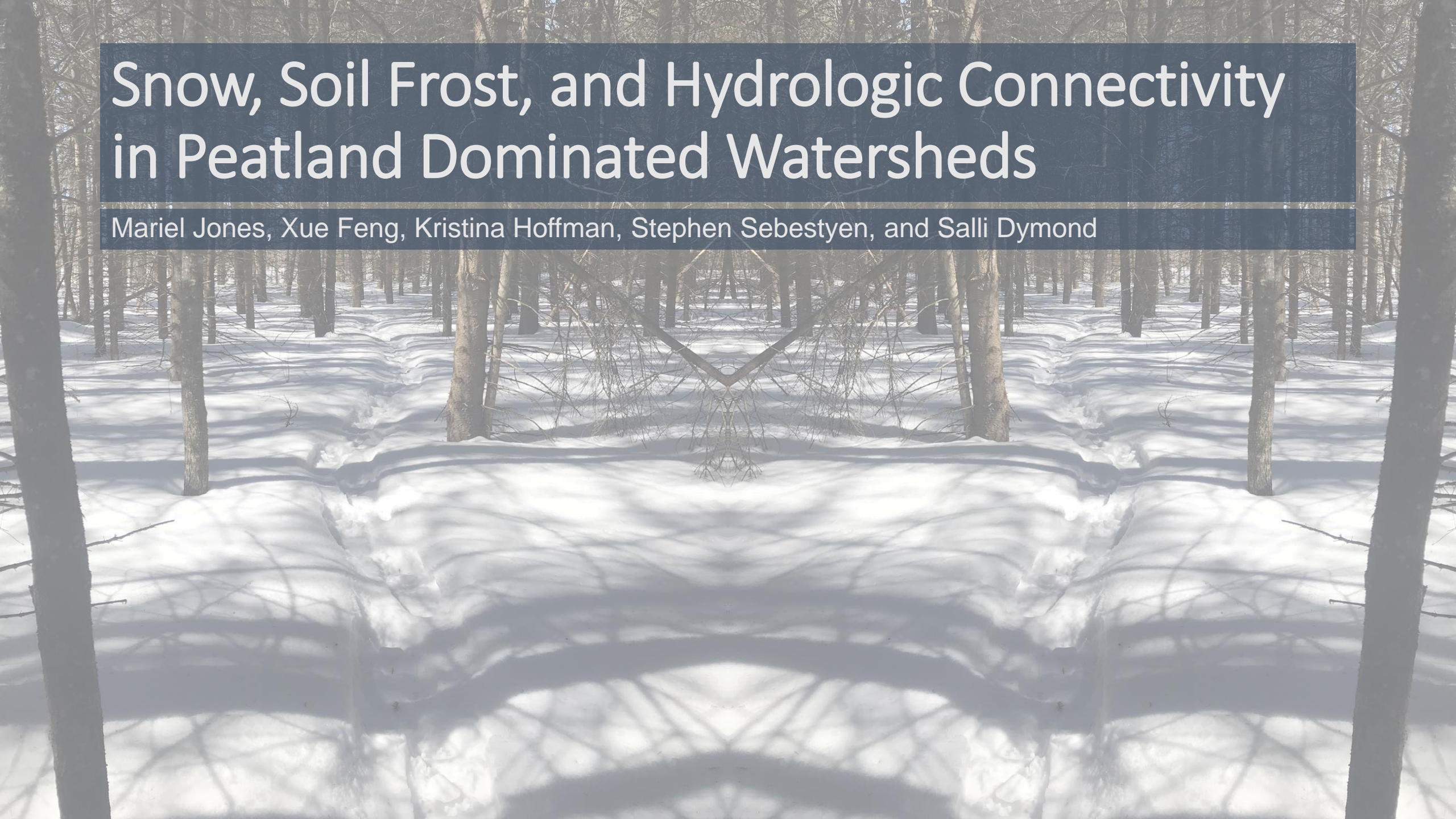


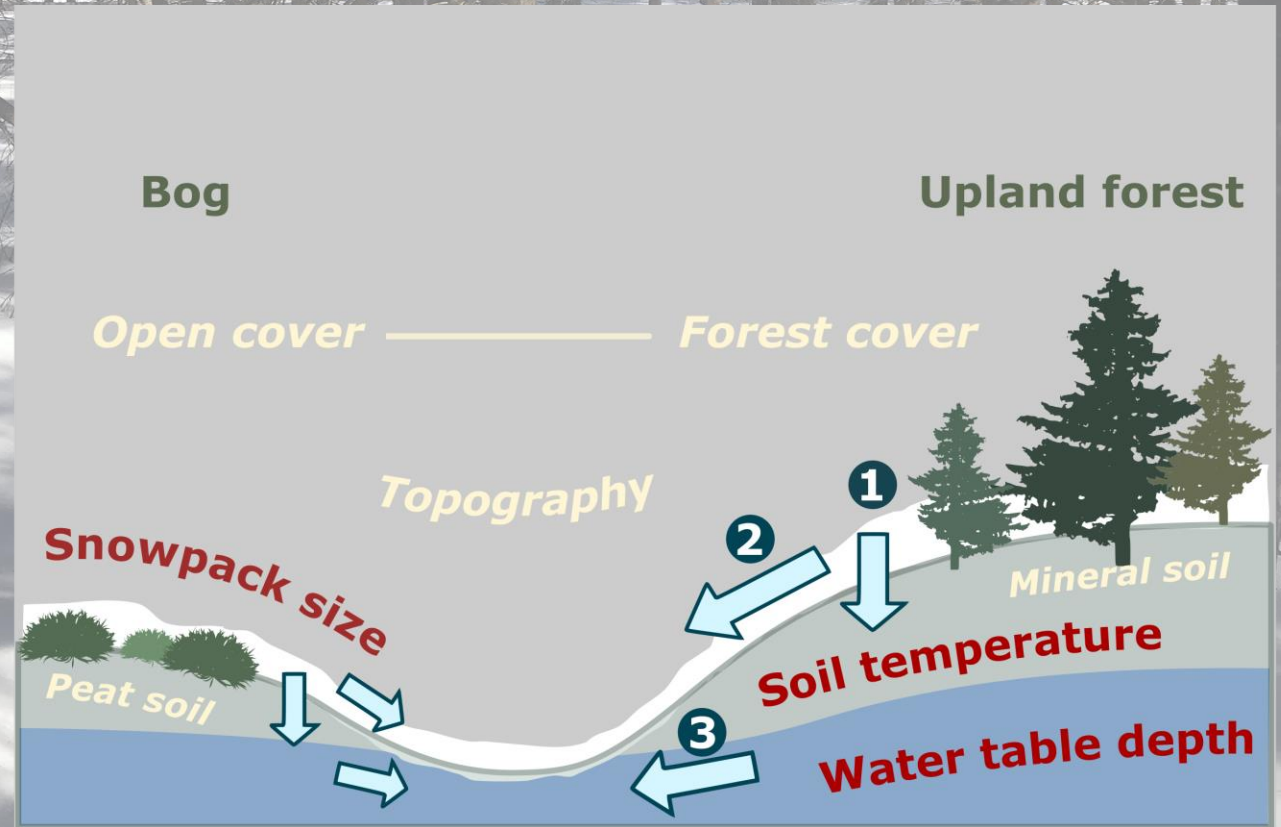
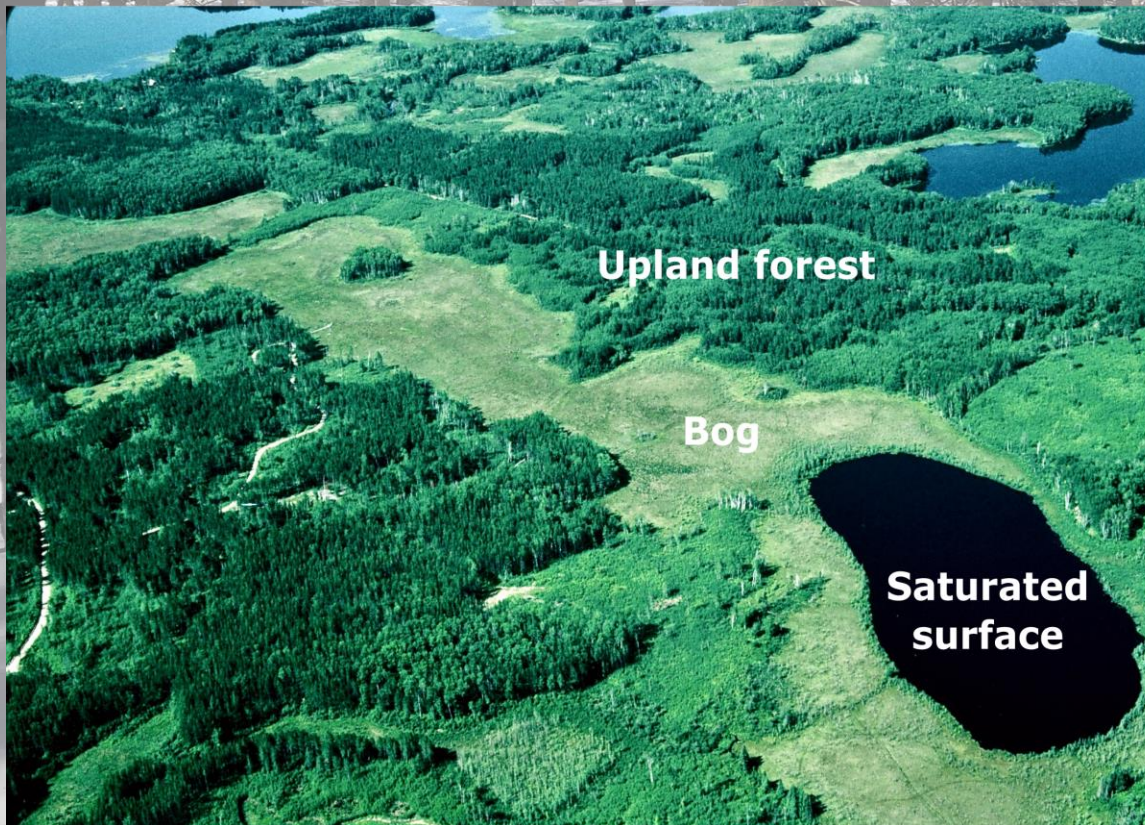
Snow, Soil Frost, and Hydrologic Connectivity in Peatland Dominated Watersheds

Mariel Jones, Xue Feng, Kristina Hoffman, Stephen Sebestyen, and Salli Dymond

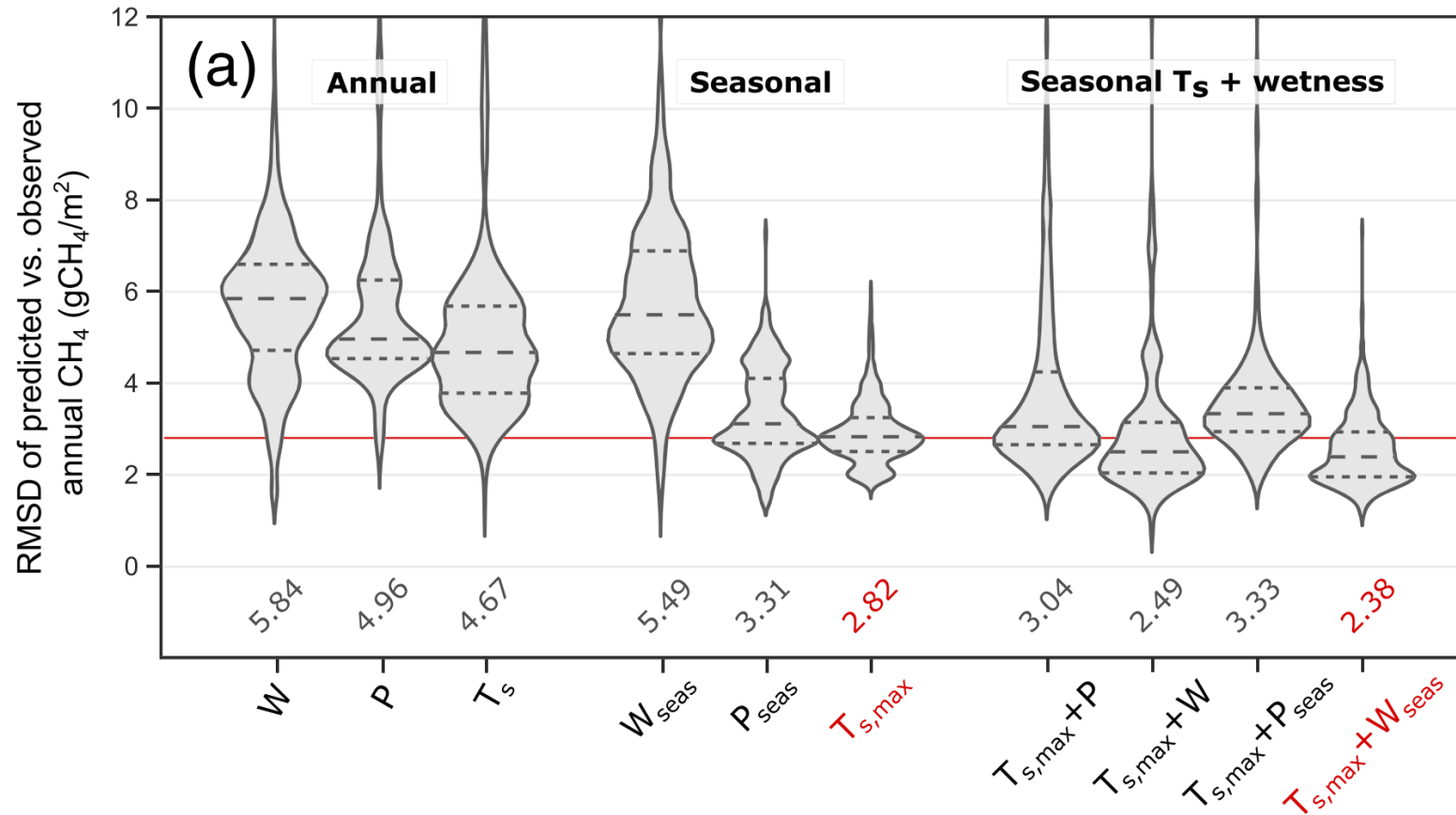


Snow, Soil Frost, and Hydrologic Connectivity in Peatland Dominated Watersheds

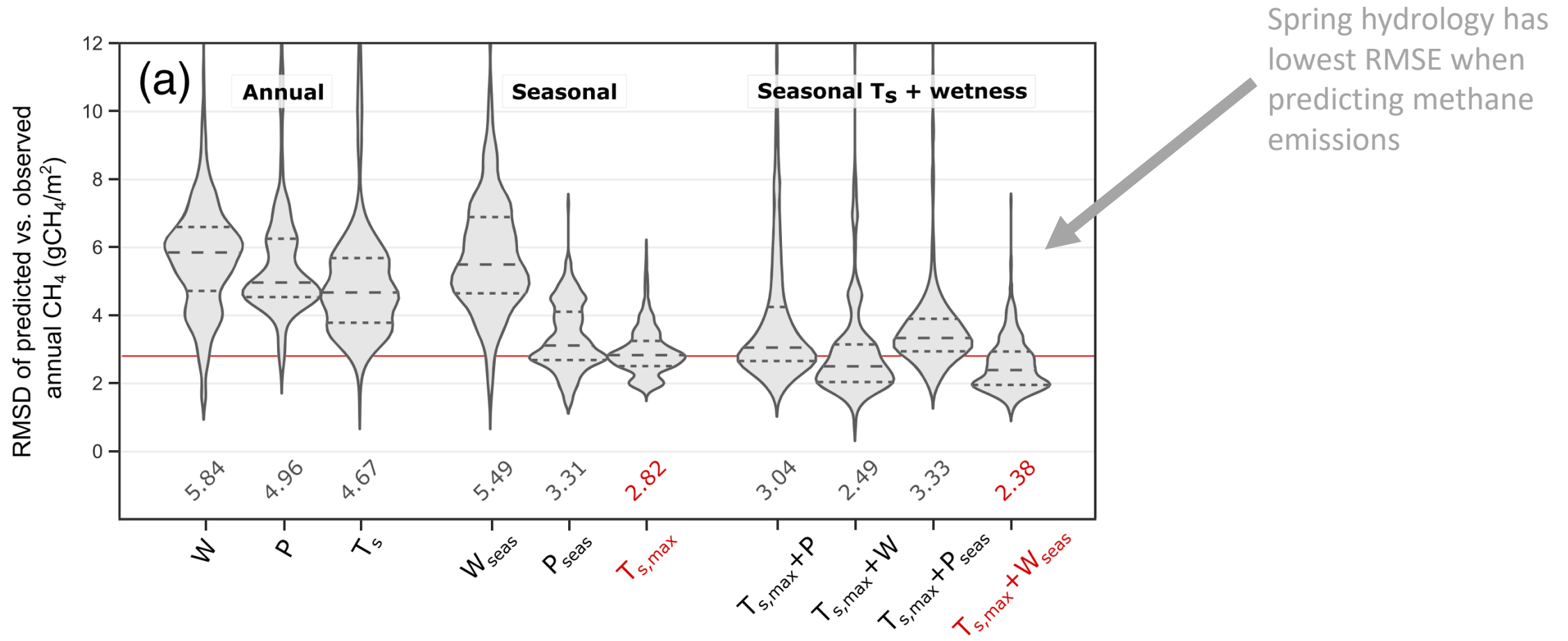
Mariel Jones, Xue Feng, Kristina Hoffman, Stephen Sebestyen, and Salli Dymond



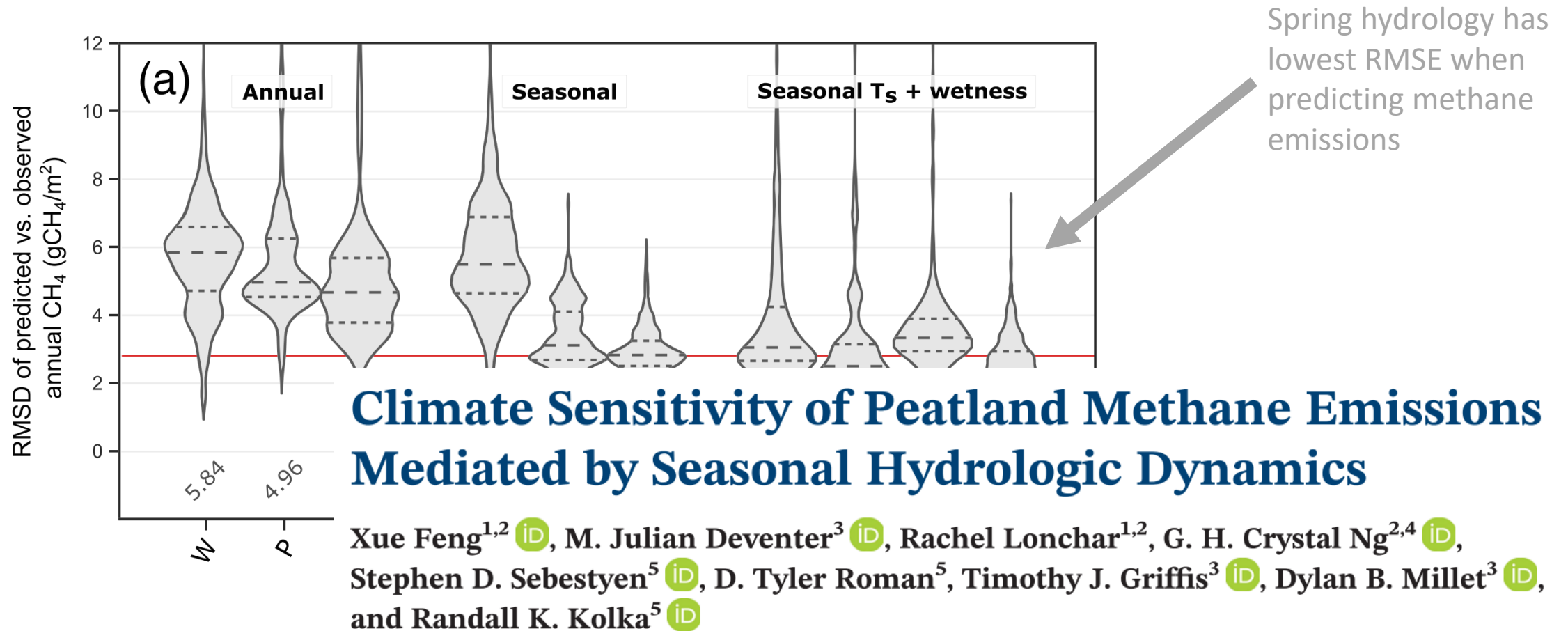
Peatland methane emissions are controlled by spring water availability, independent of soil temperature.



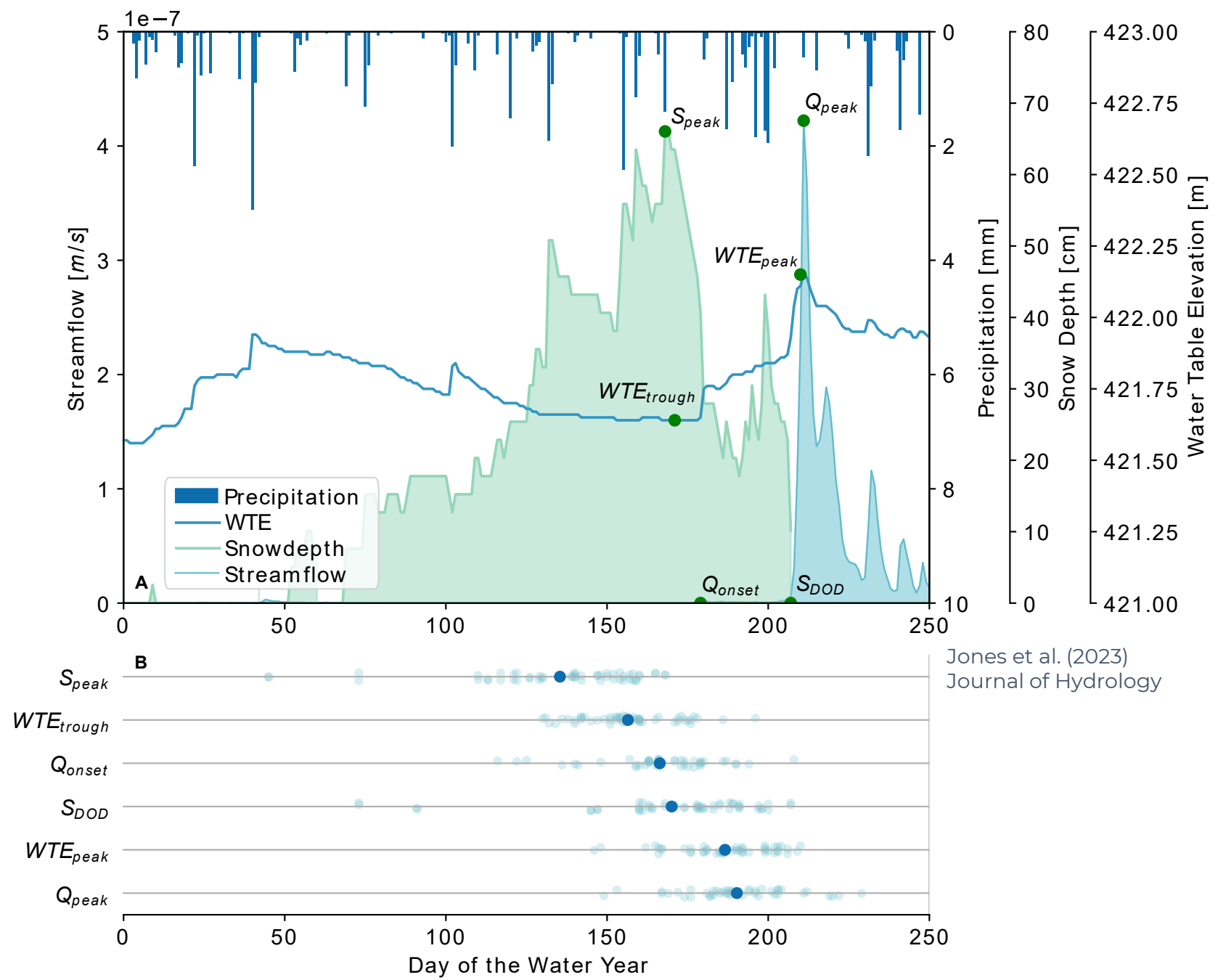
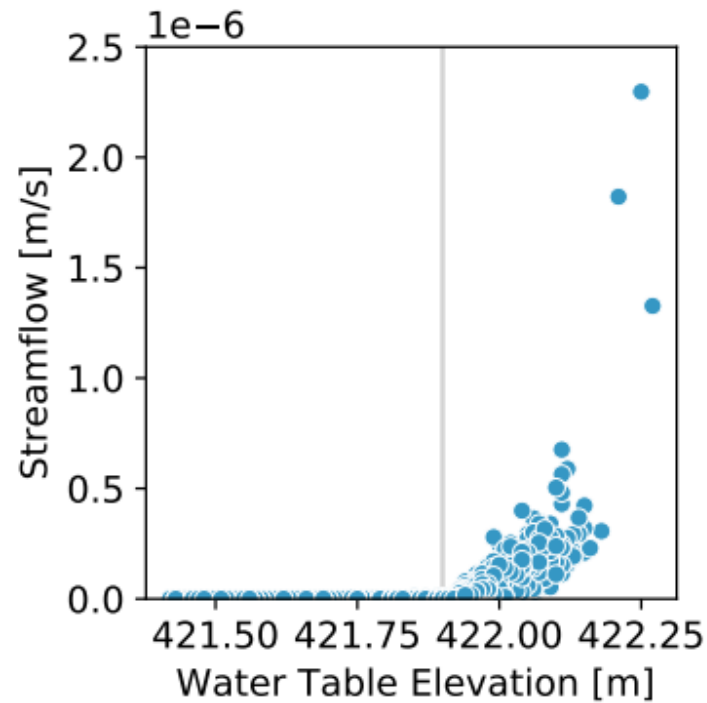
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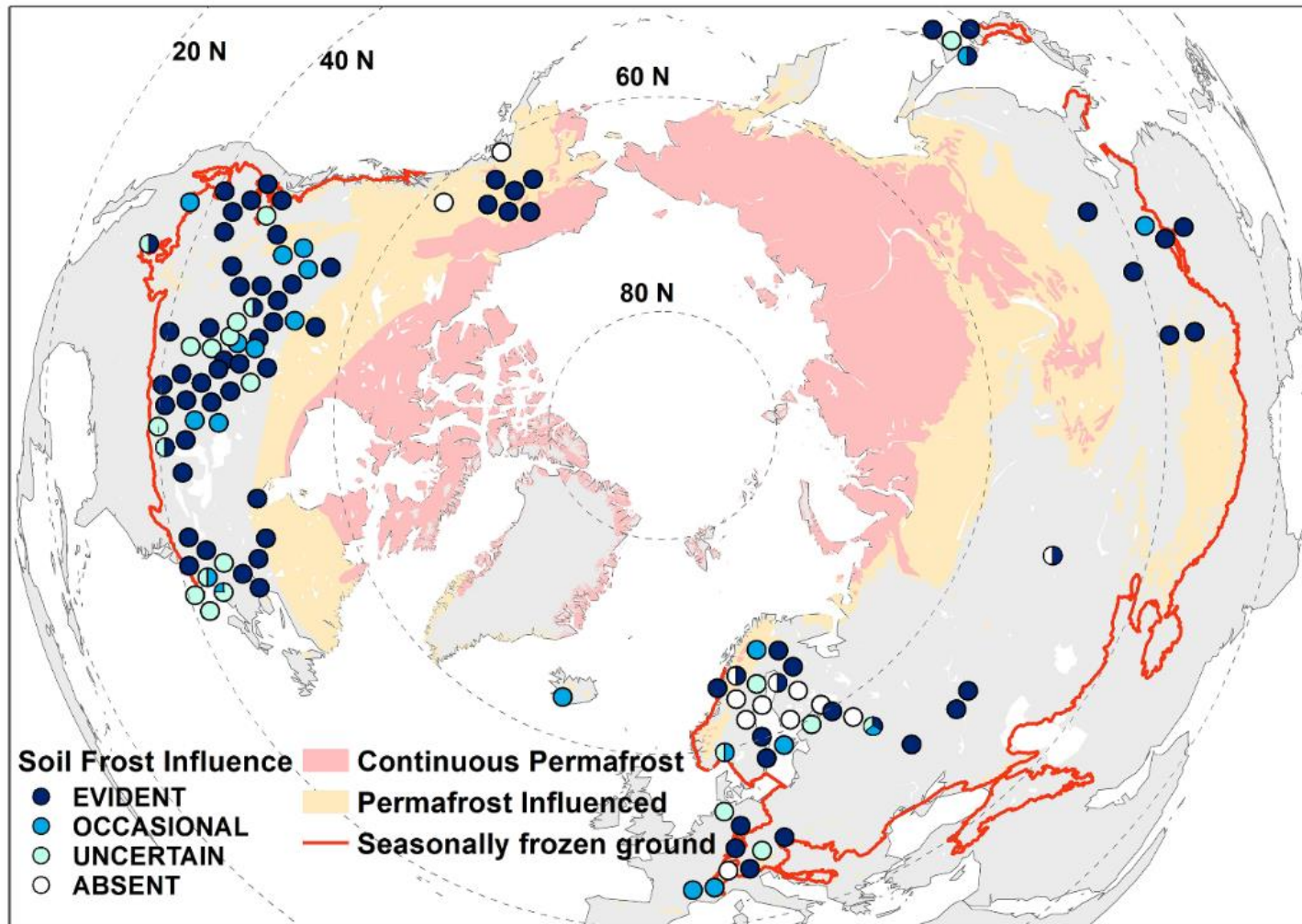
Peatland methane emissions are controlled by spring water availability, independent of soil temperature.



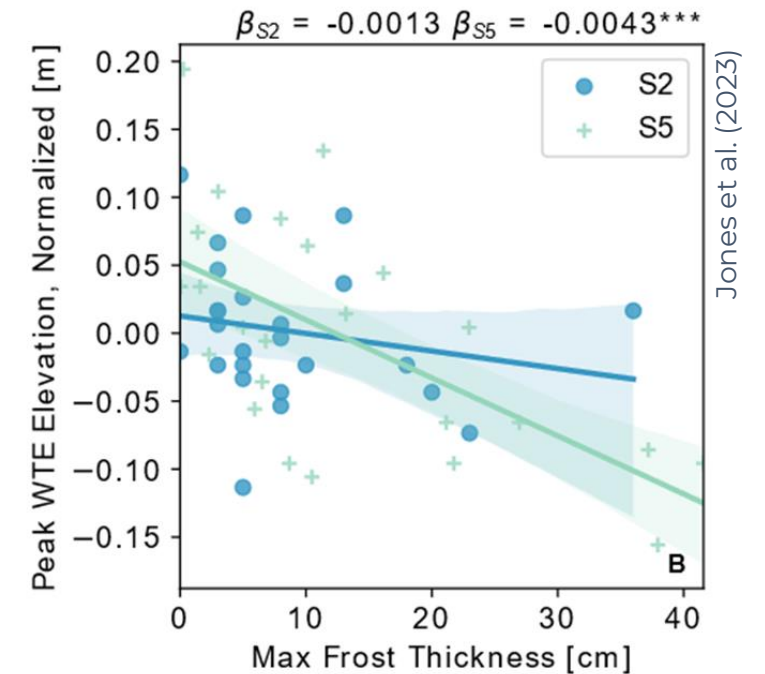
In low-relief peatland watersheds, hydrologic cascade shows the ‘fill-spill’ dynamics that regulate the flow of snowmelt.



Frost dynamics are not well understood in low relief systems – but show strong correlation with spring water availability in wetland.



From Ala-aho et al. (2021)



Jones et al. (2023)



1

Forest – How does canopy cover influence snow accumulation and melt dynamics?



1

Forest – How does canopy cover influence snow accumulation and melt dynamics?

2

Frost – Where does frost form in the watershed and how does it influence snowmelt processes?



1

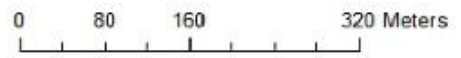
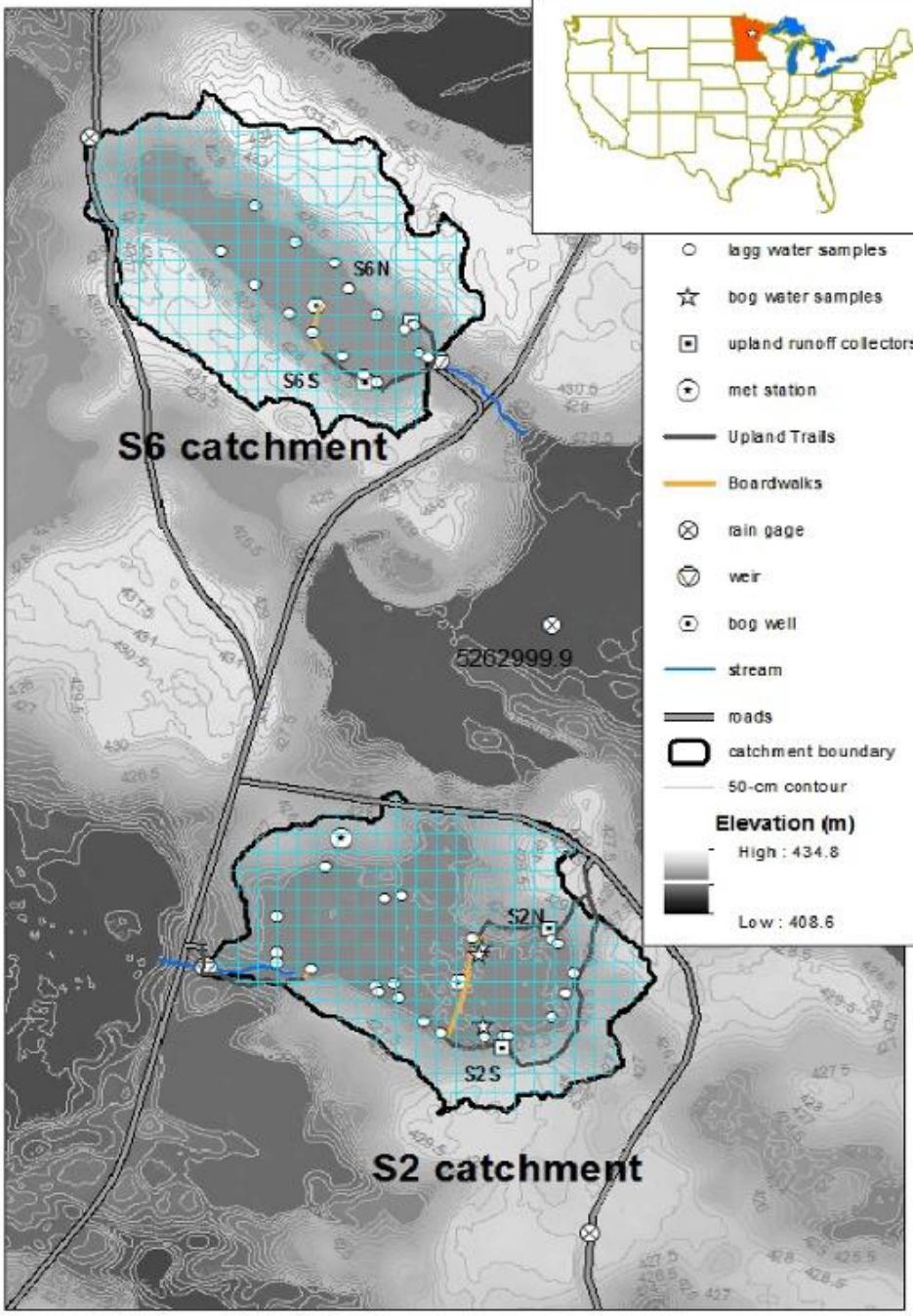
Forest – How does canopy cover influence snow accumulation and melt dynamics?

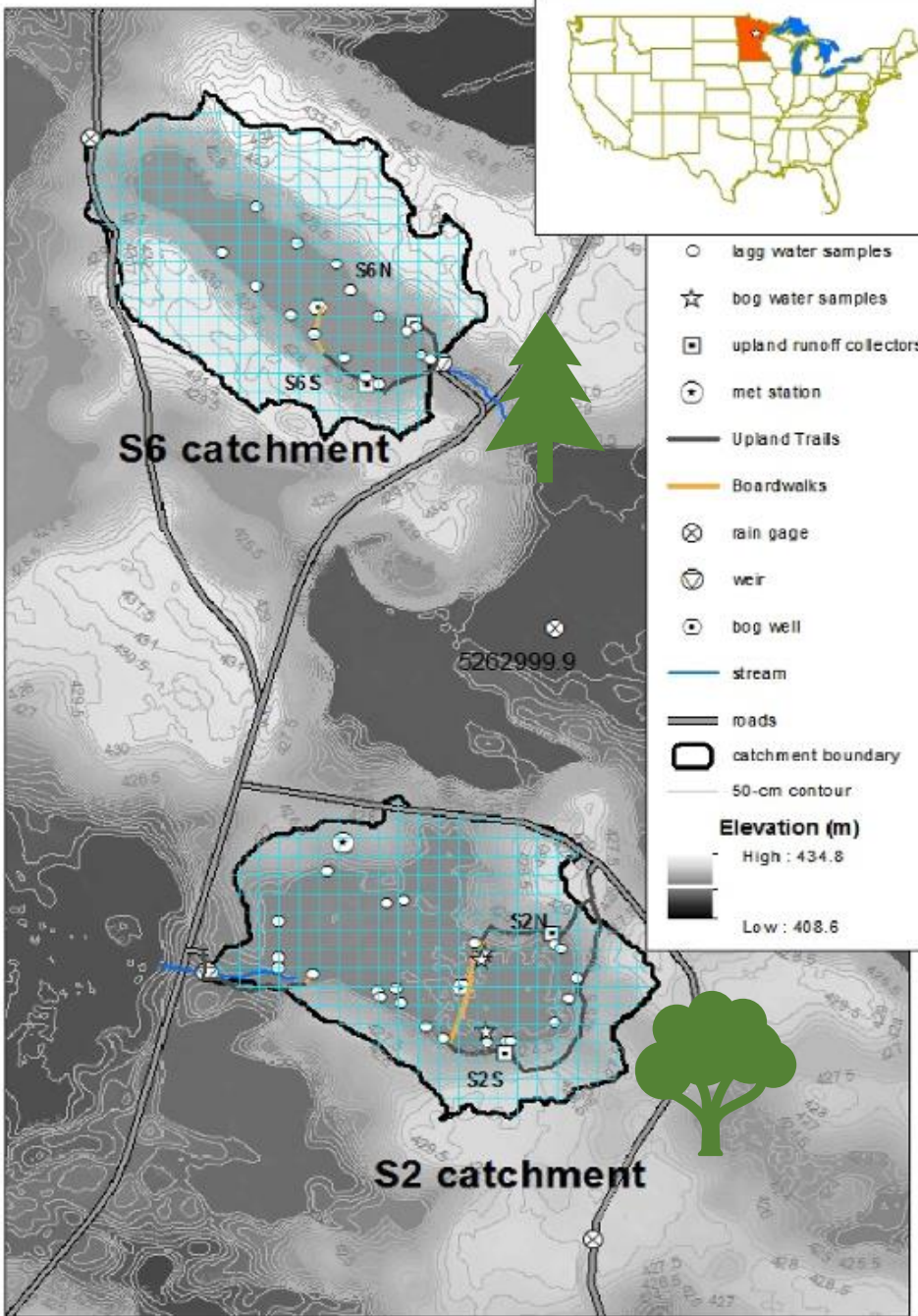
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Frost – Where does frost form in the watershed and how does it influence snowmelt processes?

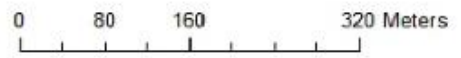
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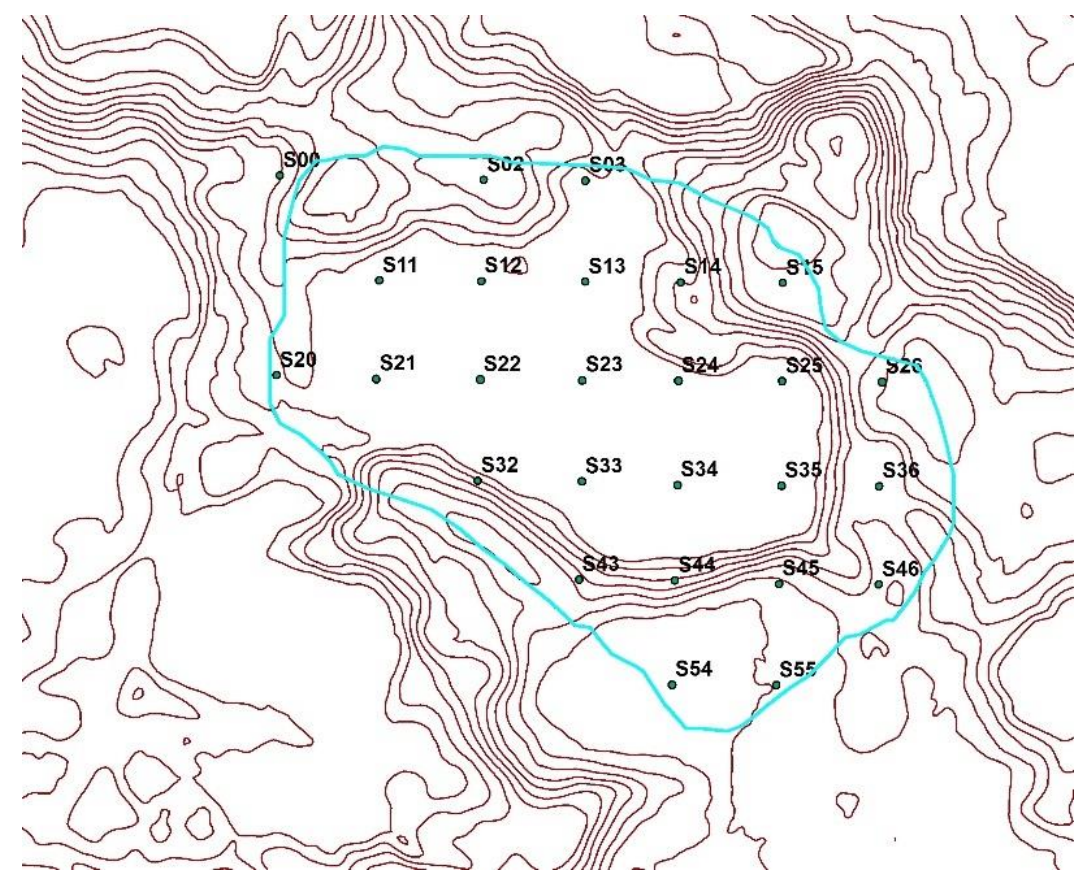
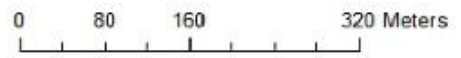
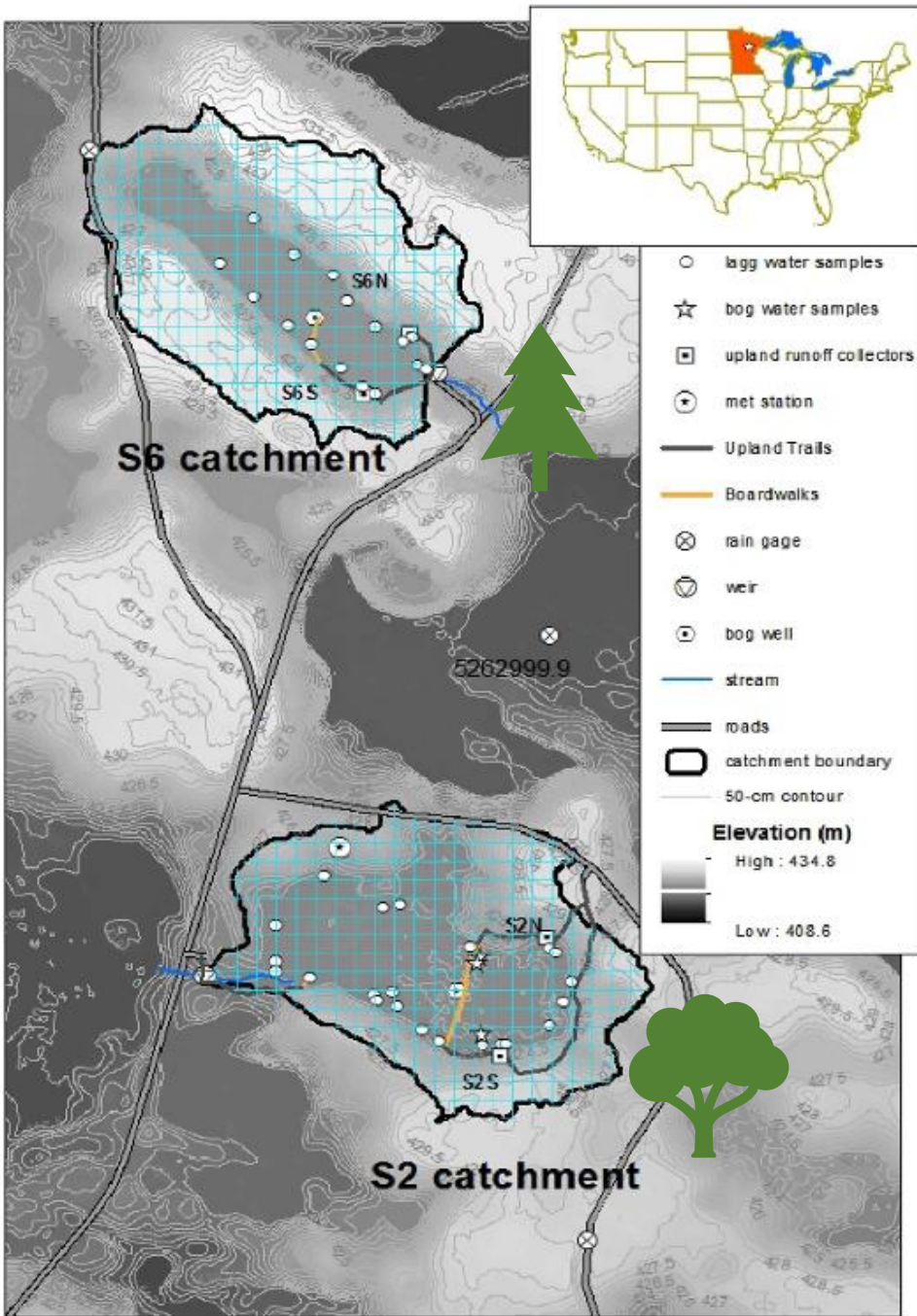
Flow – How does snow melt and infiltration affect spring water availability in wetland watersheds?

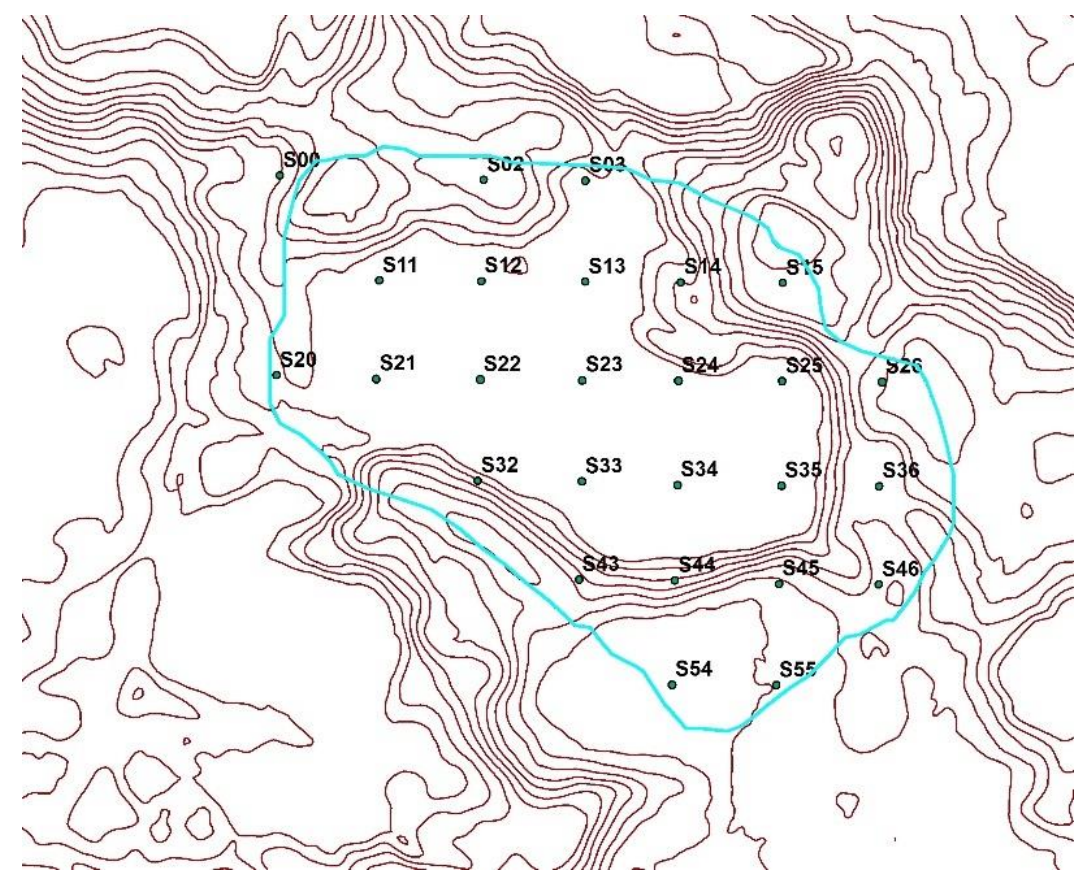
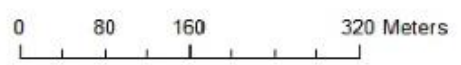
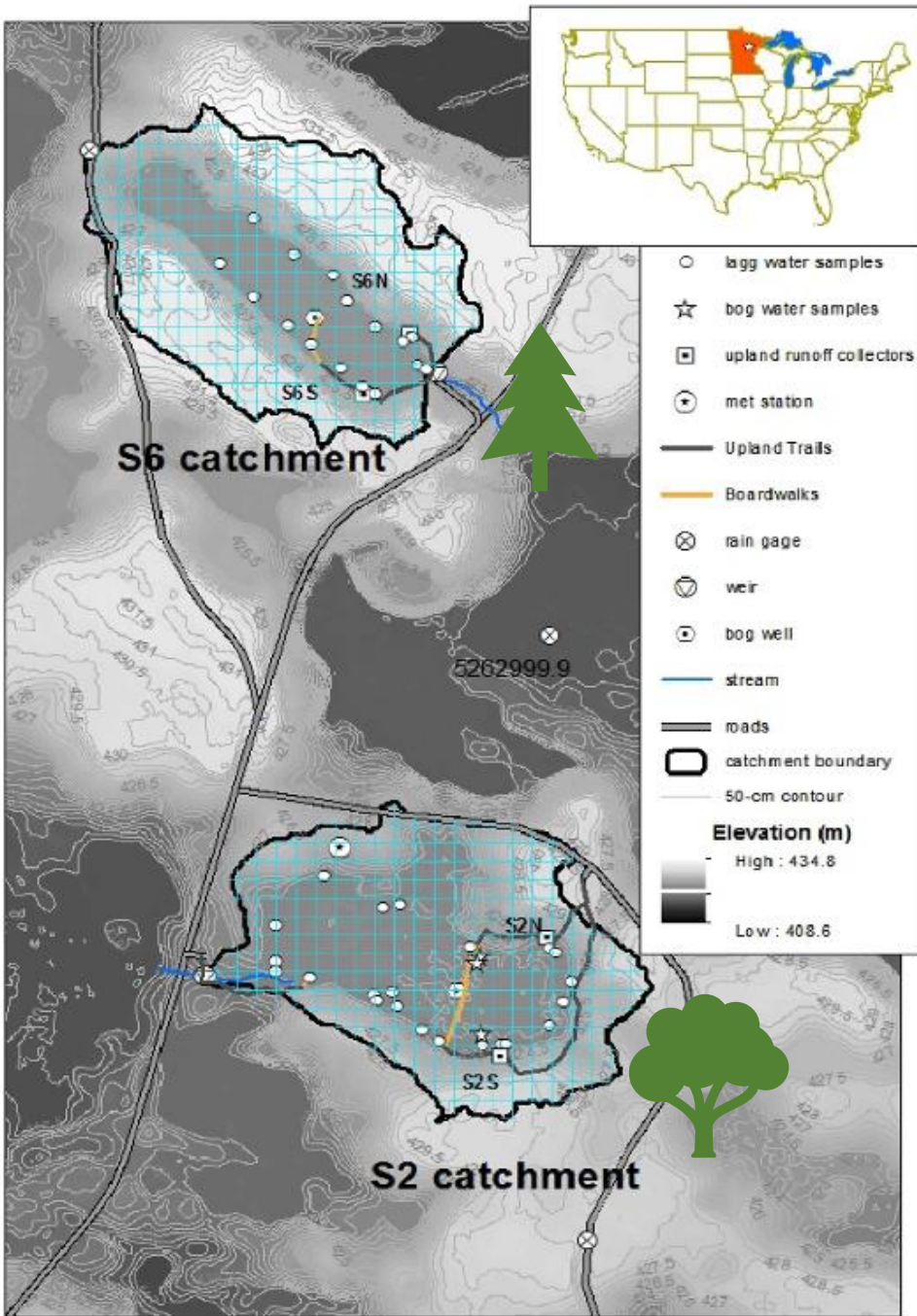




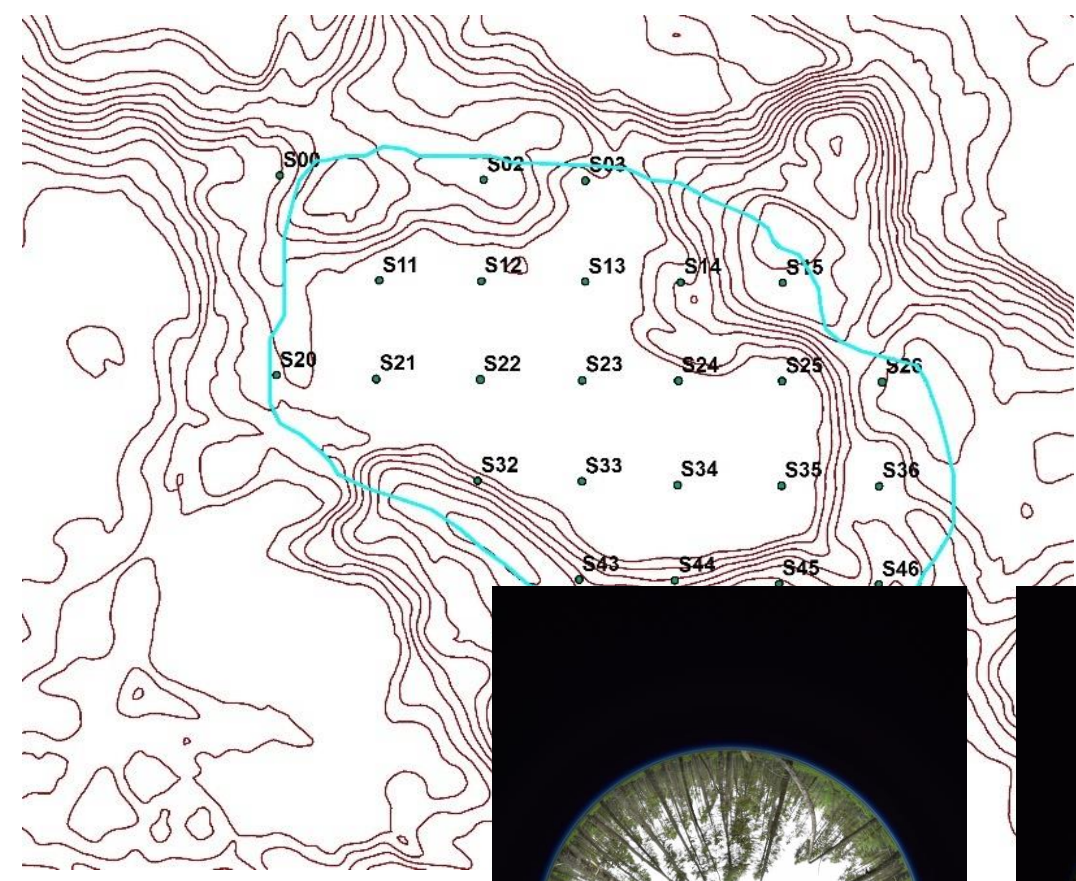
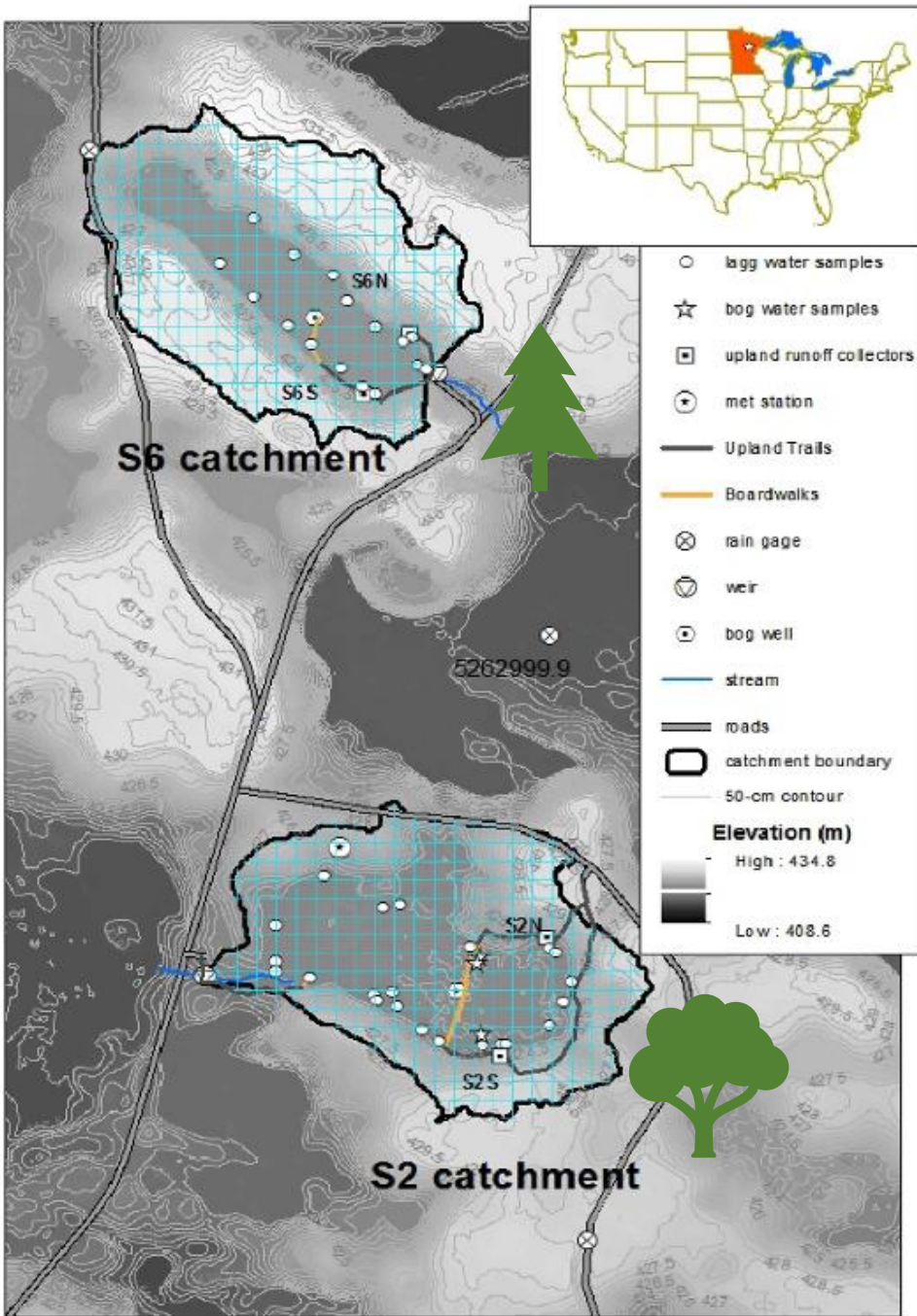
- lagg water samples
- ☆ bog water samples
- upland runoff collectors
- ⊙ met station
- Upland Trails
- Boardwalks
- ⊗ rain gage
- ⊖ weir
- ⊙ bog well
- stream
- roads
- catchment boundary
- 50-cm contour
- Elevation (m)**
 - High : 434.8
 - Low : 408.6



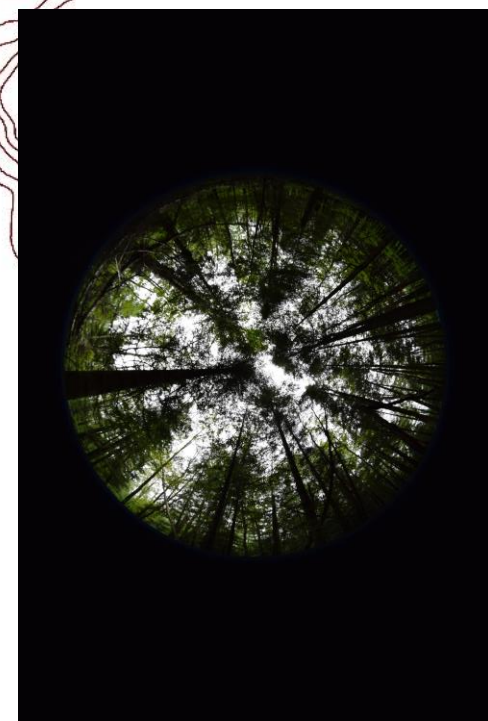
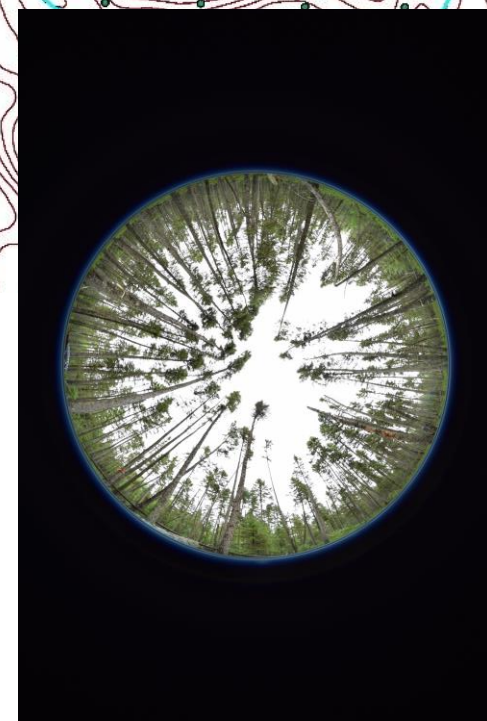


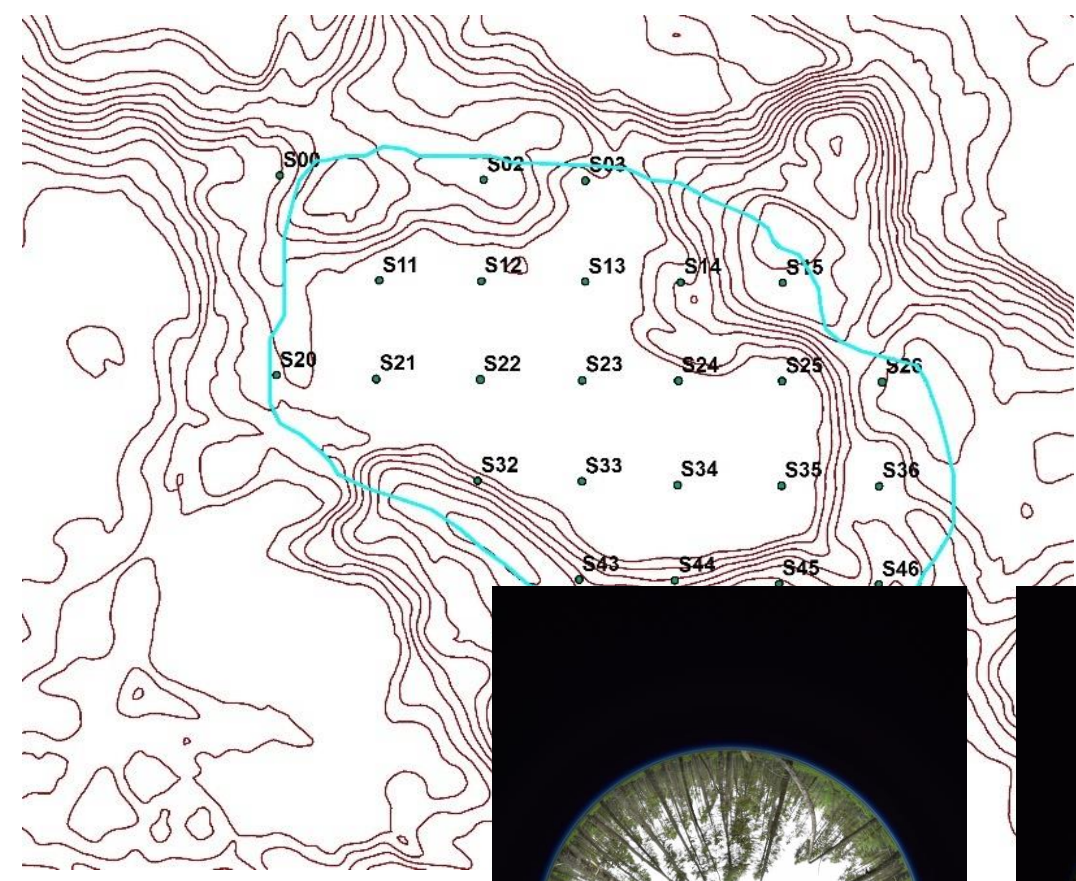
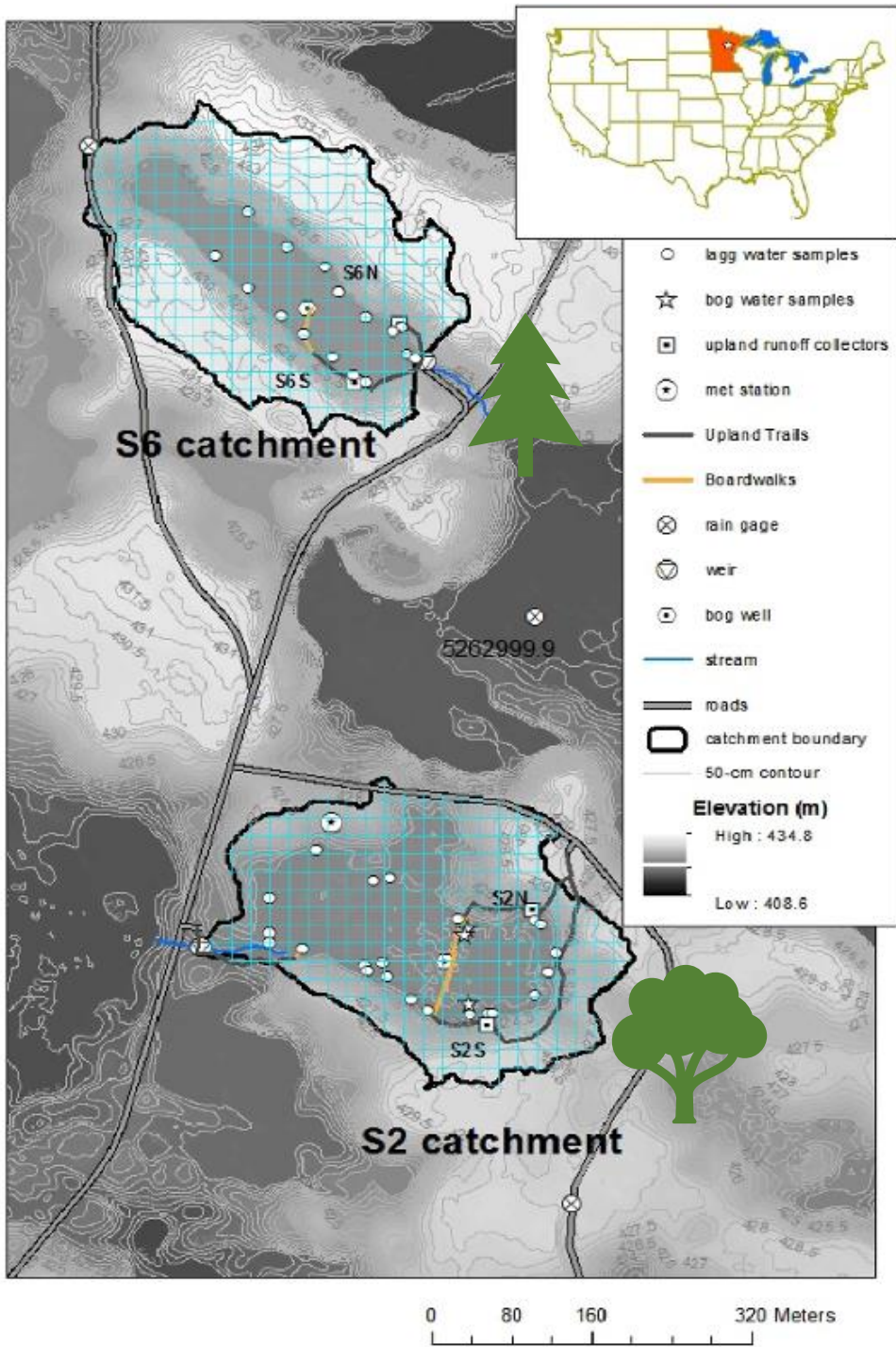


(1) Snow depth and SWE measurements along a 150m grid in each watershed (forest and frost)

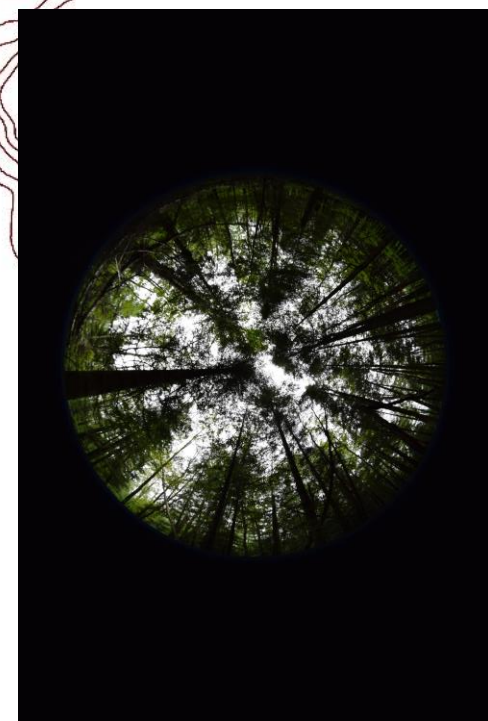
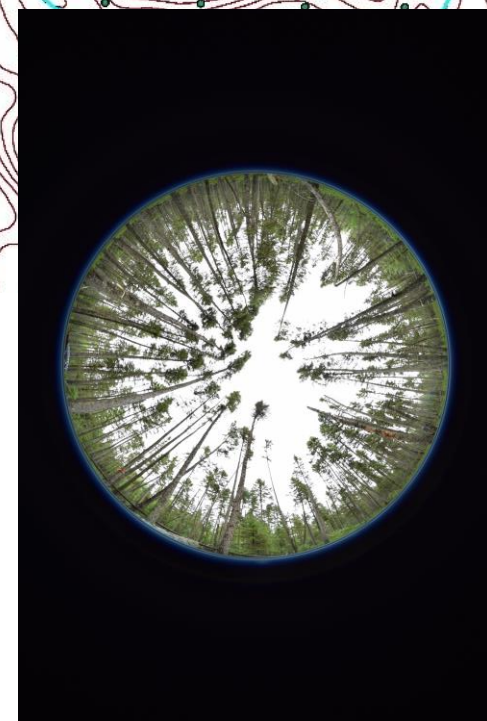


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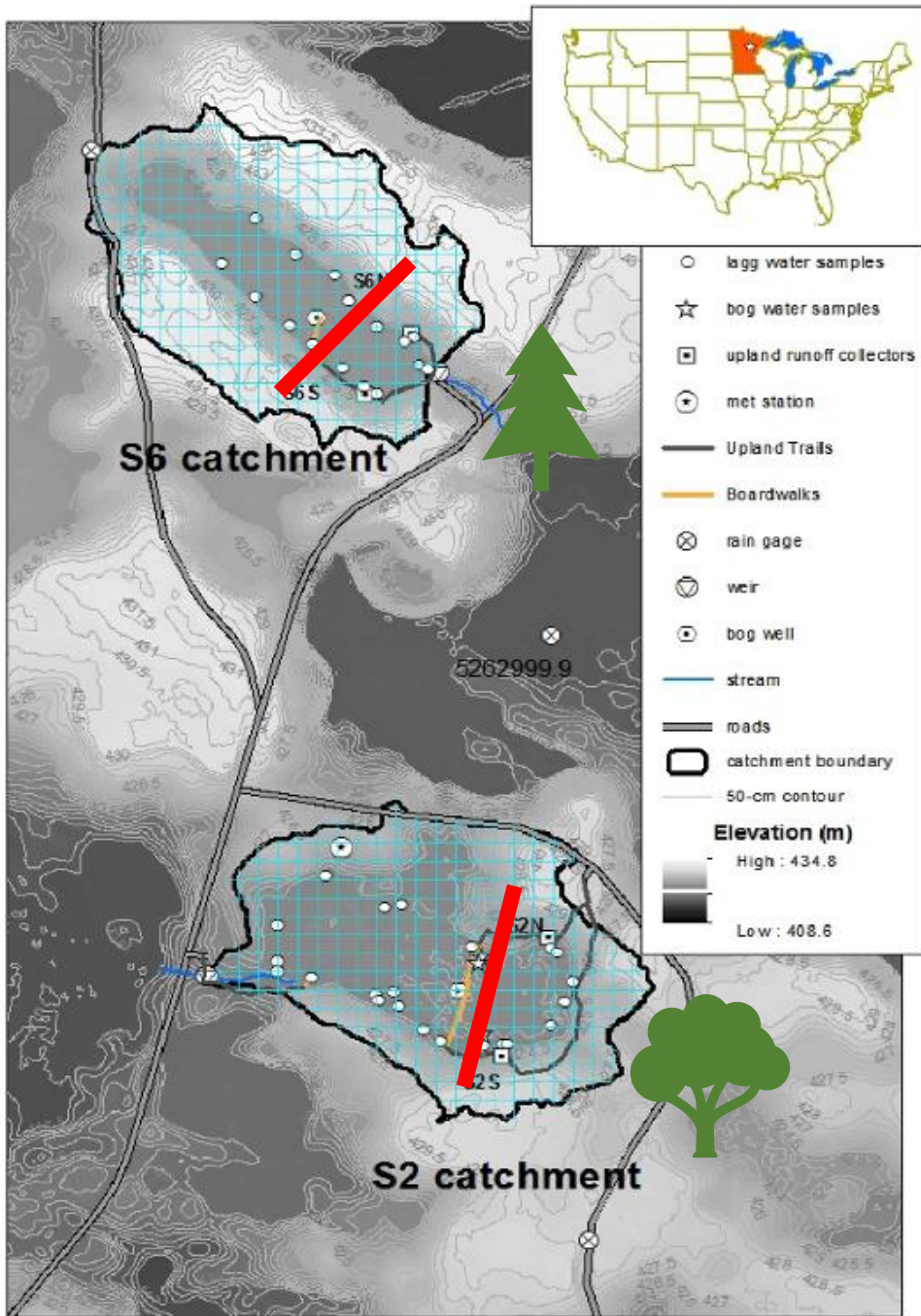




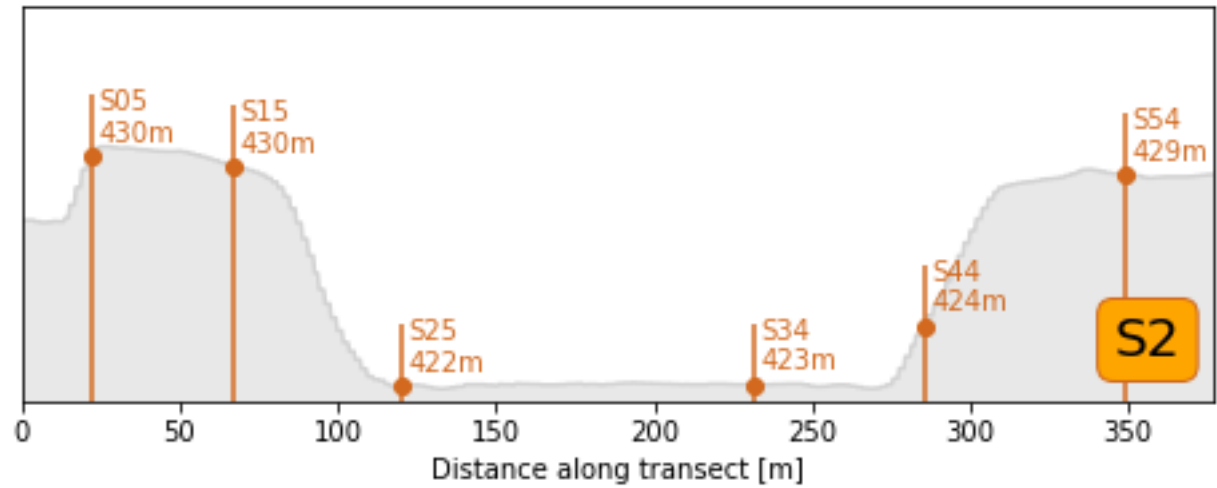
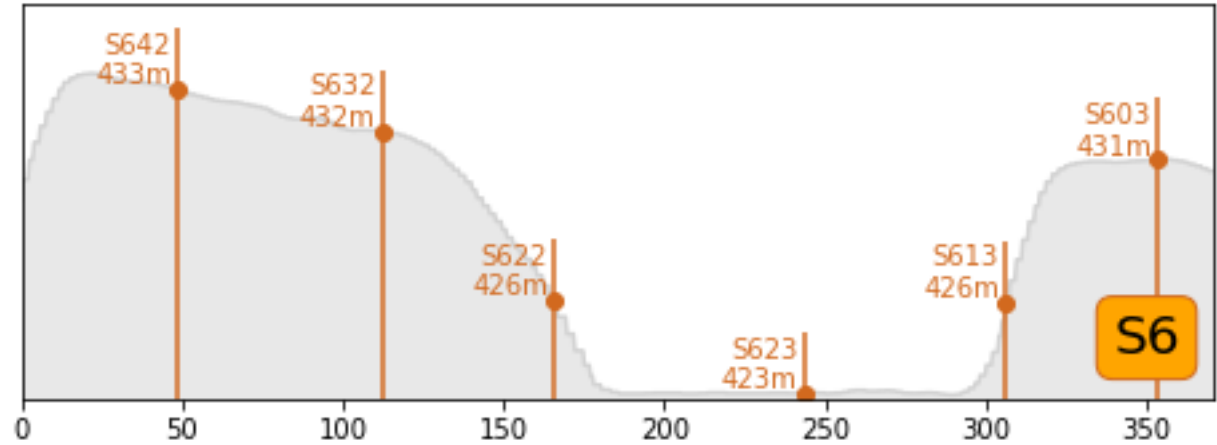
(1) Snow depth and SWE measurements along a 150m grid in each watershed (*forest and frost*)

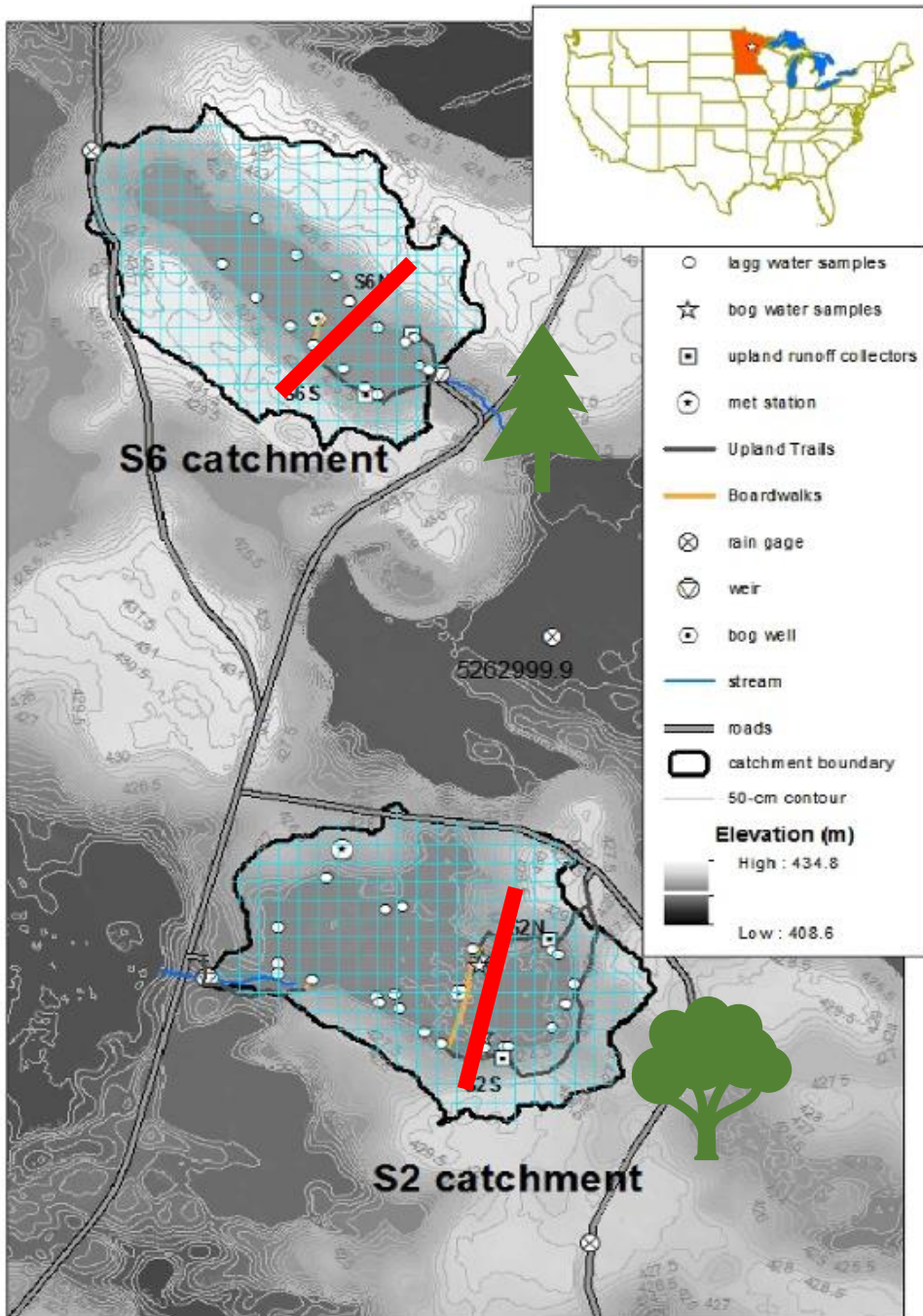


(2) Leaf Area Index photos at each grid point to characterize canopy structure (*forest and frost*)

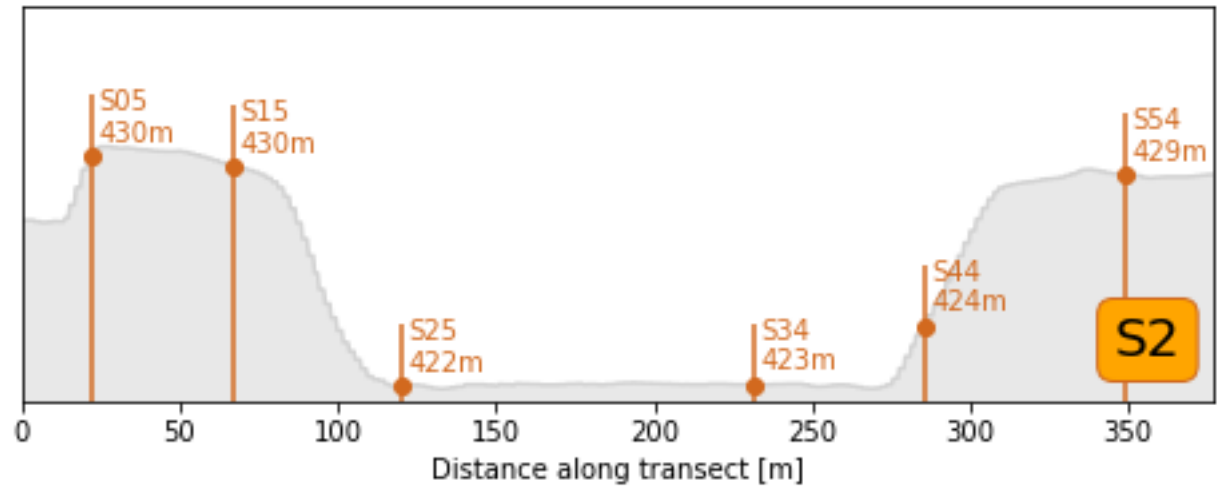
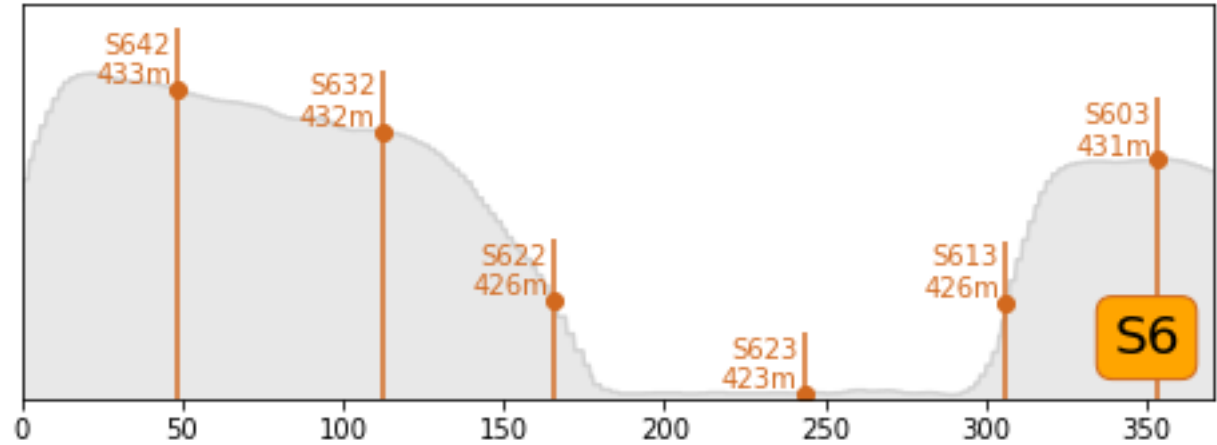


Elevation Profiles for Proposed Transects



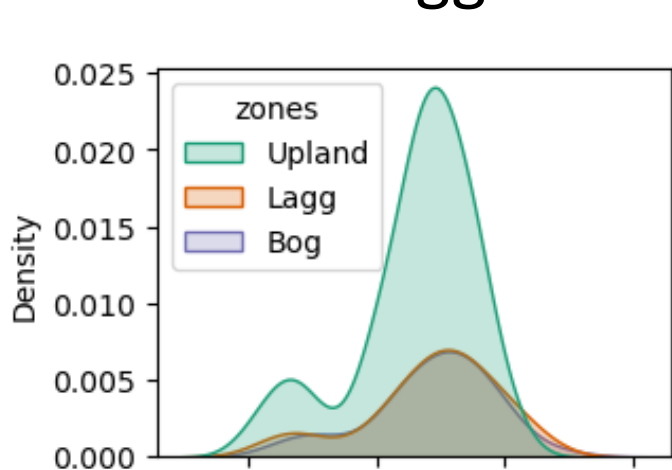


Elevation Profiles for Proposed Transects

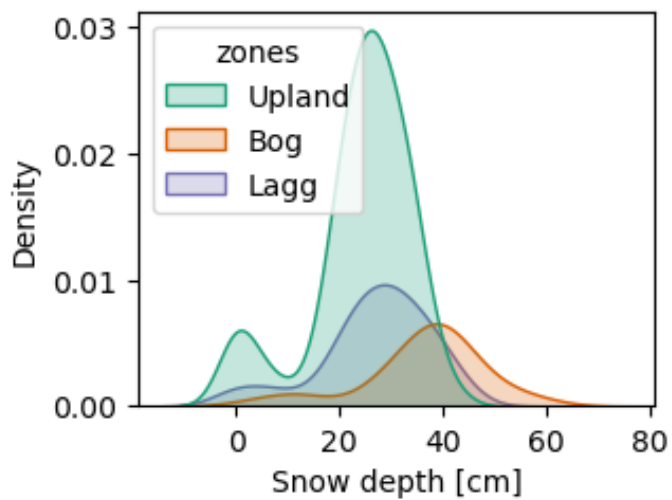
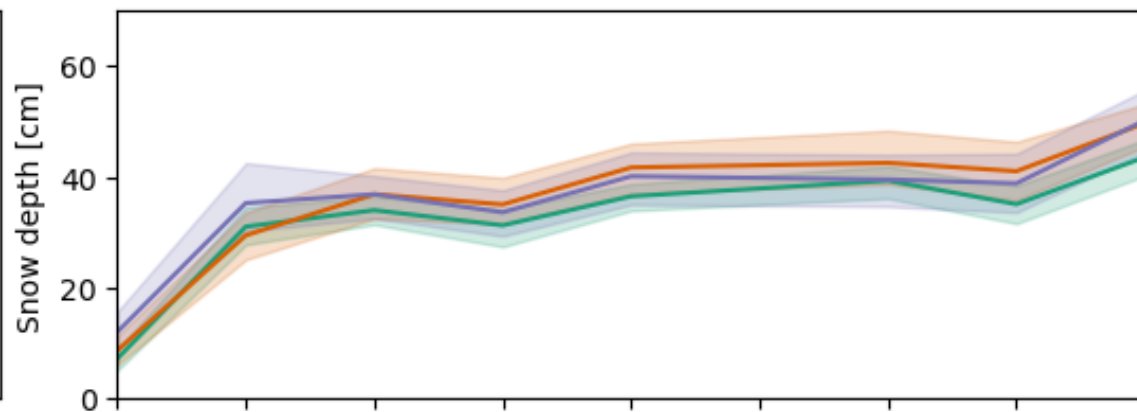


(3) Installed multi-depth soil moisture and temperature sensors along two North-South transects to capture subsurface soil dynamics (*frost and flow*).

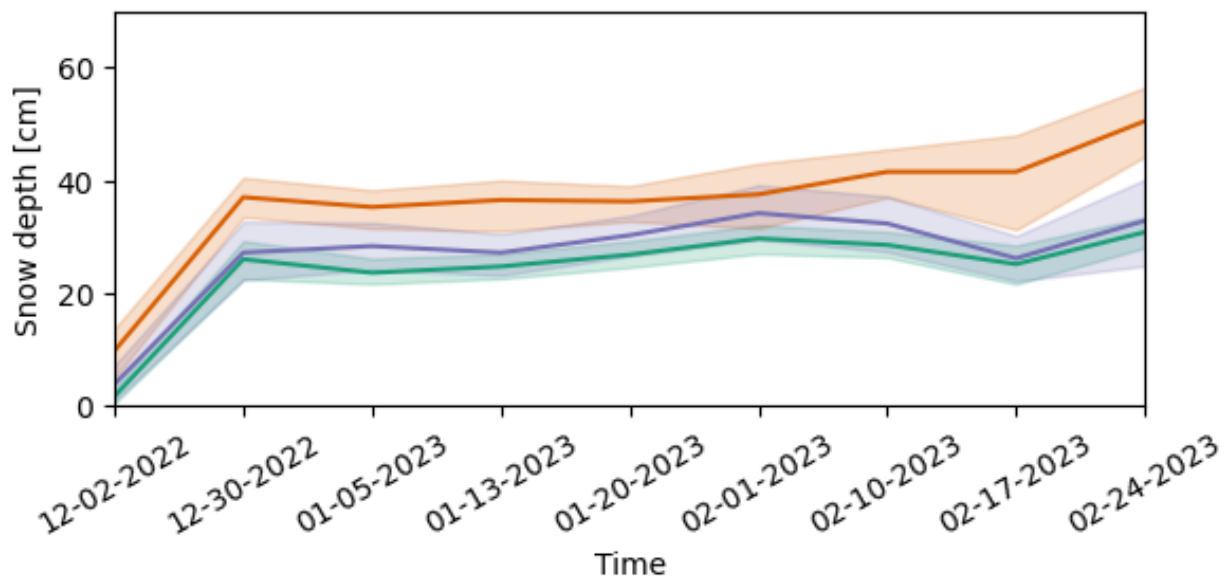
(Result 1a: Forest) In snow is spatially homogeneous in the deciduous watershed, coniferous watershed has more snow and > SWE in the bog compared to the lagg and uplands.



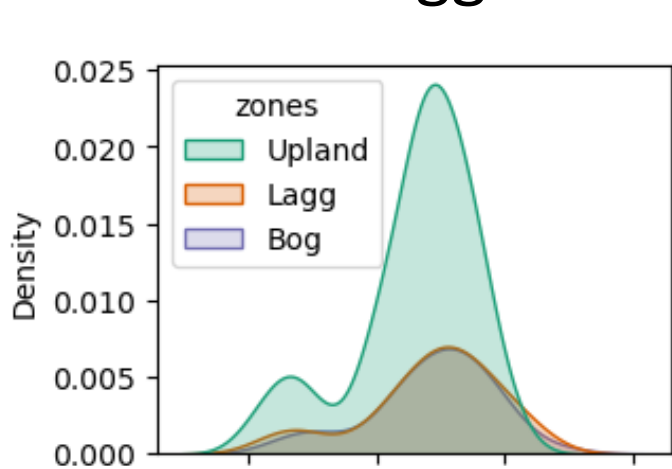
Snow Depths in S2



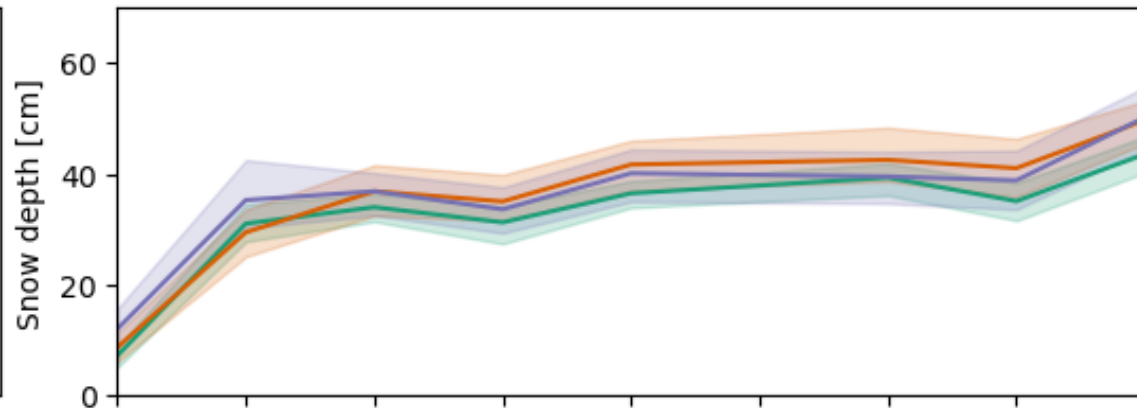
Snow Depths in S6



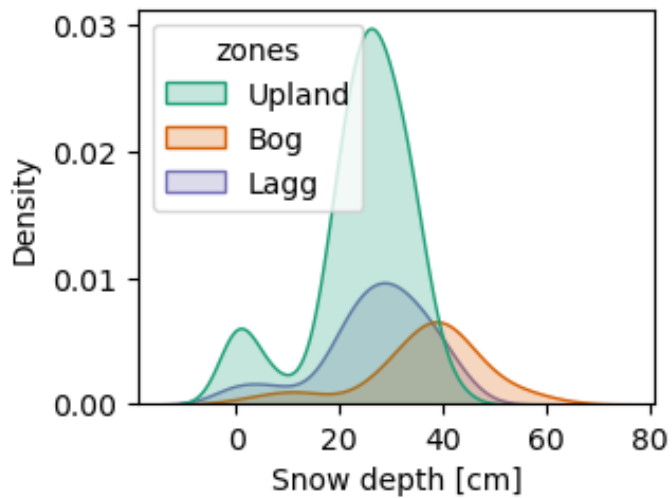
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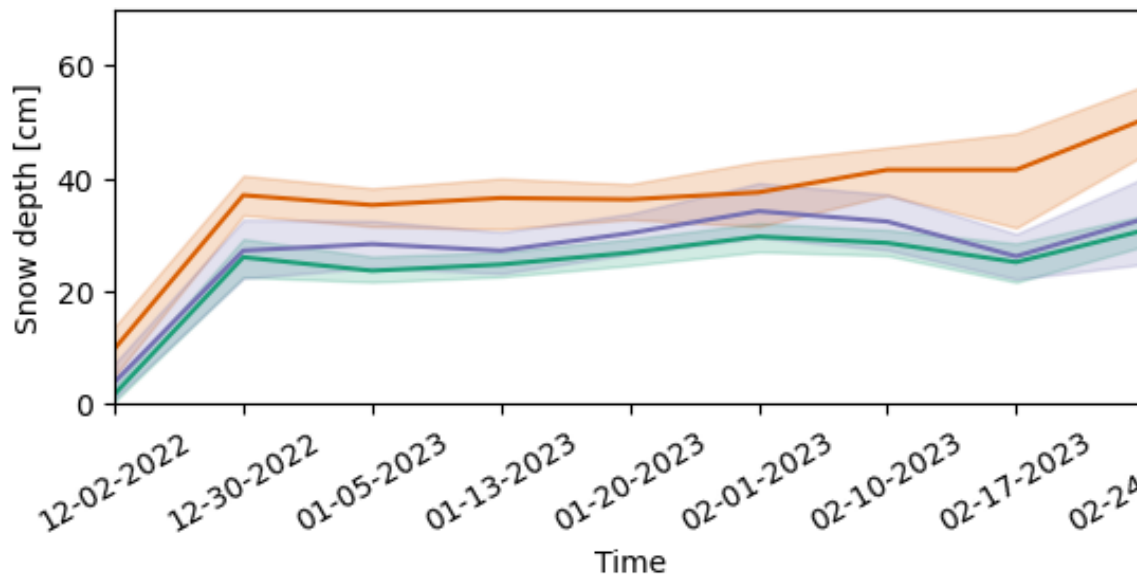
Snow Depths in S2



Spatially homogeneous snowpack in deciduous watershed

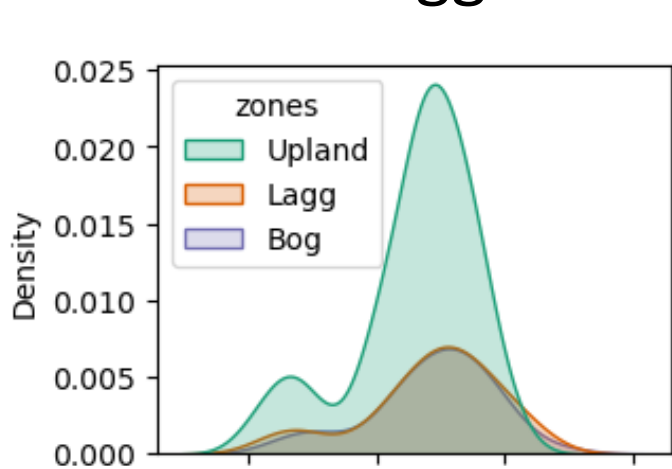


Snow Depths in S6

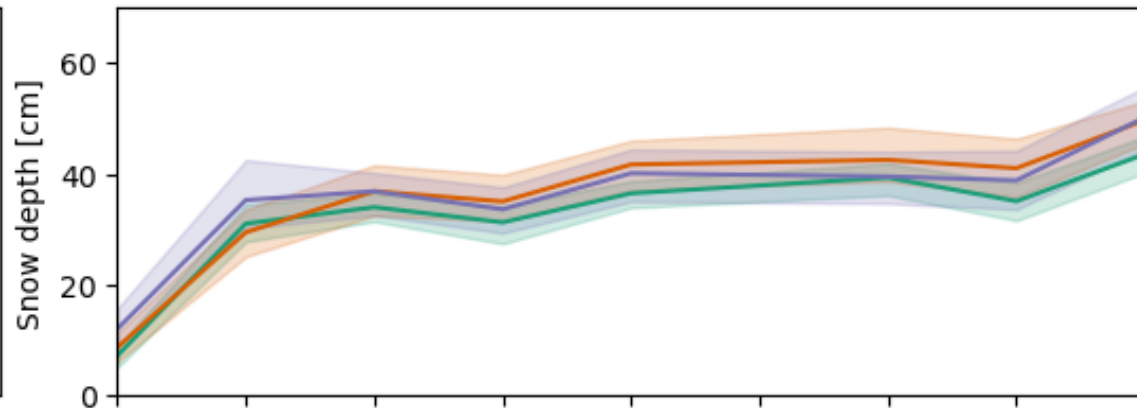


Time

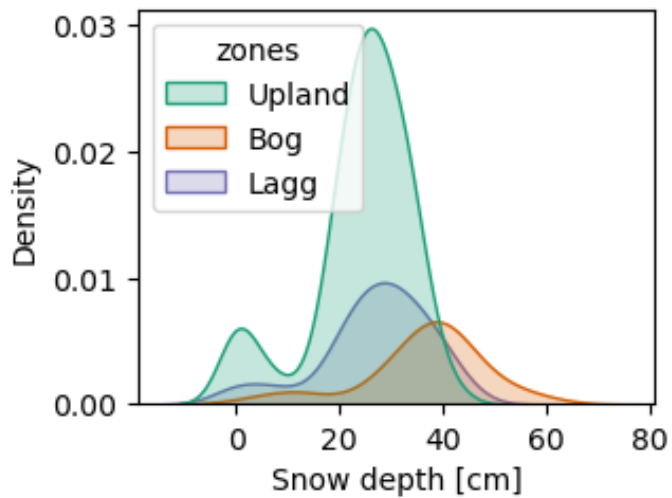
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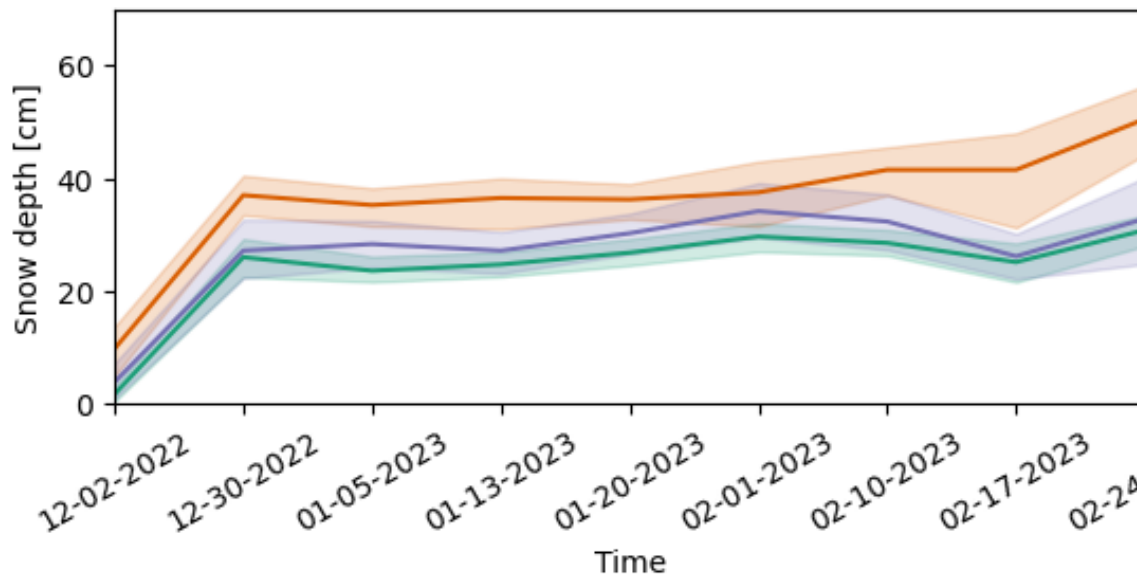
Snow Depths in S2



Spatially homogeneous snowpack in deciduous watershed

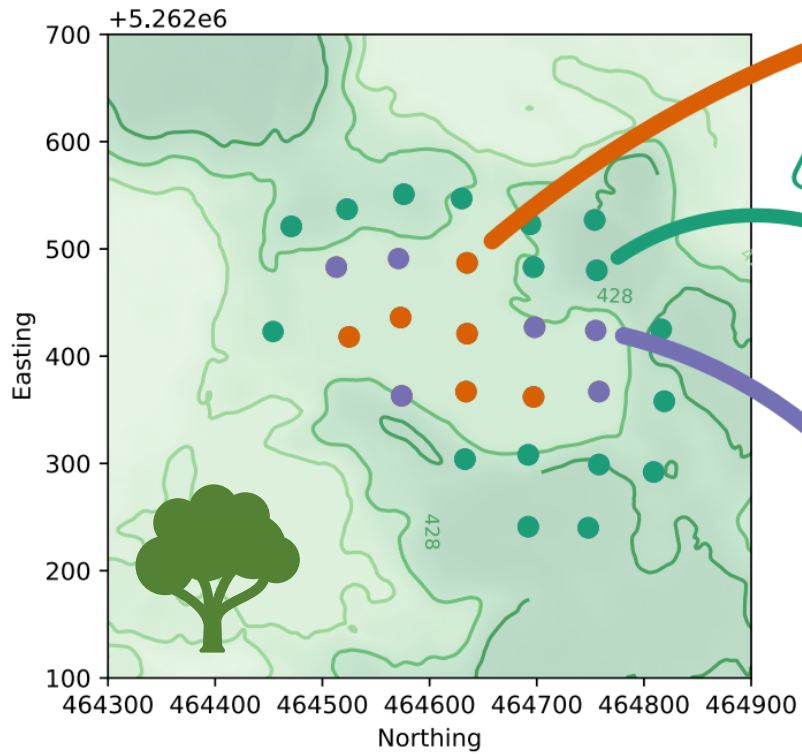


Snow Depths in S6

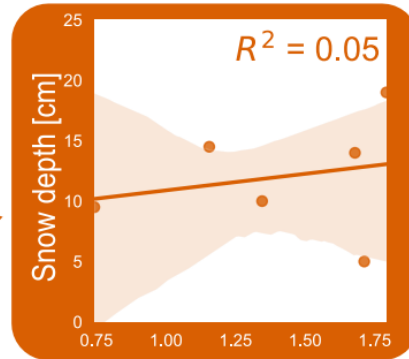


Consistently higher snowpack in the bog zone of the coniferous watershed.

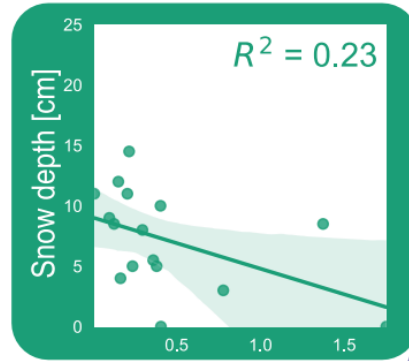
(Result 1b: Forest) LAI is a strong control on LAI during snow accumulation and initial melt periods.



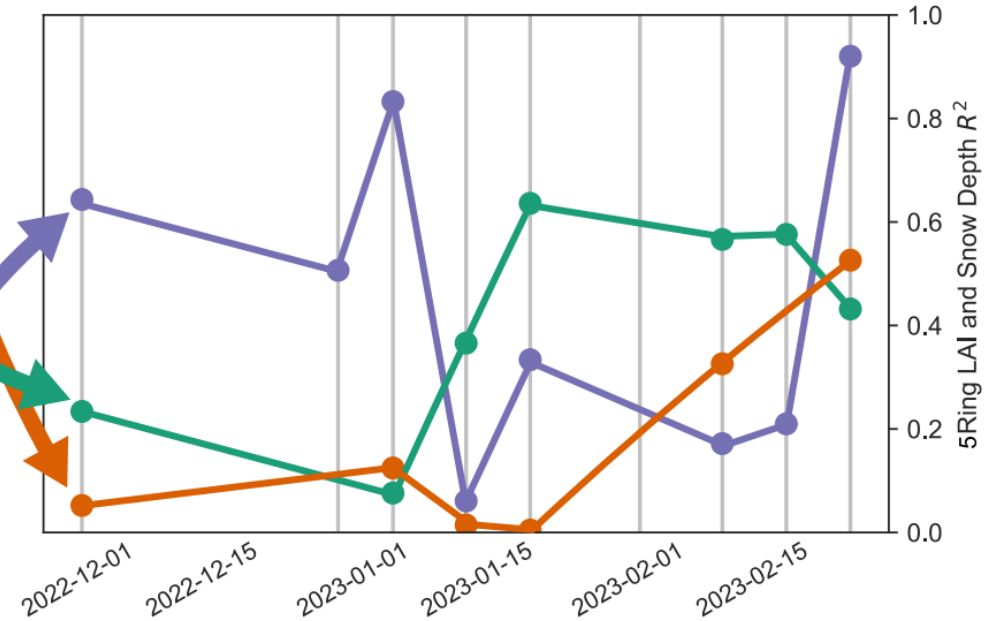
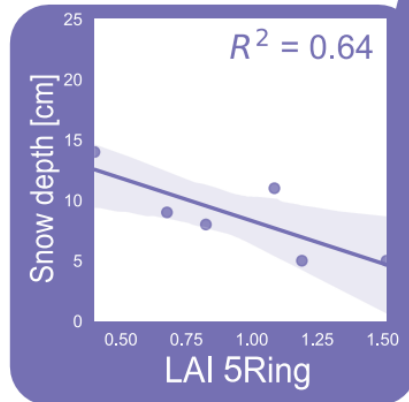
Bog



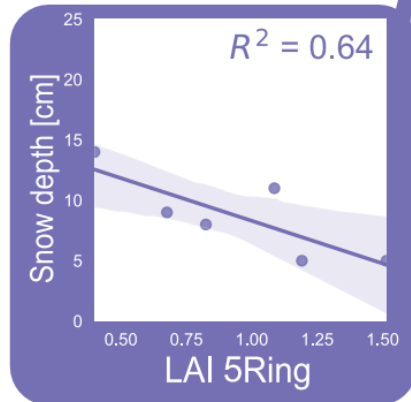
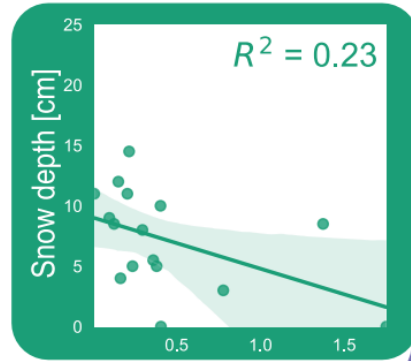
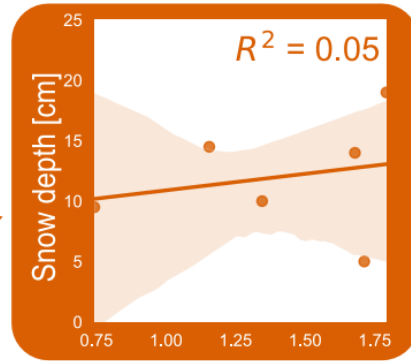
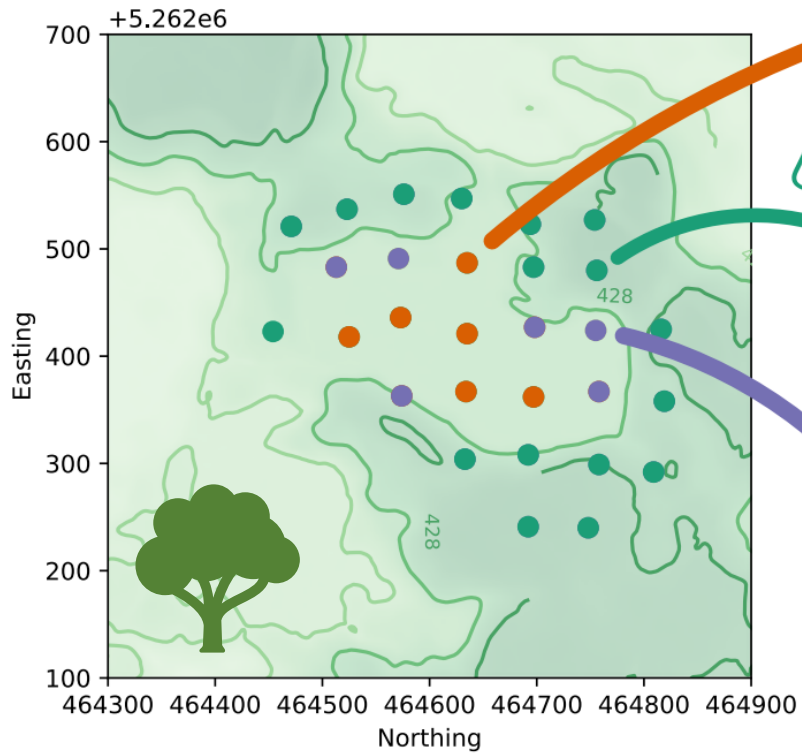
Upland



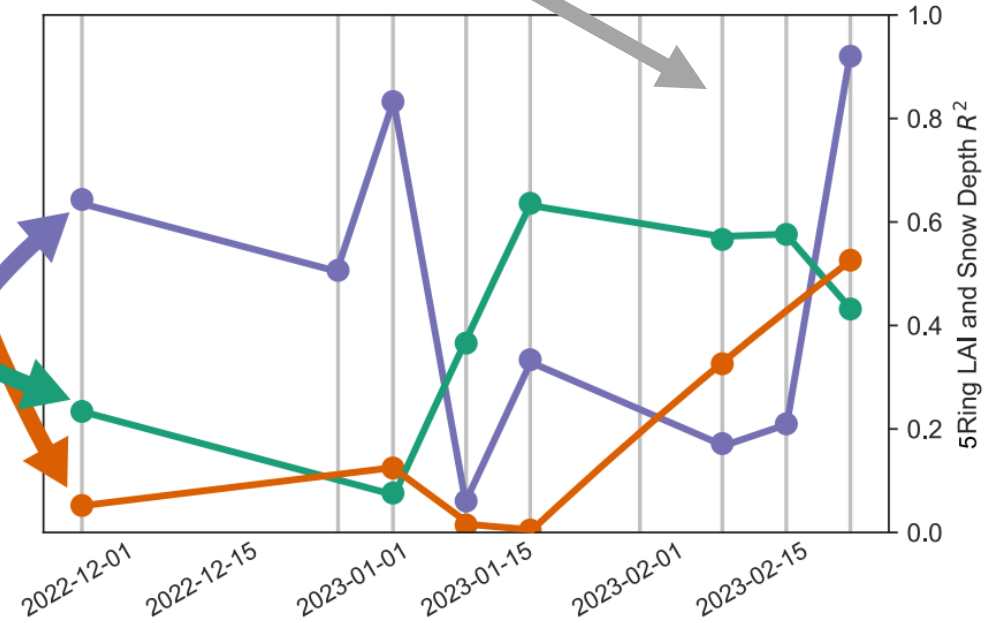
Lagg



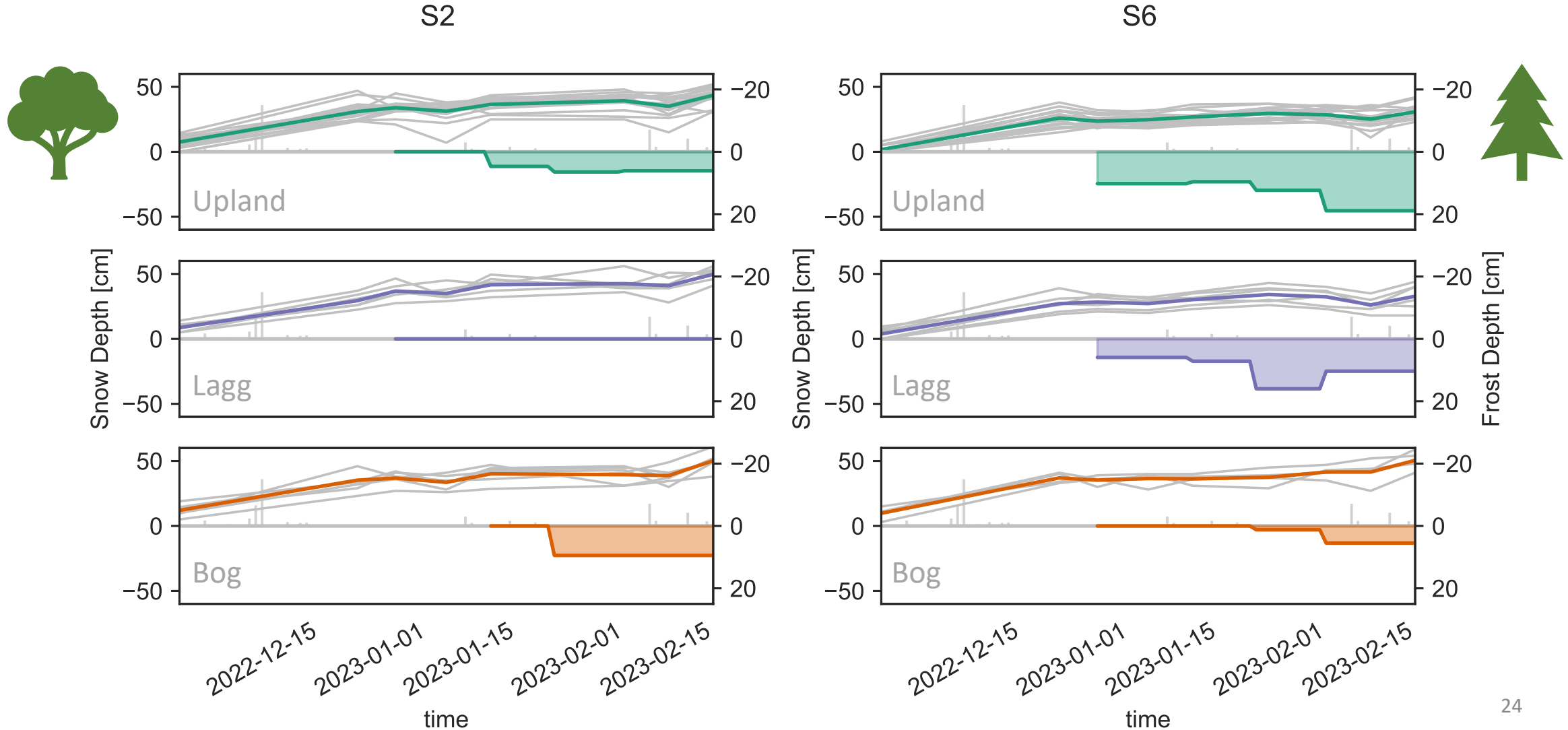
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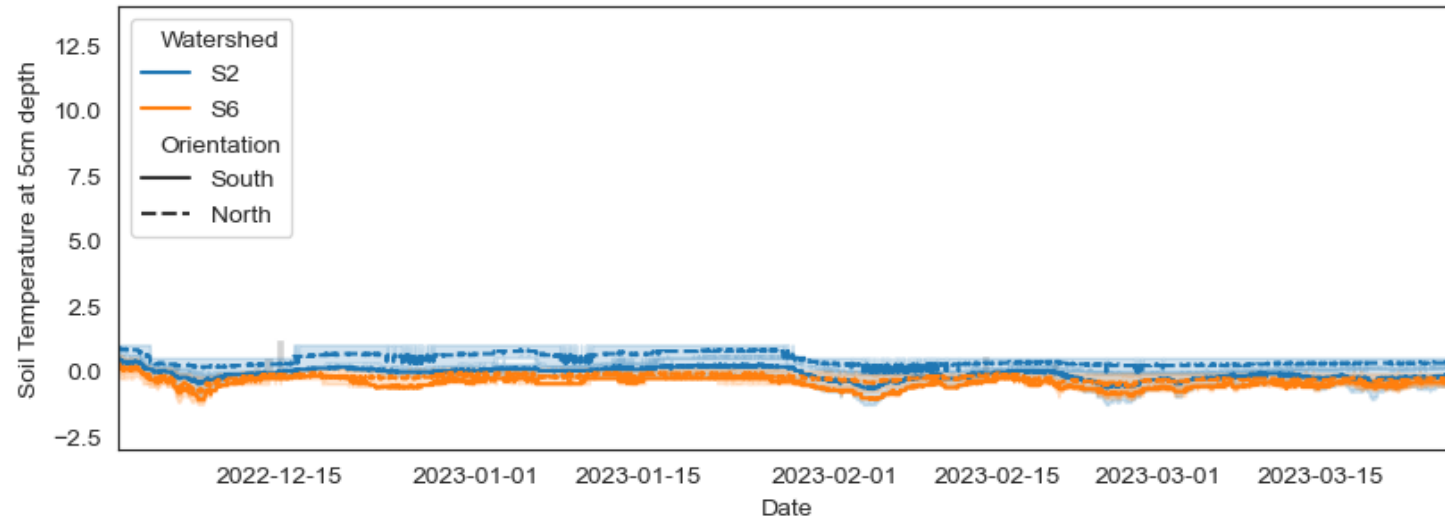
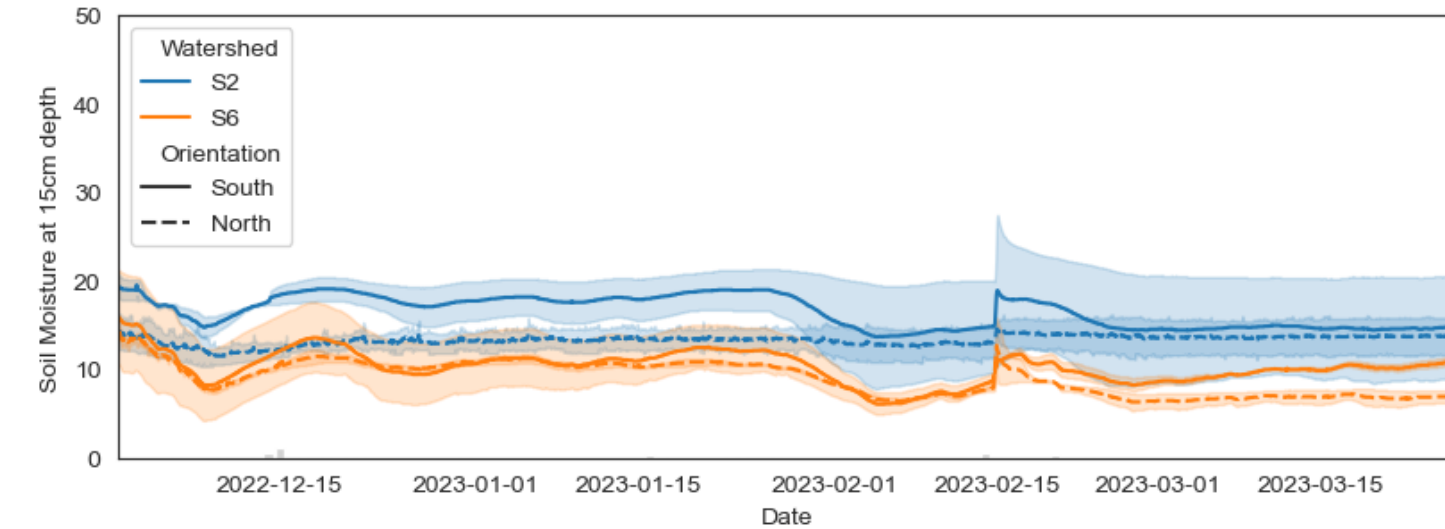
Slight trend uptick in LAI/snowpack correlation as melt season begins



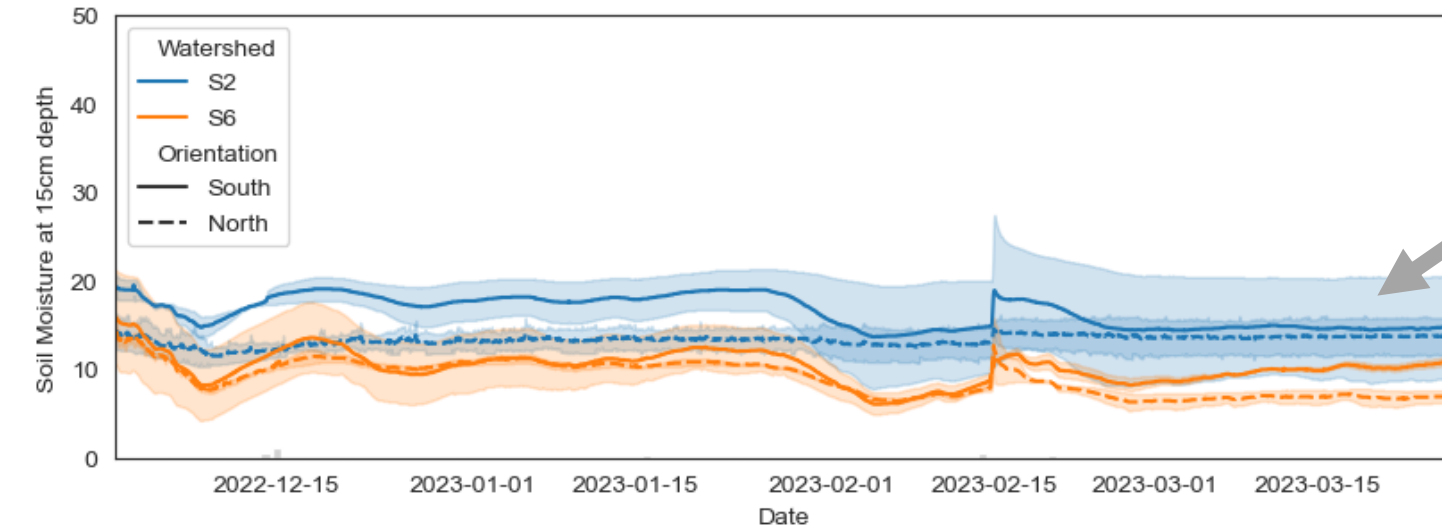
(Result 2: Frost) Snow depth and frost how inverse relationship under coniferous cover, not under deciduous cover.



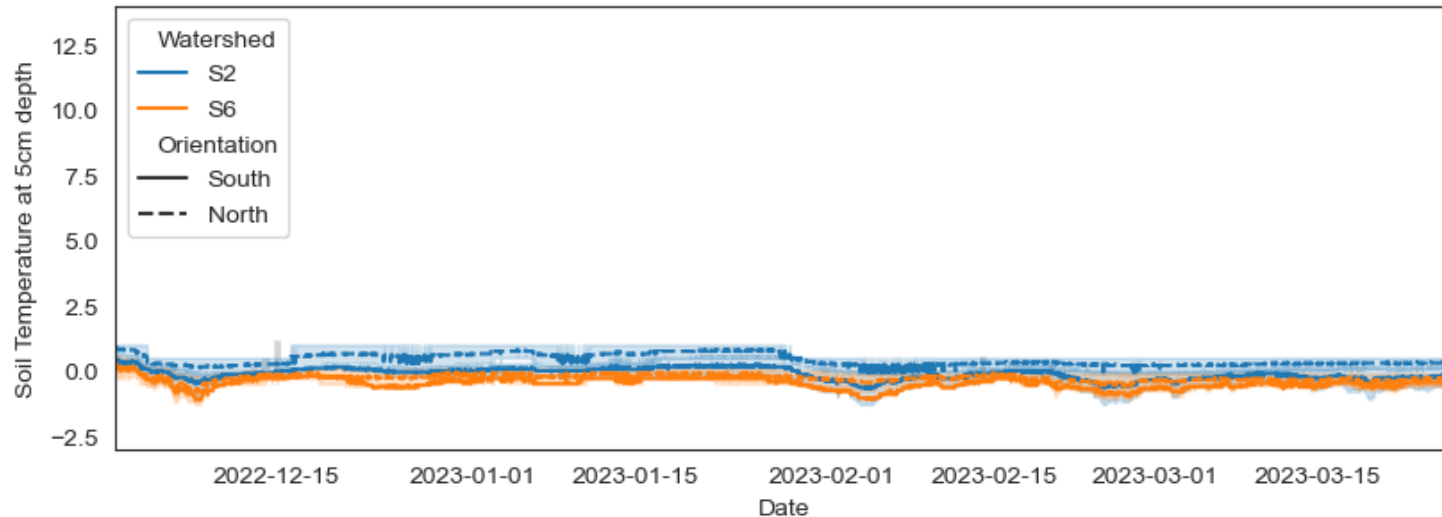
(Result 3: Flow) Higher snow depths lead to higher soil moisture and temperature potentially due to midwinter melt events and insulation effects.



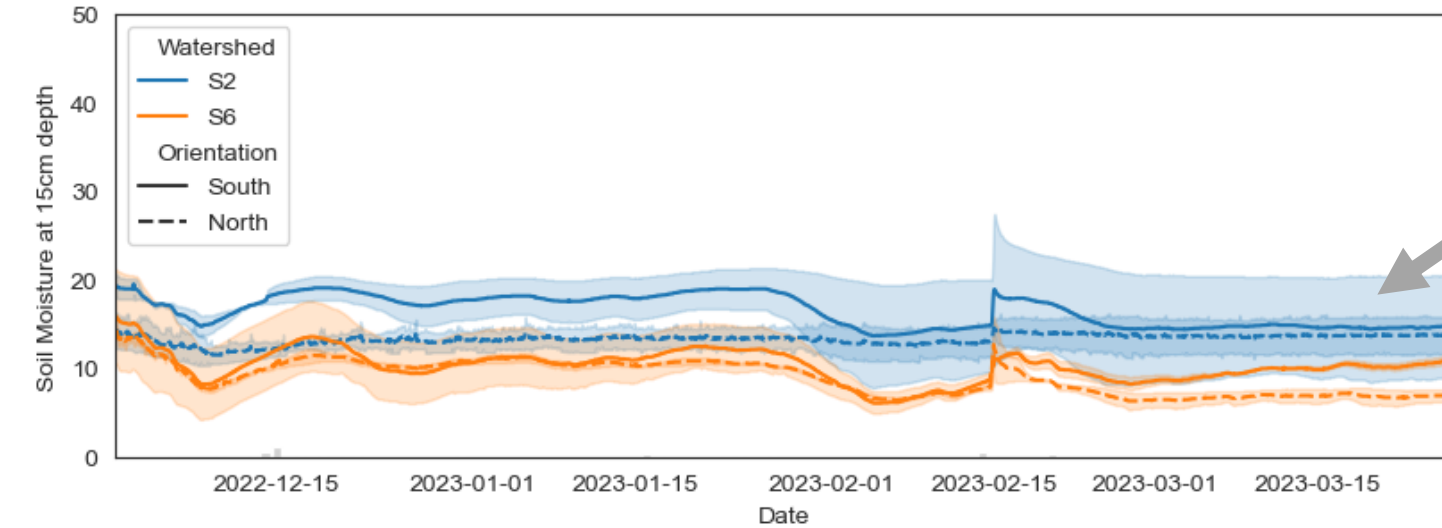
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Deciduous watershed has higher soil moisture



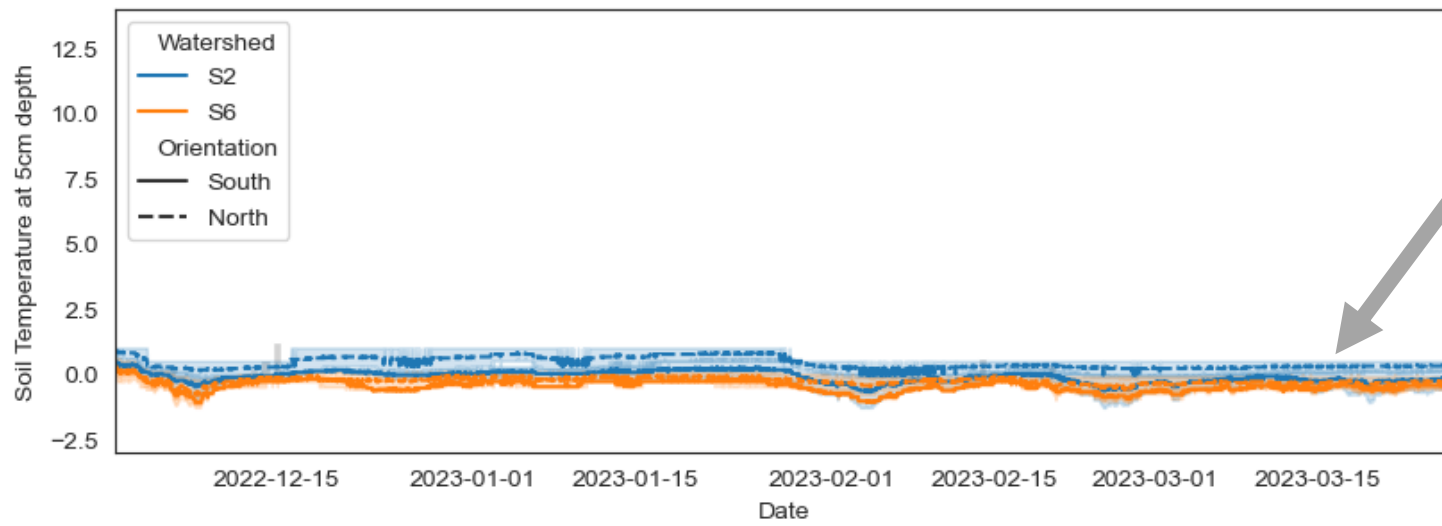
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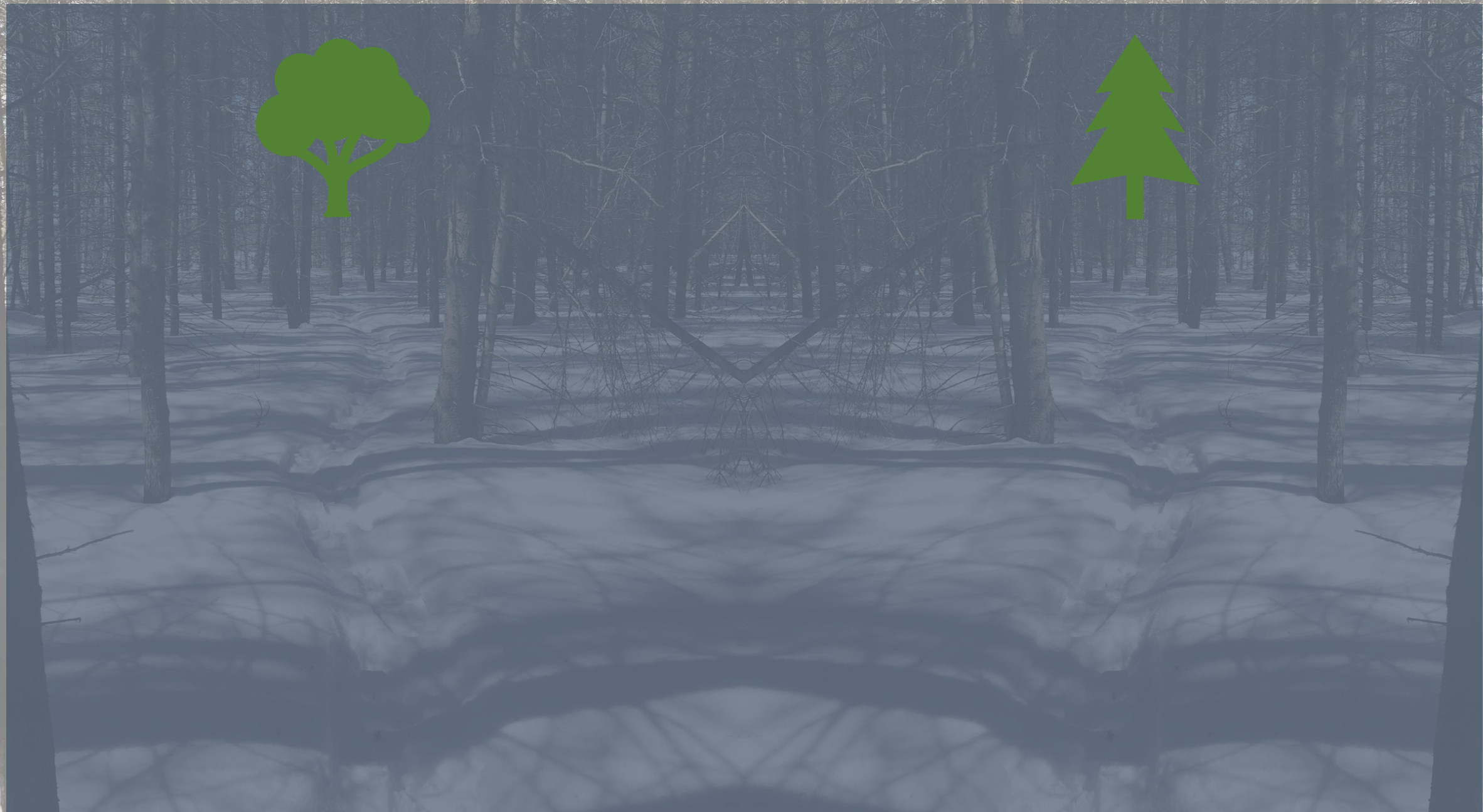


Deciduous watershed has higher soil moisture

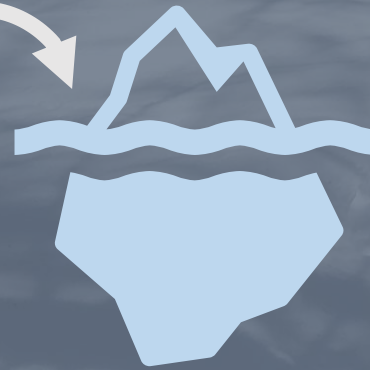


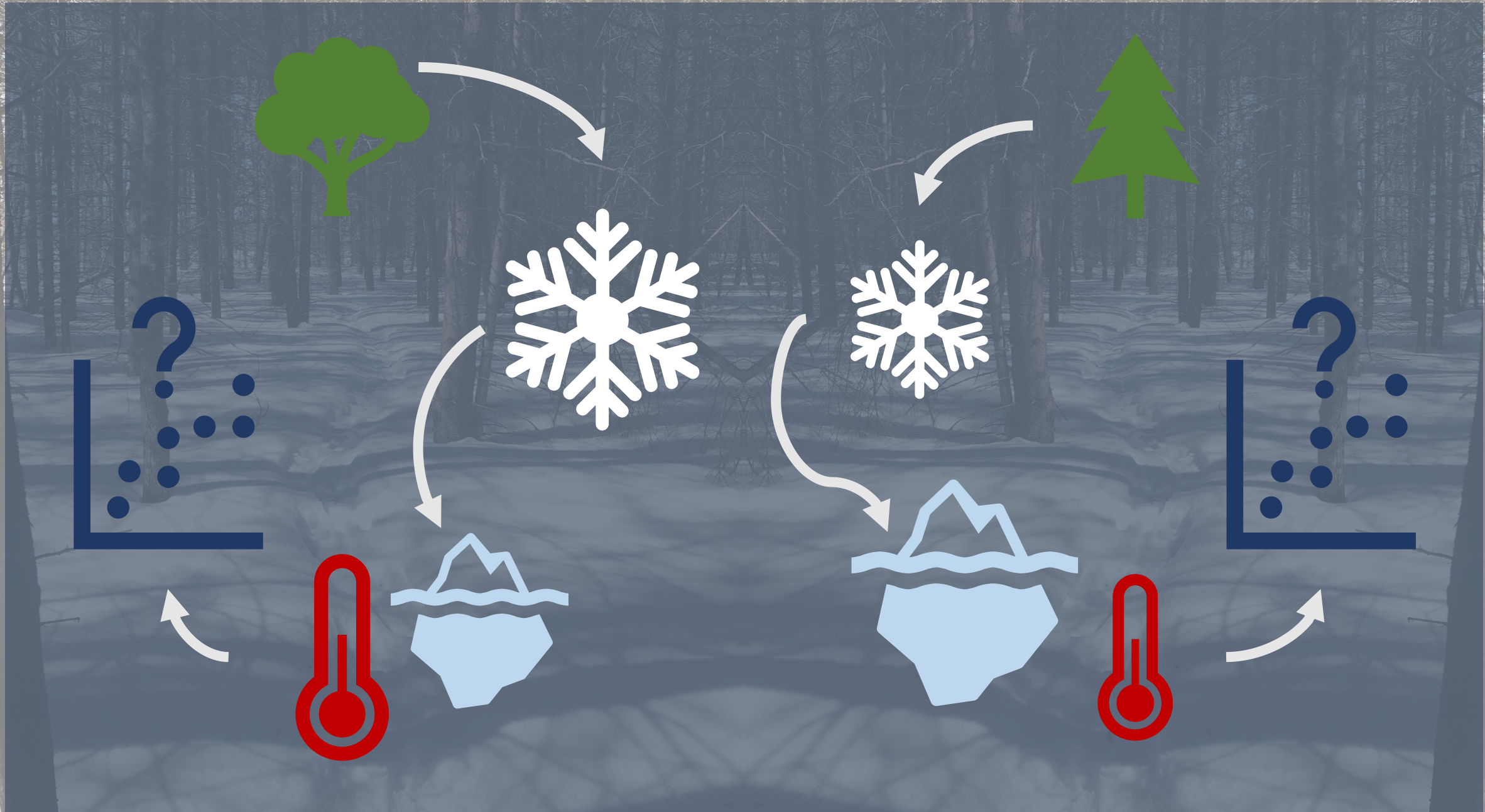
and higher soil temperature

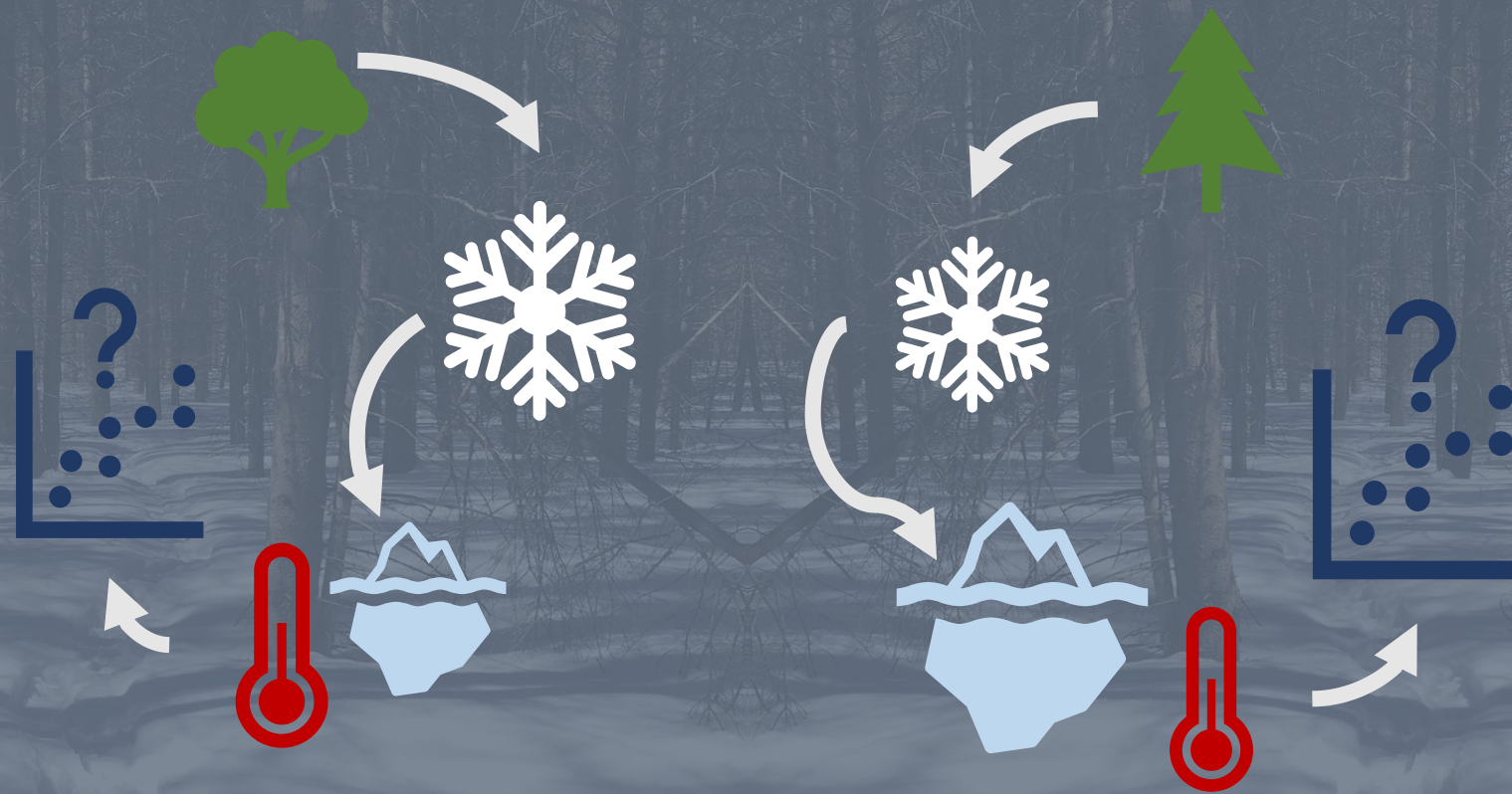












Questions and queries?
Mariel Jones
jone3247@umn.edu

