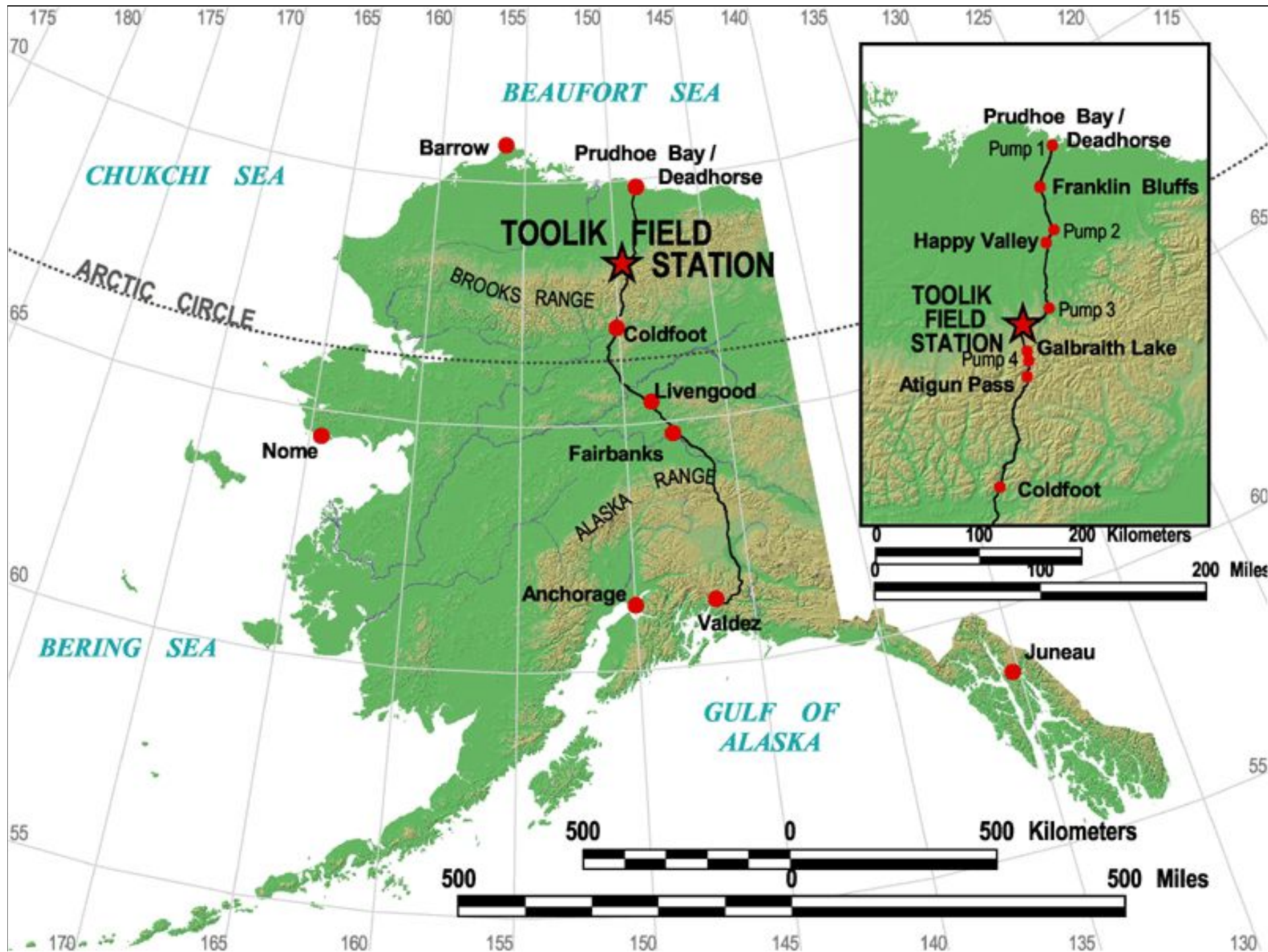


Ecological Monitoring at Toolik Field Station: Lessons Learned and Challenges Ahead

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Toolik Field Station

<http://toolik.alaska.edu/>

- Managed by University of Alaska Fairbanks
- Many institutions use as base for field work
- Most funding from U.S. federal agencies
 - National Science Foundation (NSF)
 - Department of Energy (DOE)
 - National Aeronautics and Space Administration (NASA)

Monitoring Programs

- Funded through specialized solicitations
- NSF Programs
 - LTER (Long-Term Ecological Research)
 - AON (Arctic Observing Network)
 - NEON (National Ecological Observing Network)

Toolik Field Station

- Environmental Data Center
 - Funded as logistics support for NSF research grants based at Toolik
 - Plant phenology (dates)
 - Migratory bird arrival and departure dates
 - Mammal presence/absence
 - Weather

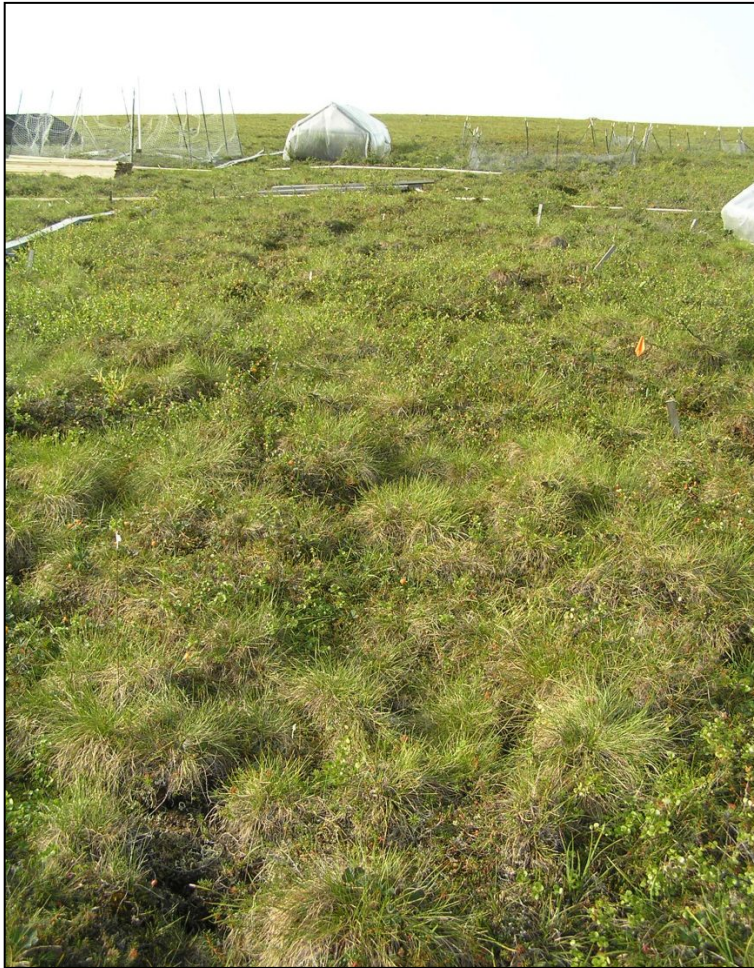
Arctic LTER

- Part of LTER Network
- 6-year funding cycles; up for renewal in 2016
- 5 core areas
- Terrestrial and aquatic
- Long-term experiments
 - Opportunities for data collection
 - Participate in other networks (e.g., ITEX)
 - But need funding in addition to LTER for new efforts



Long-term Nutrient Addition

Moist Acidic Tussock Tundra (MAT)



Control

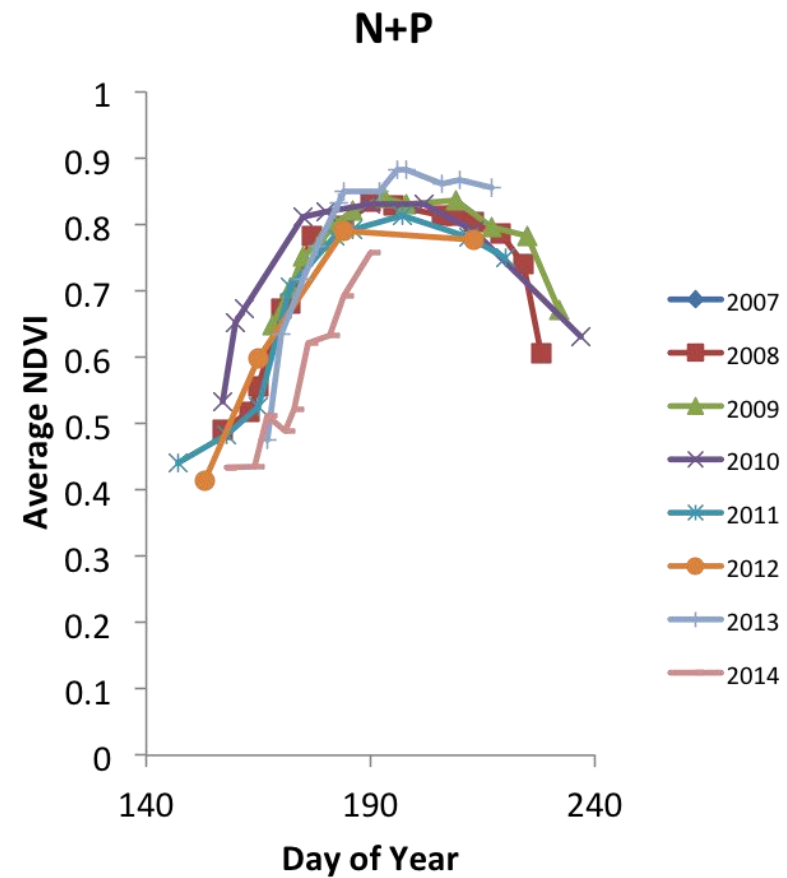
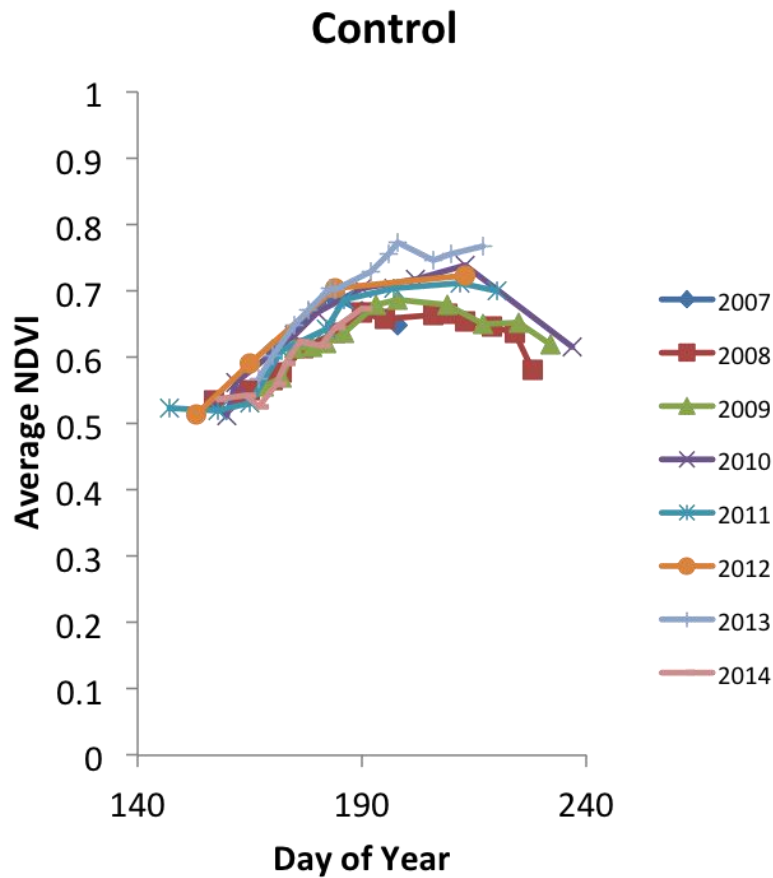


Annual N and P addition

Photos: J. McLaren

Annual NDVI

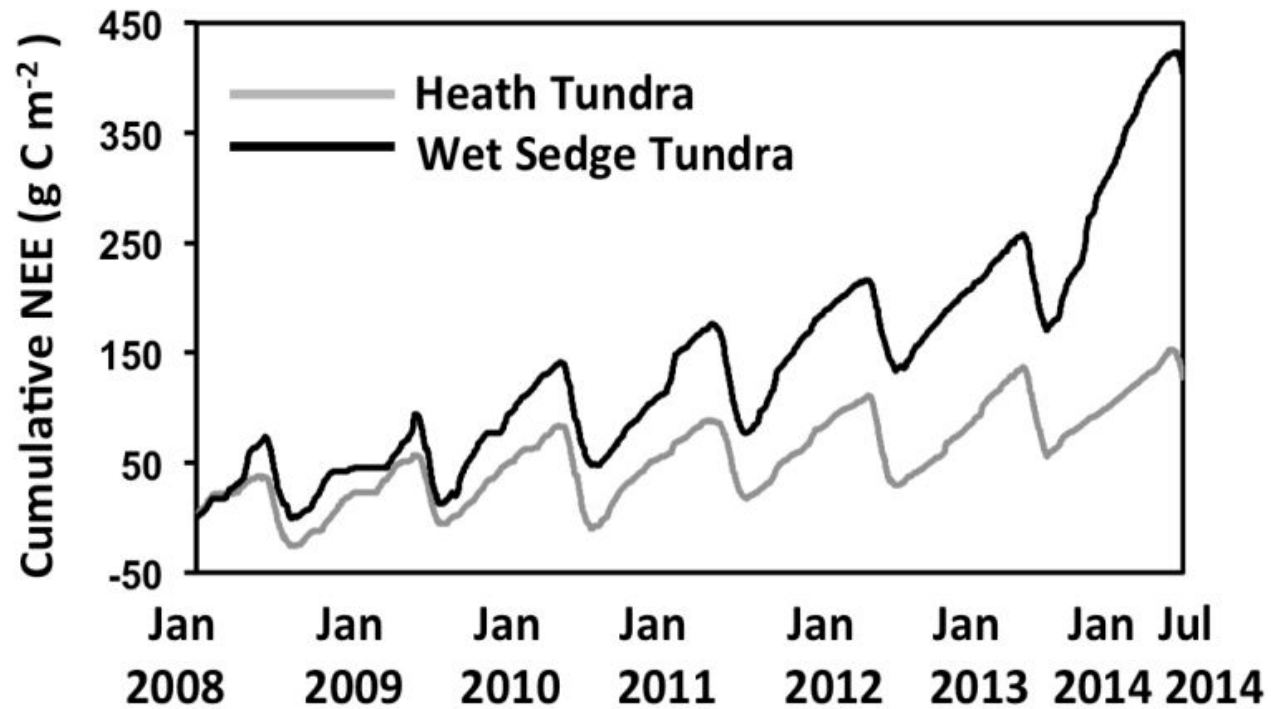
Moist Acidic Tussock (MAT) Tundra



AON

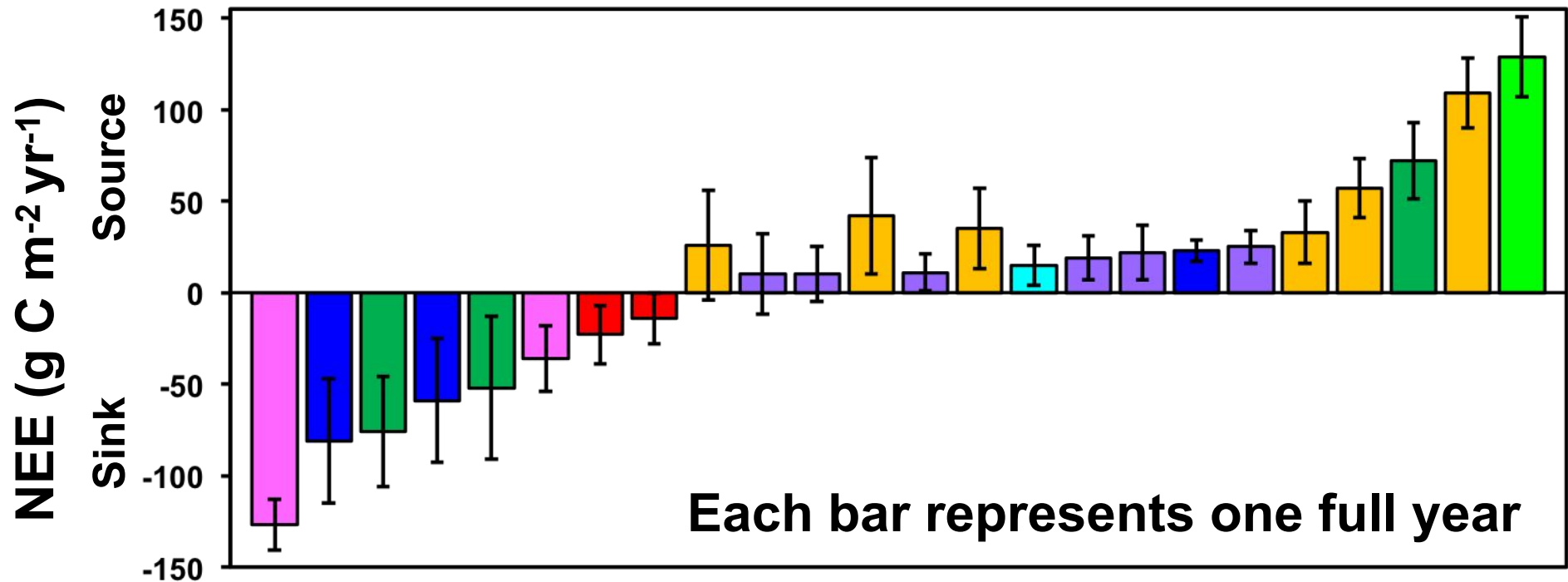
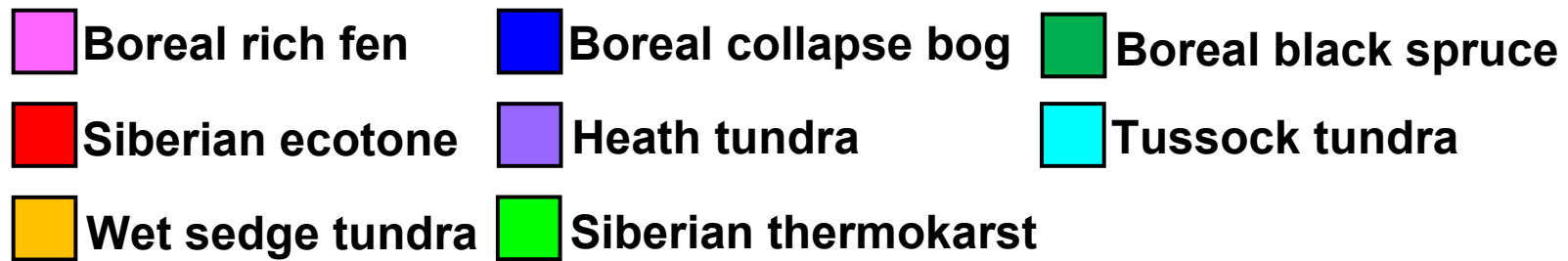
- 3 year funding cycles
- Two projects at Toolik
- Euskirchen, Kling, Bret-Harte and Shaver
 - continue collecting and making available year-round, continuous observations of C, water, and energy exchange in arctic terrestrial and aquatic systems

Cumulative NEE January 2008 – July 2014 (Positive Value = C Release)



*Updated from
Euskirchen et al.,
Ecosphere, 2012*

Variation in NEE across sites and years





The SEARCH Vision: Scientific understanding of arctic environmental change to help society understand and respond to a rapidly changing Arctic.

The SEARCH Mission: To provide a foundation of arctic change science through collaboration with the research community, funding agencies, and other stakeholders. Towards this mission, SEARCH:

- Generates and synthesizes research findings and promotes arctic science and scientific discovery across disciplines and among agencies.
- Identifies emerging issues in arctic environmental change.
- Provides scientific information to arctic stakeholders, policy-makers, and the public to help them understand and respond to arctic environmental change.
- Facilitates research activities across local-to-global scales, with an emphasis on addressing needs of decision-makers.
- Collaborates with national and international science programs integral to SEARCH goals.



- Arctic Biome
 - Toolik Field Station
 - Barrow
- Projected start date: Summer 2015
- Datasets to be collected
 - Plants
 - Birds
 - Bugs
 - Small mammals
 - Weather
 - Carbon flux

Adaptation and Management

- Not factored in to current data collection or planning

Challenges

- Funding (amount and duration)
- Monitoring is not considered groundbreaking science, not funded in usual grant cycle
 - Result is hodgepodge of data collected by collaborators depending on grant goals
 - Aquatic teams do a better job of this than the terrestrial
- Without strong baseline, hard to predict

Acknowledgements



- National Science Foundation
- Gus Shaver, Eugenie Euskirchen, LTER Collaborators