

Snow-wildlife Breakout Group

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Phase 1 Snow-wildlife syntheses

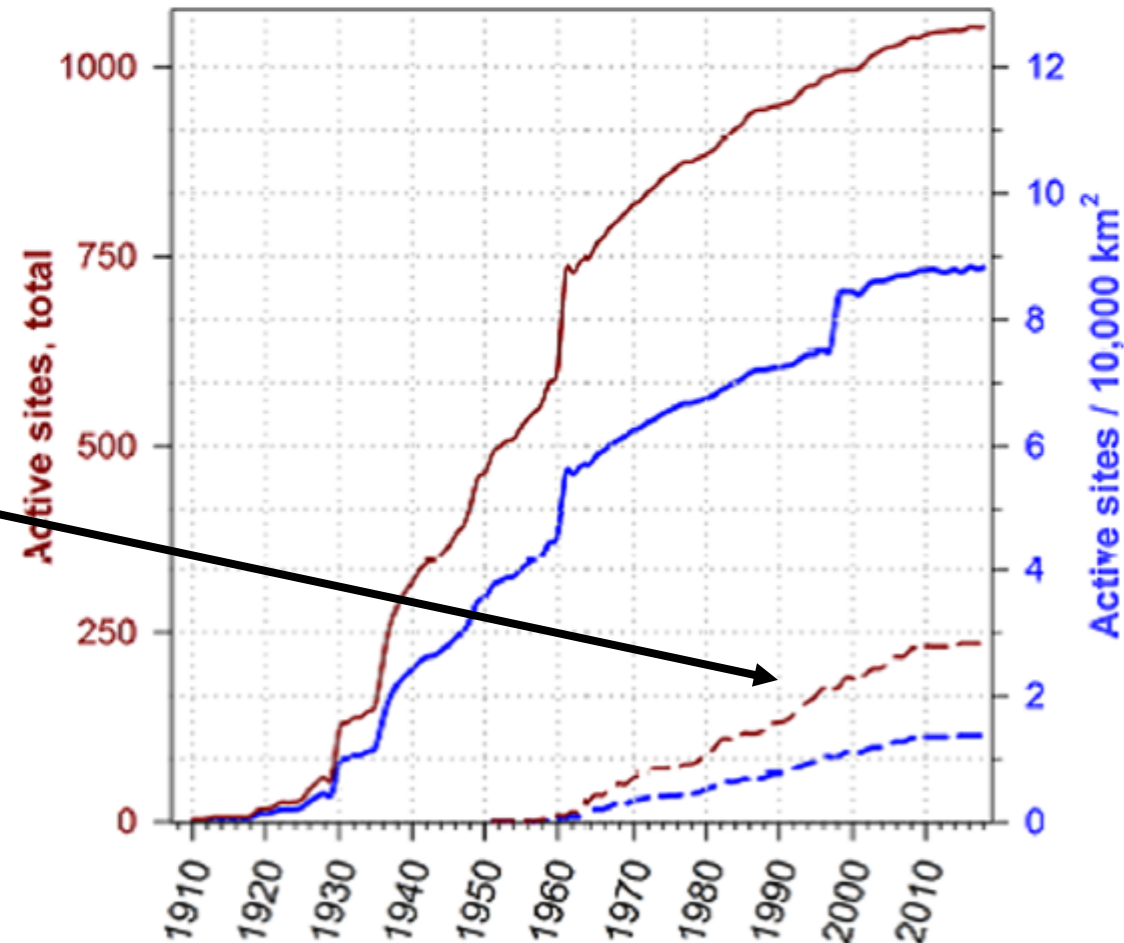
Environmental Research Letters

Research Articles

Integrating snow science and wildlife ecology in Arctic-boreal North America

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- Few in-situ measurements in AK
- Sparse snow-on airborne
- Satellite RS = limited info
- Table S1 = list of available products
- Call for data-model fusion approach



Phase 1 Snow-wildlife syntheses

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Navigating snowscapes: scale-dependent responses of mountain sheep to snowpack properties

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- Modeled snow depth & density best at fine scale, MODIS best at coarse scale
- Density/hardness is important snow property, even harder to get right than depth

Brainstorming Cross-cutting Questions

Indirect effects on wildlife via habitat

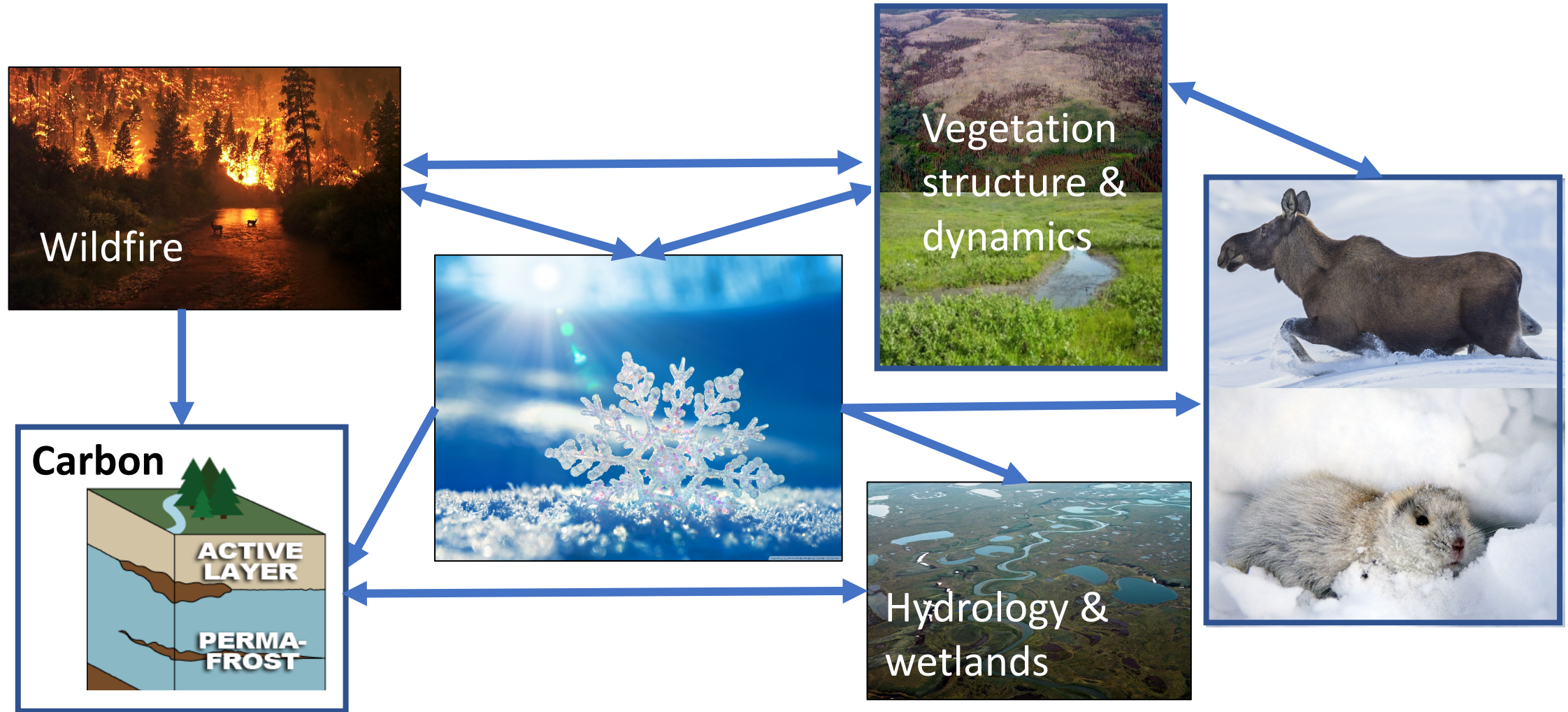
- Role of snow in shrub expansion (fine scale—in situ, airborne, modeled)
- Timing of snowmelt → veg productivity (coarse scale, RS)
- Snow impacts on post-fire veg recovery (scale-dependent?)
- Snow impacts on wetland habitat (??)
- Snow refugia: microtopography leads to stable heterogeneity in melt timing & moisture

Direct effects of snow on wildlife

- Impact of snow hardness on ungulates/lemming populations (coarse scale, RS)
- Snow impacts on predator-prey interactions (fine-scale--in-situ, airborne, modeling)

Snow: a central unifying theme [There's No Business like Snowbusiness?]

- Led by Natalie



How?

Data-model assimilation via SnowModel (Glen Liston)

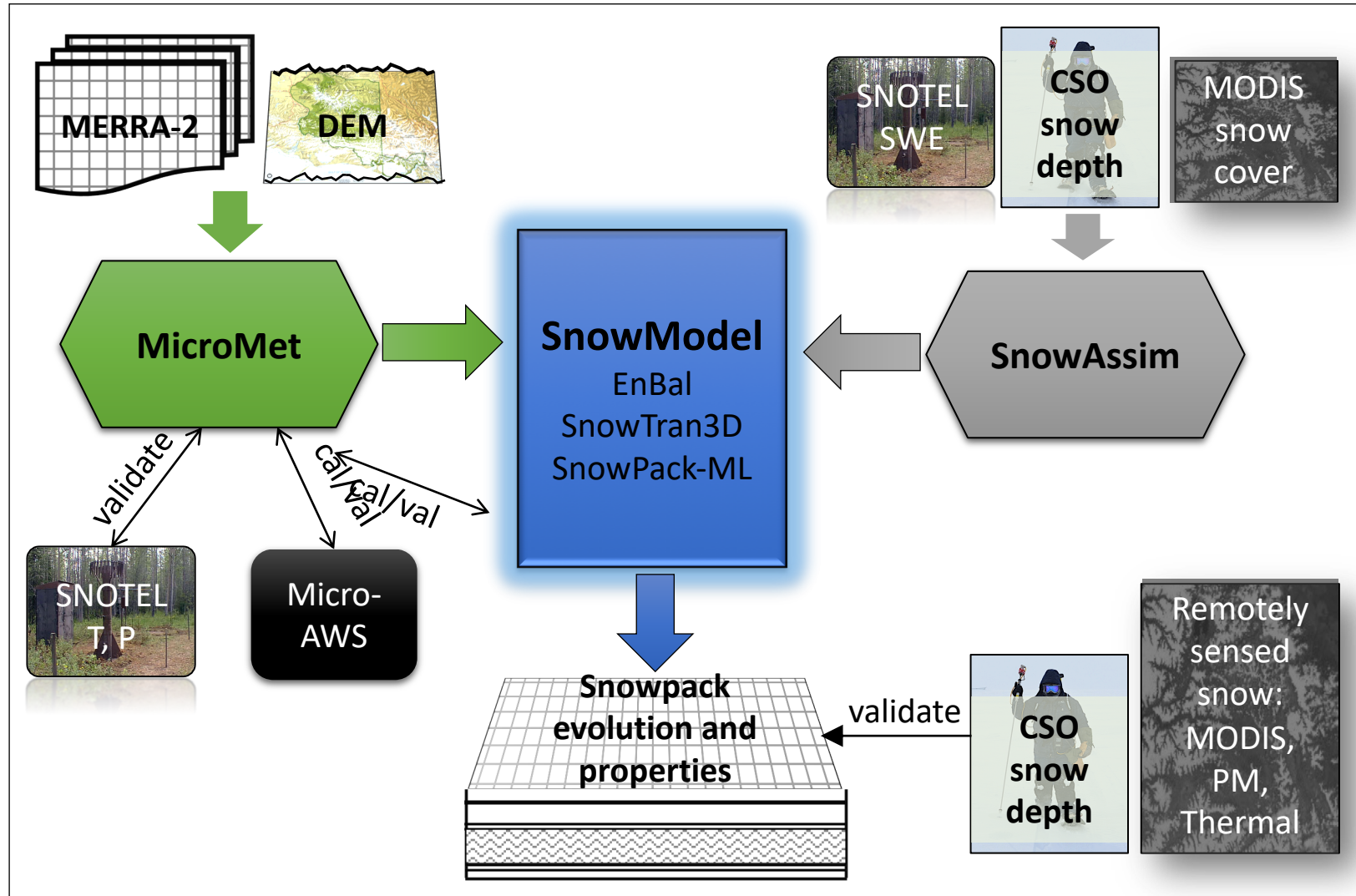
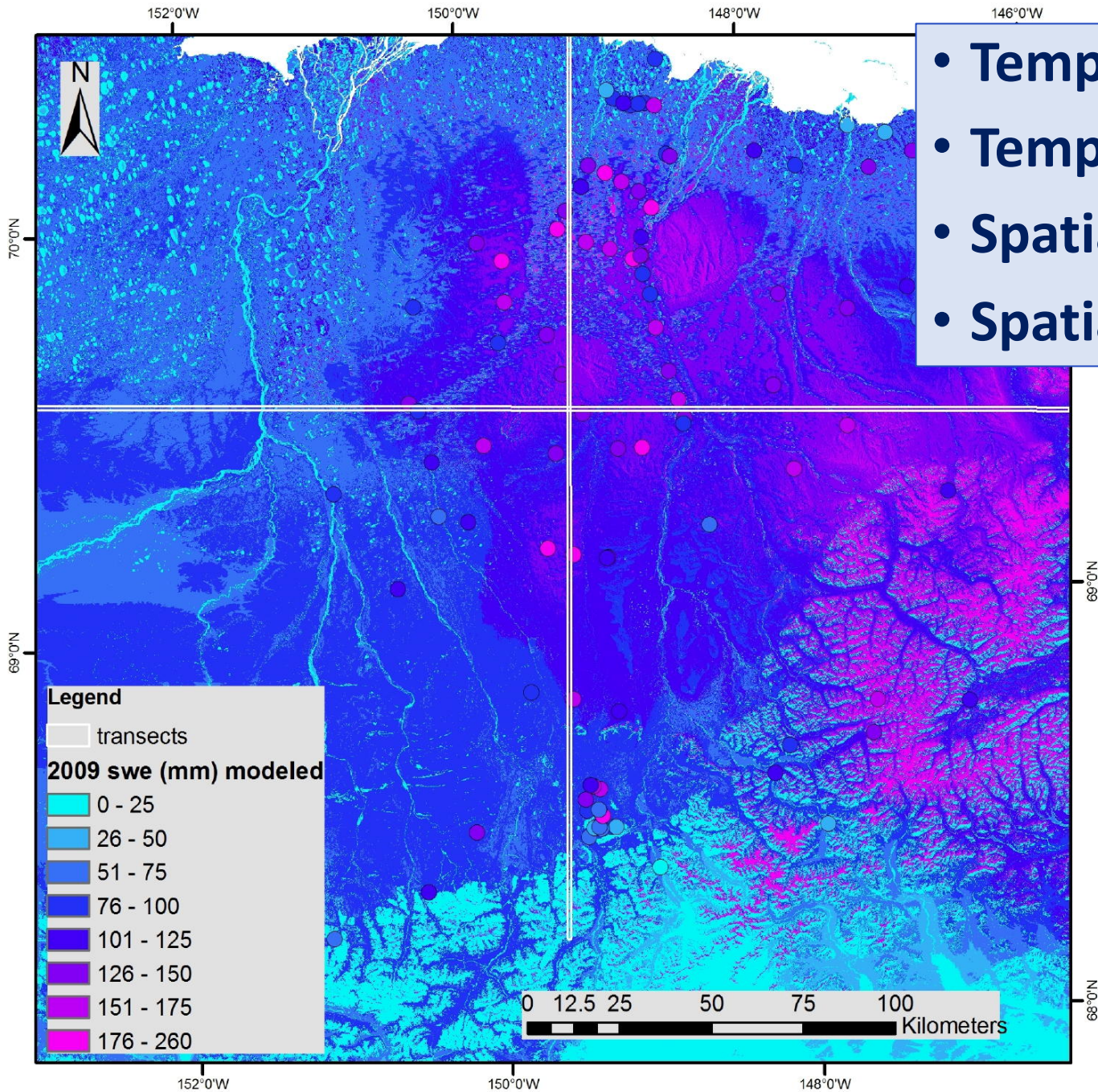


Table 1. Environmental variables produced as part of Obj. 1. These include daily spatial distributions, on 1-km grids, covering the ABOVE Study Domain, 1980-through-present, and dates representing 2100. In special cases, 30-m, 3-hourly data will be produced for specific areas. Each grey heading represents a separate variable group.

Meteorology	Snow	Soils
Air temperature	Depth	Temperature
Relative humidity	Density	Ice content
Wind speed	Snow water equivalent (SWE)	Liquid water content
Wind direction	Collapse pressure	
Precipitation	Hardness	Vegetation
Solar radiation	Strength	Land cover type
Cloud fraction	Trafficability	Leaf-off date
Snowfall	Snow cover fraction	Leaf-on date
Rainfall	Snow patchiness	LAI
Time since last snowfall	Albedo	Vegetation height
Daylight duration	Stratigraphy	Vegetation density
	Grain size	NDVI
	Grain type	
Lake Ice and River Ice	Blowing snow mass flux	Time-Invariant
Ice thickness	Snow-onset date	Elevation
Ice-onset date	Snow-free date	Surface roughness
Ice-free date	Snow season length	Ruggedness
Ice season length	Rain on snow events	Slope aspect
Snow on ice	Ice layers	Road/path type
Snow-melt onset	Thermal conductivity and resistance	
Ice-melt onset		



- **Temporal resolution:** 3 hourly to daily
- **Temporal extent:** 1980 - 2100
- **Spatial resolution:** 30-m to 1-km grids
- **Spatial extent:** ABoVE Study Domain