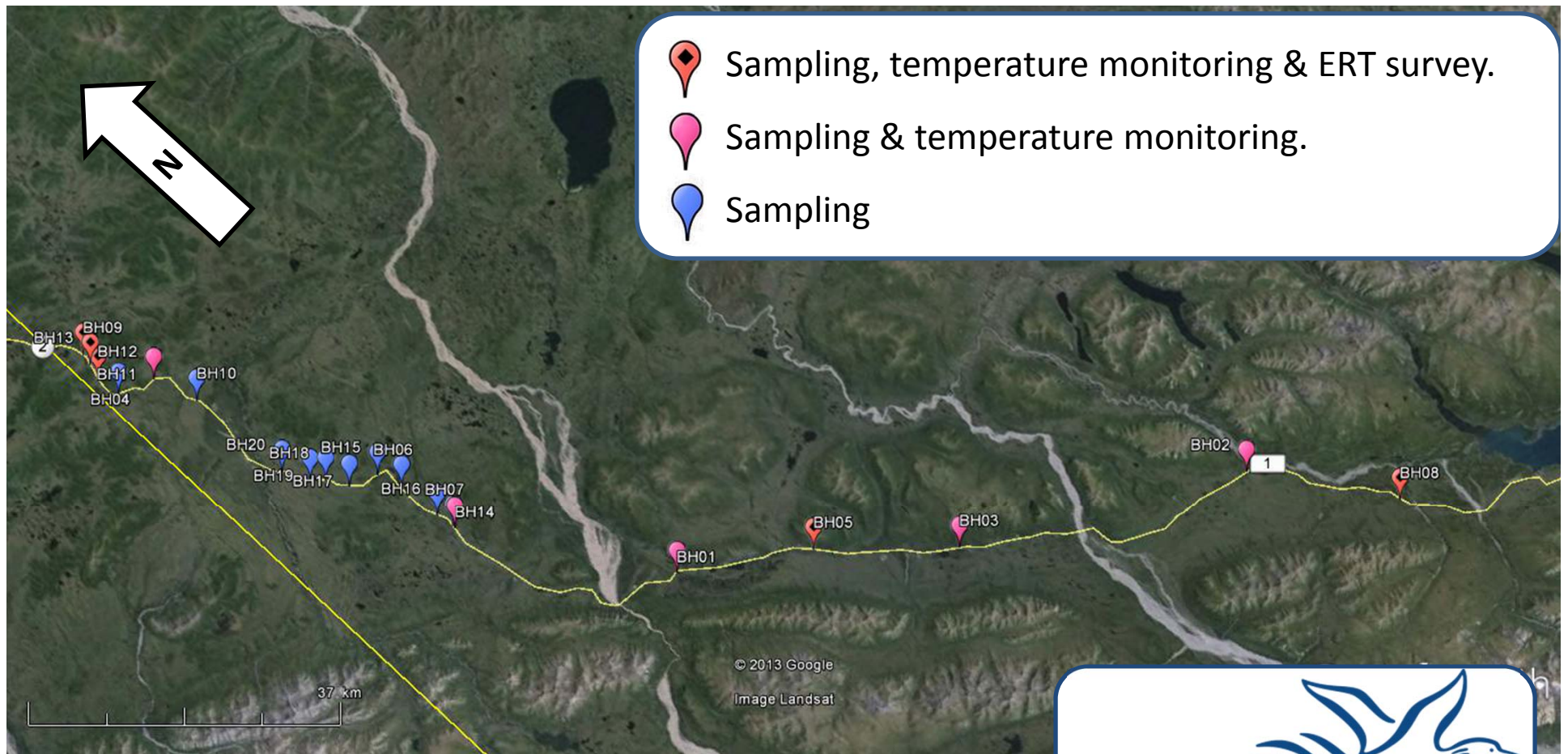
Permafrost but with a focus on:

- Ground ice content (sampling, ERT)
- Ground temperature (loggers)
- Permafrost thickness (ERT, loggers)

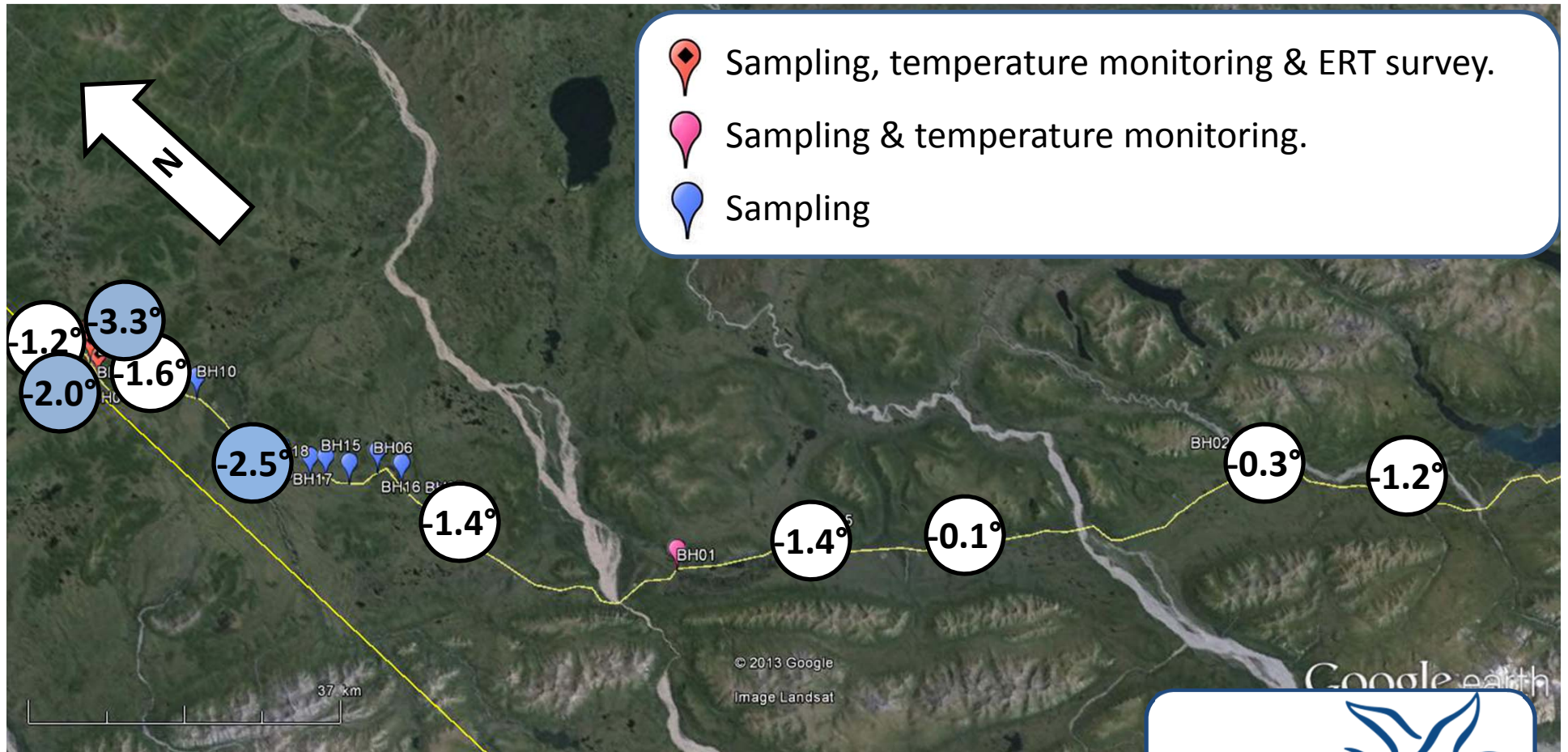


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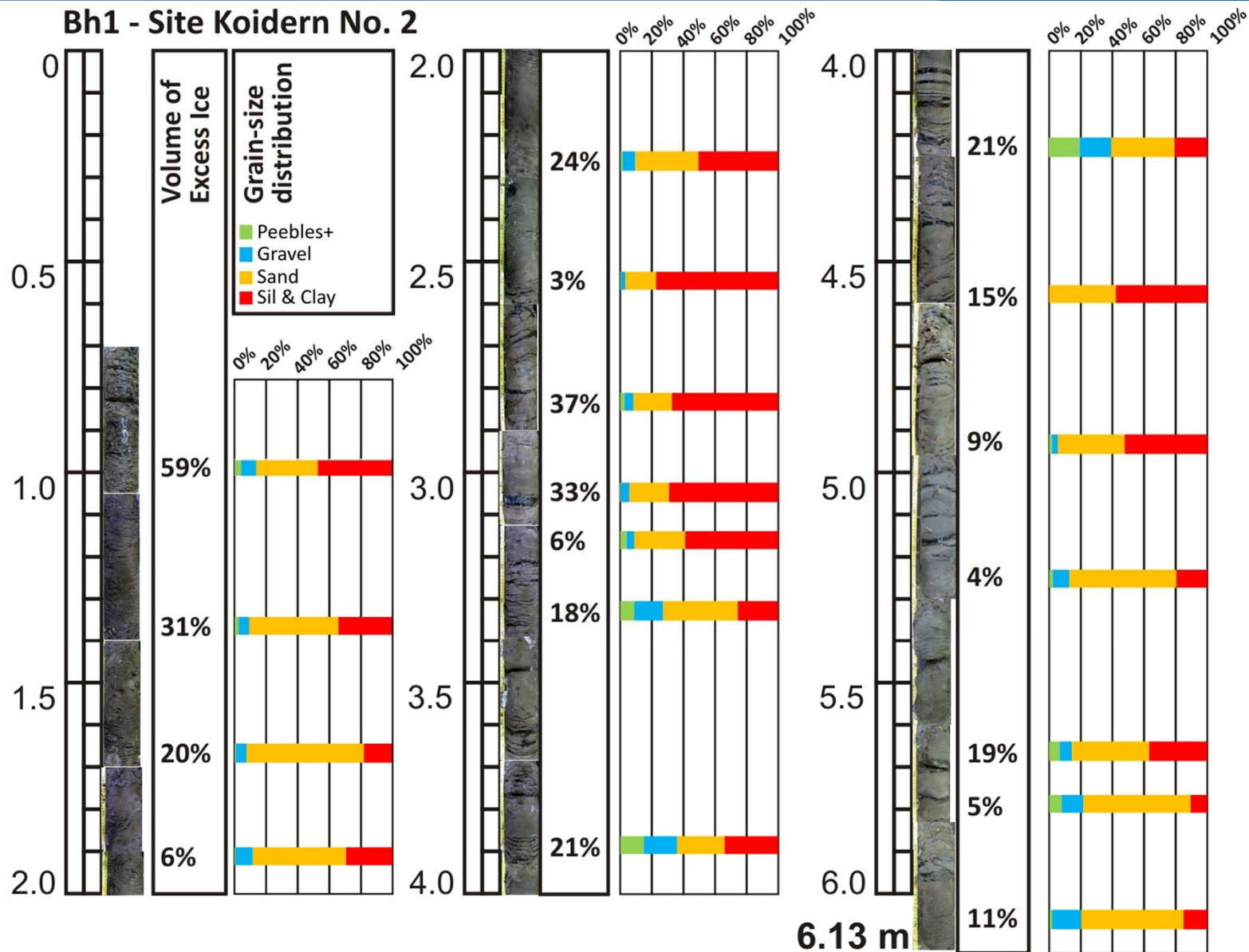
20 sites so far....



Some sites colder than others....



Permafrost cores



North to Beaver Creek....



Electrical resistivity tomography



Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	USC	SOIL SYMBOL	GROUND ICE DESCRIPTION AND COMMENTS
0	VEGETATIVE COVER - (50 mm thick) SILT - clayey, gravelly, some sand, some day, subangular to subrounded gravel, well graded, low to medium plastic, greyish brown		G1			Vx <5%
1			G2	ML		
2						
3	- sandy, gravelly, trace of fines, friable, no to little cohesion, trace of white precipitates		C3			- switch to Laskey
4			C4			
5	CLAY - silty, trace of sand, trace of gravel, medium to high plastic, grey - reworked, iron oxide staining - 10 mm thick ice lens - 10 mm thick ice lens - some silt, trace of sand, trace of gravel, poorly graded, cohesive, medium plastic		C5			Vx <1%
6			C6			
7			C7			Vx <5%
8	- sandy, gravelly - 200 mm thick ICE AND CLAY layer - less fines		G8	CL		- switch to solid stem auger Vx <5% Vx, Vc 40% Vx 30-40%
9			G9			
10			G10			
			G11			
			G12			

Silt: fine and coarse sediment mixed together, with few ice.

Then icy clay.

30-40% within clay



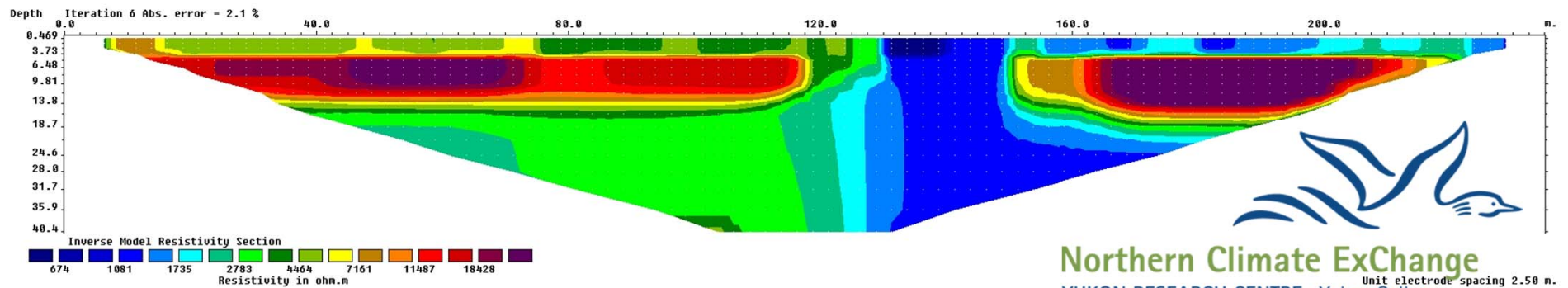
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Ice Wedges....

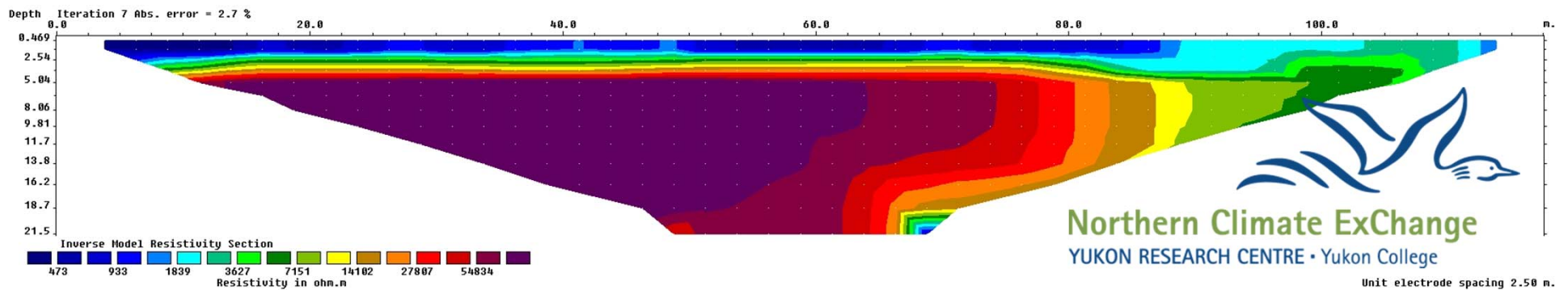


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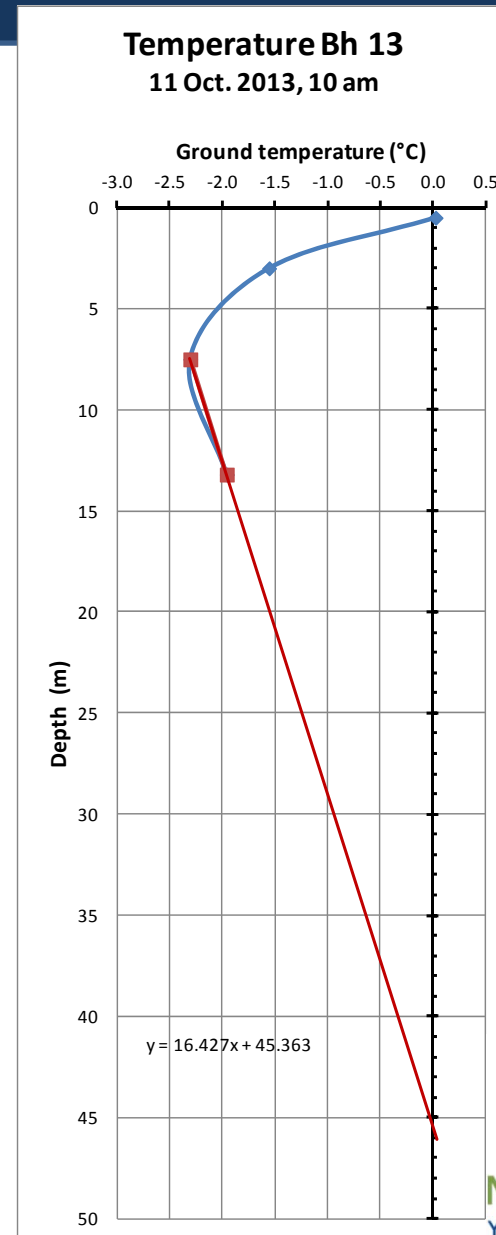
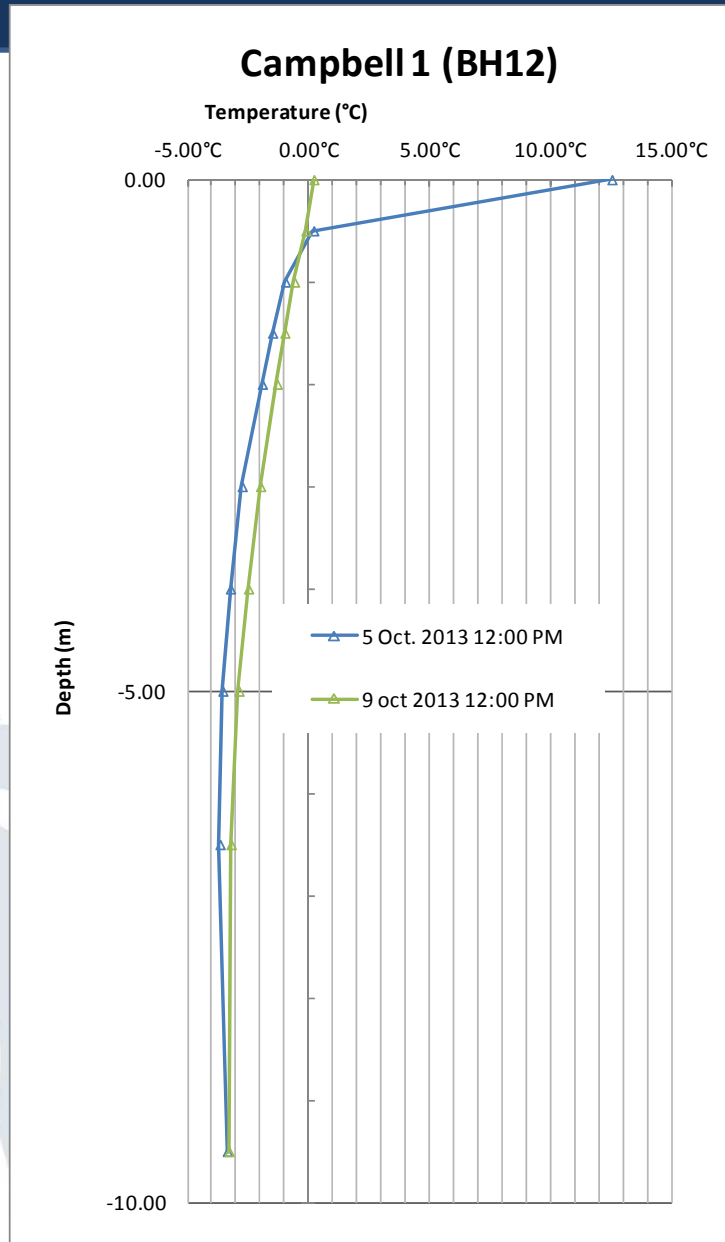
Electrical resistivity tomography



Electrical resistivity tomography



Ground temperature...



Snow thickness survey



Communicating project progress

- ❑ Community lunch and presentation
- ❑ Regular meetings with HPW
- ❑ One-pagers and postcard
- ❑ CBC coverage – tv and radio
- ❑ Videos of field techniques
- ❑ Outreach to travellers:
 - ❑ Placemats
 - ❑ Placards



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