

Above and belowground carbon stocks in a Northeast Siberian tundra ecosystem: a comparison between disturbed and undisturbed sites

L. Weber¹, H. Pena², S. Curasi³, E. Ramos², H. Alexander², M. Lorañty³, S. Natali⁴

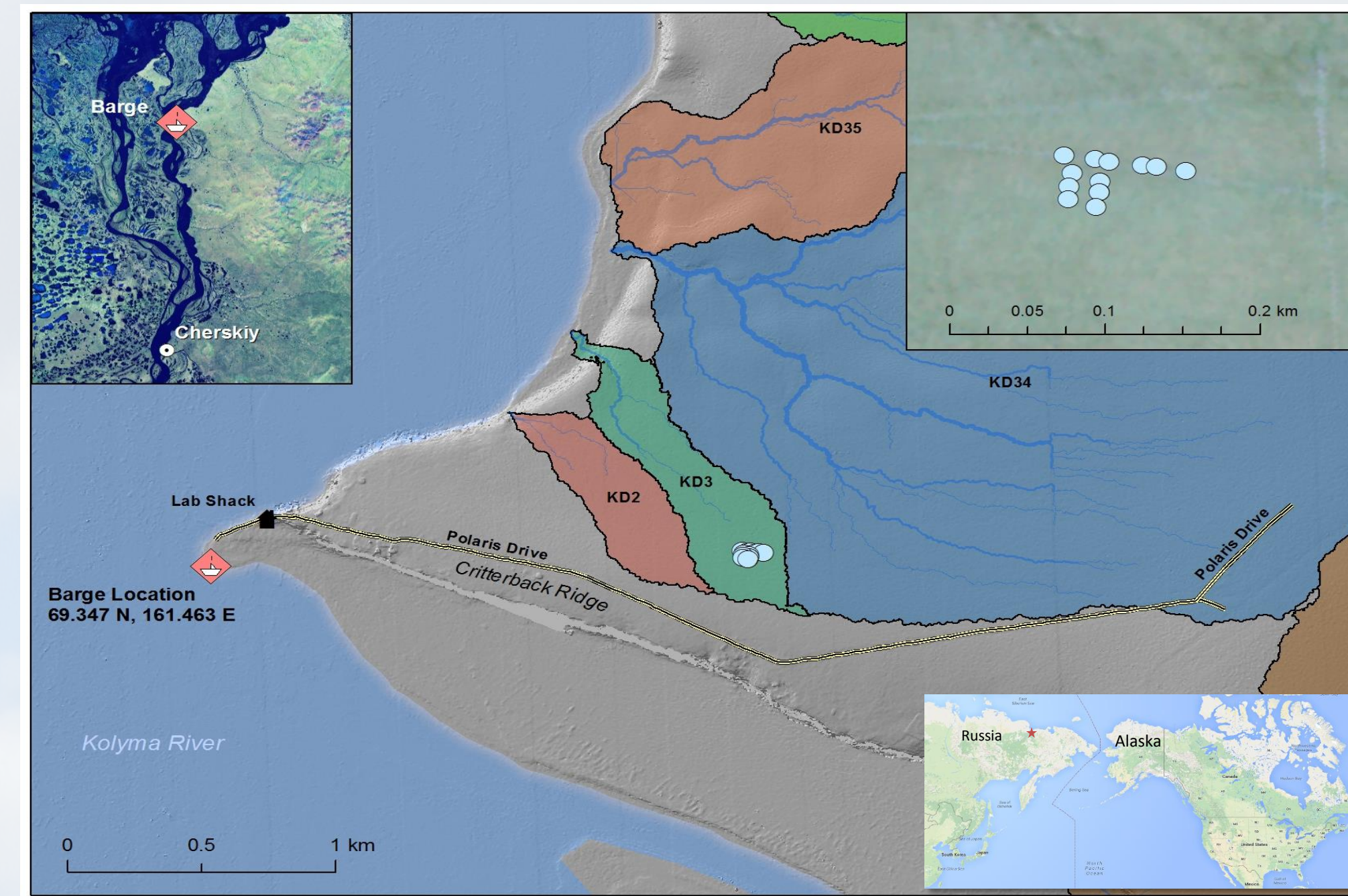
¹University of Puerto Rico - Rio Piedras Campus, ²University of Texas at Brownsville, ³Colgate University, ⁴Woods Hole Research Center

Background

- Human activities in the Arctic are increasing. These activities, which include infrastructure and road development, may alter vegetation communities and carbon (C) storage.
- Human development impacts will occur against a backdrop of climate change driven shifts in plant composition, productivity and permafrost thaw.
- Changes in the plant community have the potential to alter regional C budget through changes in biomass and through vegetation impacts on permafrost thaw.
- We examined long-term impacts of human disturbance on plant and soil C pools along a 50+ year old recovering road in NE Siberian tundra.**



Study Area



Siberian Tundra



Conclusions & Upcoming Work



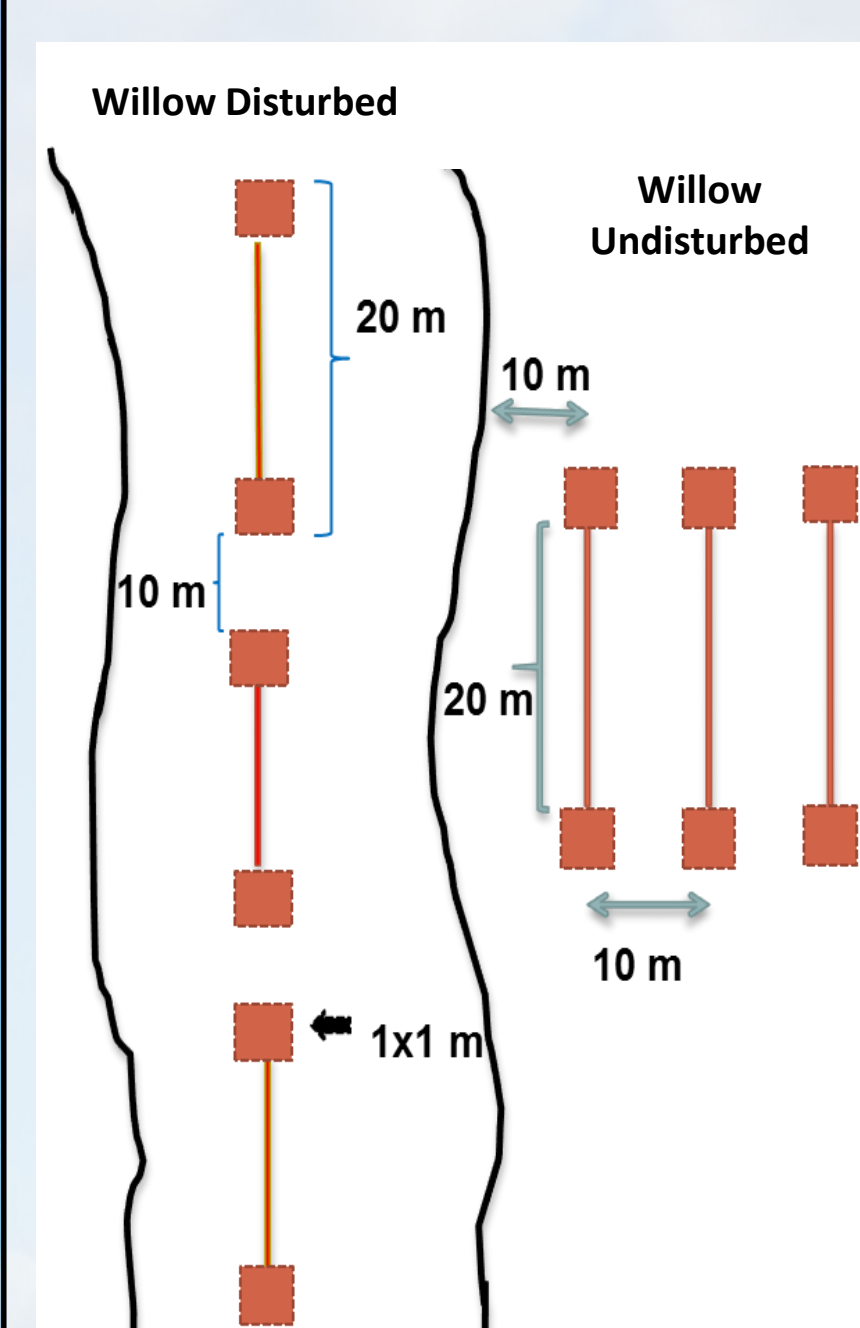
- Disturbance impacts were long term. We observed differences in plant community and biomass distribution decades after recovery was initiated.
- Disturbance effects on belowground biomass and root distribution may have been driven by changes in resource availability, ground thaw, or plant composition.
- These changes in plant composition can impact permafrost vulnerability through changes in soil organic layer depth and ecosystem energy balance.
- Future effort will focus on expanding root sampling protocol to separate dead/live roots and coarse/fine, and on examining changes in soil carbon and nutrient pools.

Questions

- How do anthropogenic soil disturbances affect distribution of vegetation functional type in Arctic tundra?
- What are the relationships between aboveground and belowground biomass and underlying permafrost soil conditions?



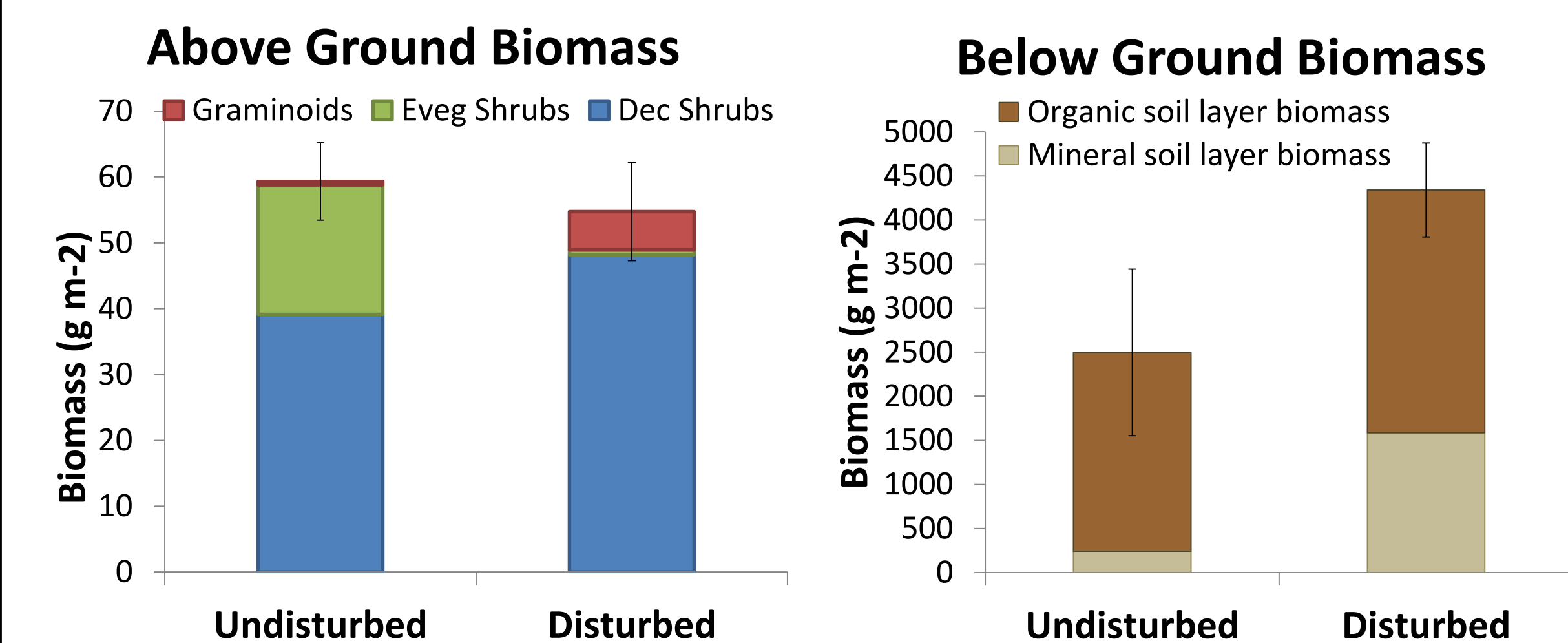
Methods



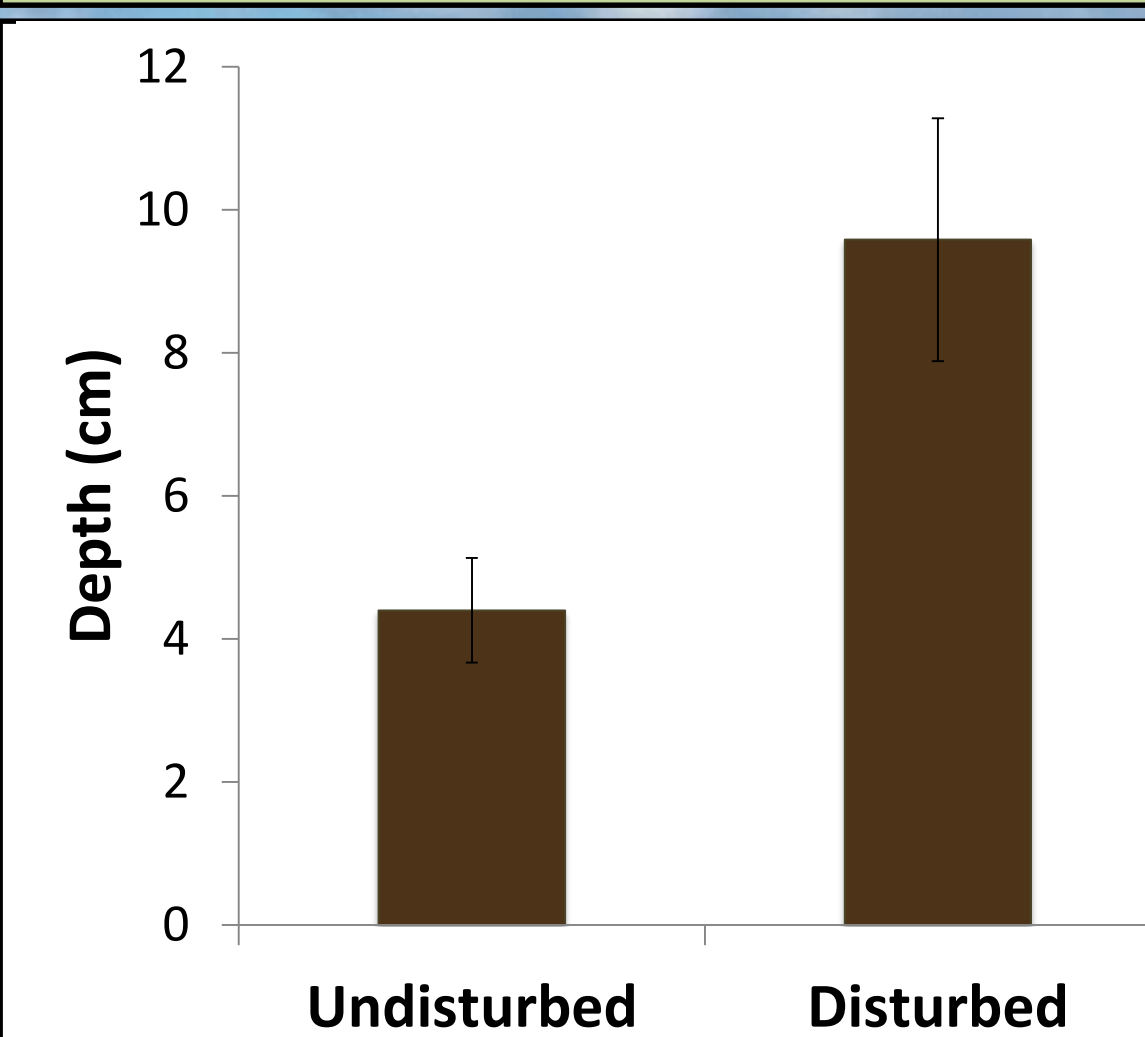
- Six 1-m² plots were established in disturbed and undisturbed areas.
- Aboveground biomass was harvested, classified, and weighed.
- Belowground biomass was collected to ~30cm depth and separated by soil layer.
- Soil organic layer depth (SOL) and thaw depth (TD) were measured along the three 20m long transects in disturbed and undisturbed areas.



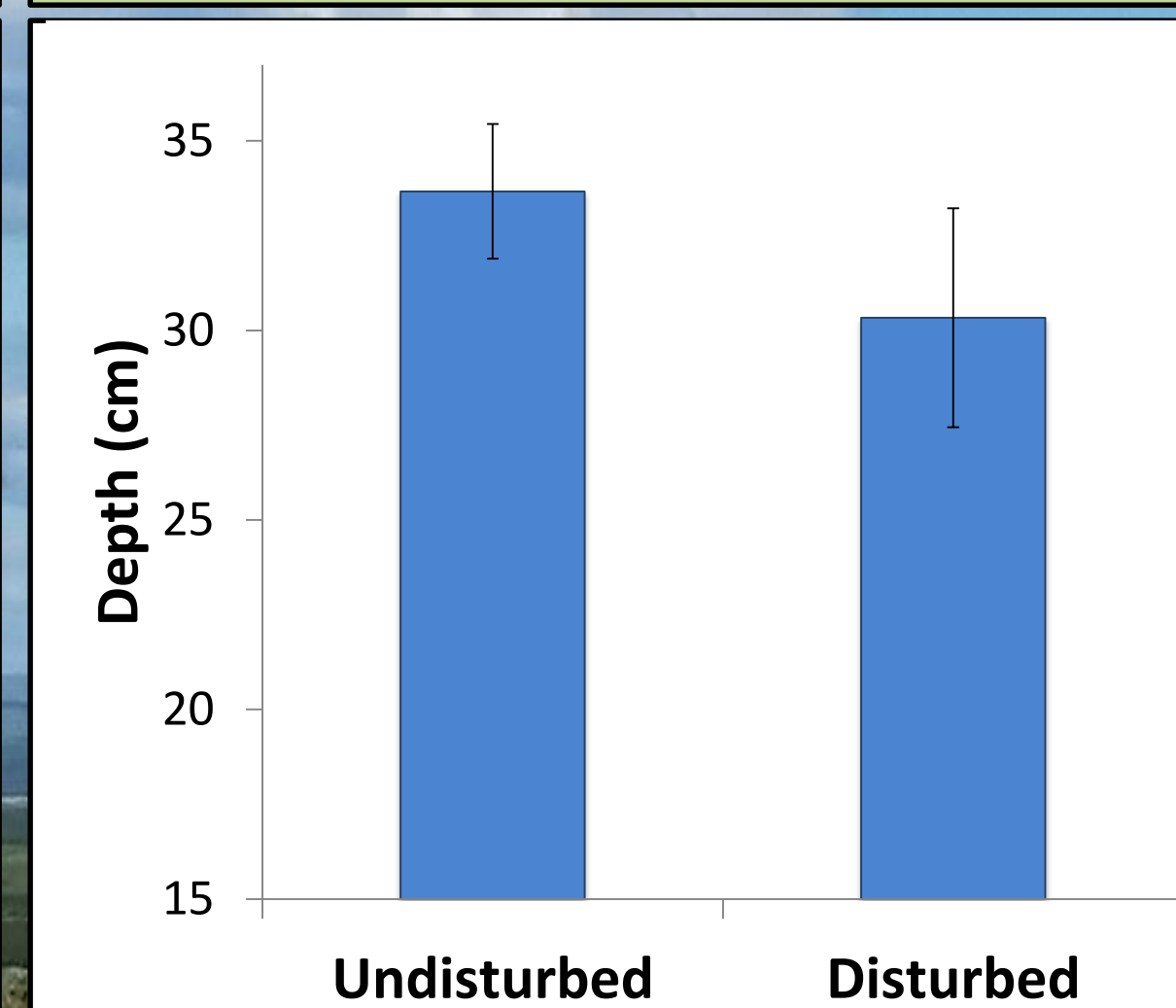
Plant Biomass



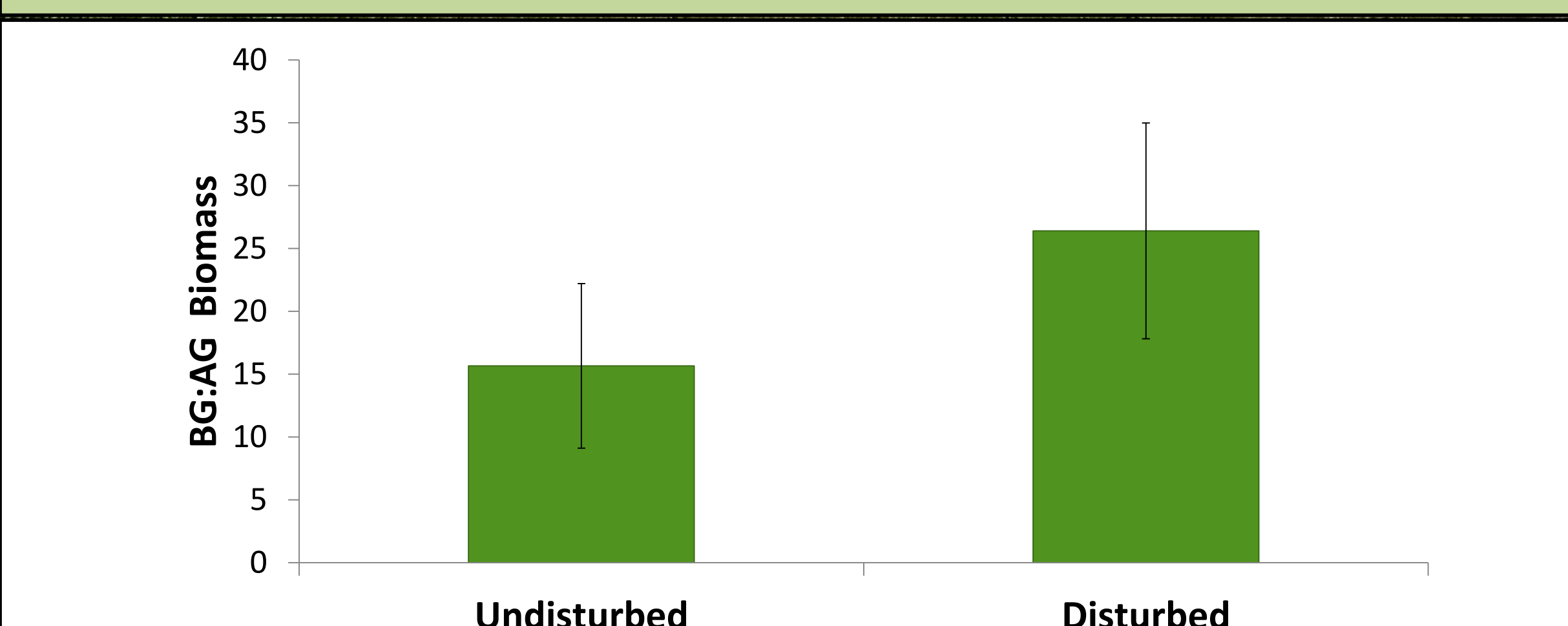
Organic Layer Depth



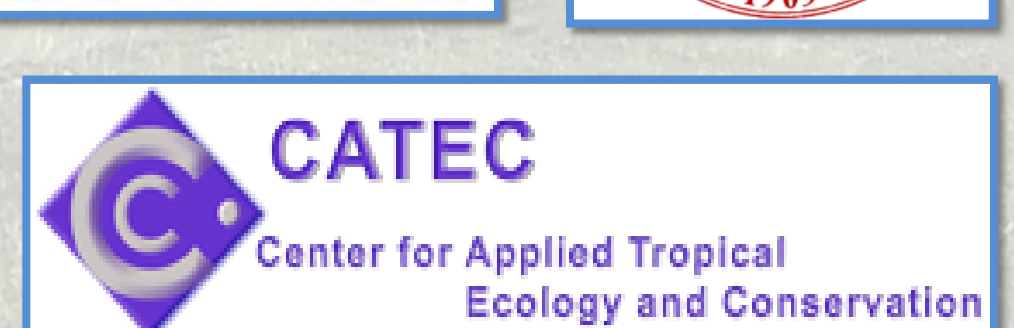
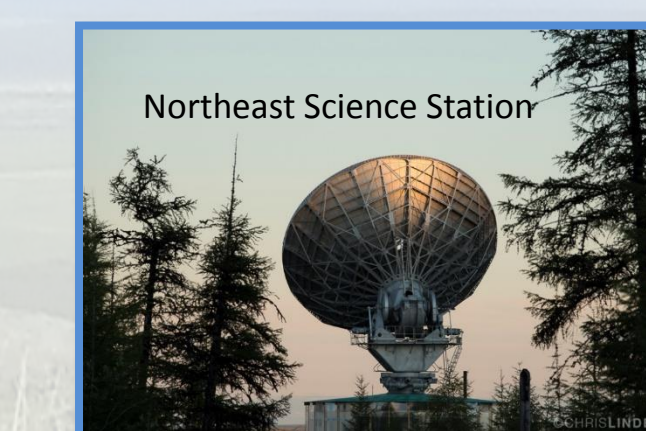
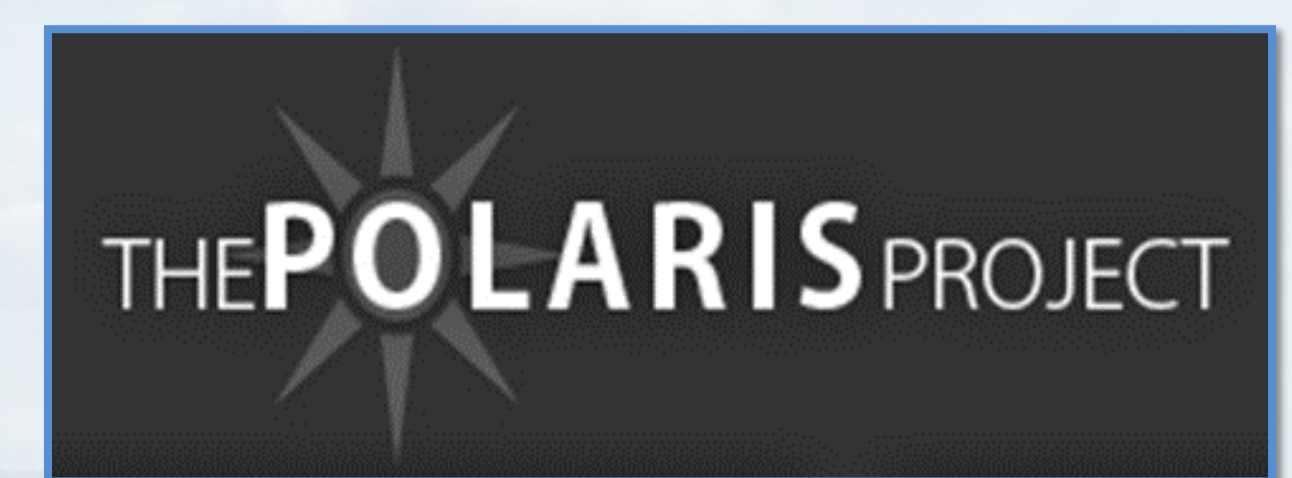
Thaw Depth



Belowground(BG):Aboveground(AG) Biomass



Acknowledgements



- This project was supported by The Polaris Project and NSF grants (OPP-1304040, OPP-1044610). Thanks to Dr. John Schade, Dr. Elvira Cuevas, Chris Linder (photographs), Greg Fiske (maps) and the 2014 Polaris team.