

# North American Arctic Transect

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Presented at the 2008 Arctic Forum, May 13, Washington D.C.

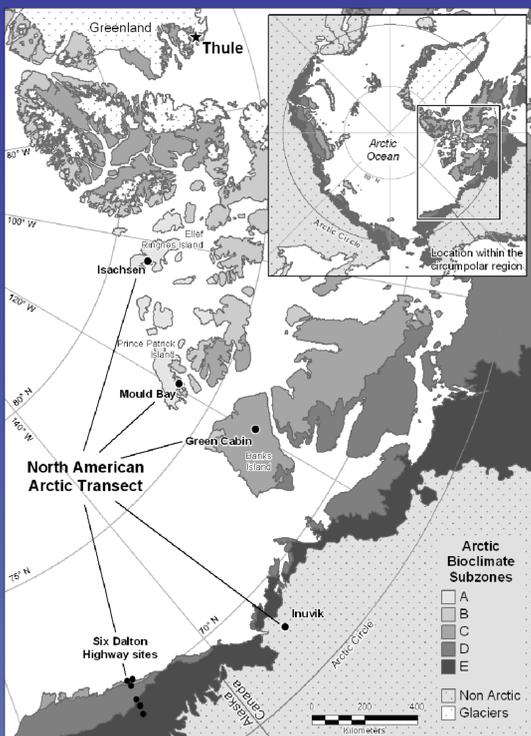


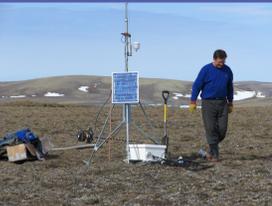
Fig. 1. Location of North American Arctic Transect and Arctic Bioclimate Subzones.



Isachsen



Isachsen



Mould Bay

The broad vision for the network of terrestrial observatories includes both the established flagship observatories and a more widely dispersed network of sites that are currently not represented. It is also important to consider how the terrestrial network is coordinated with the ocean and sea-ice observing networks.

The North American Arctic Transect (Fig. 1, left) was established as part of a Biocomplexity of the Patterned Ground project (<http://naat.geobotany.org/index.html>).

Of particular importance are the locations of Mould Bay and Isachsen in the coldest part of the Canadian Archipelago. These sites are cold because they are in the region of perennial sea ice where summer air temperatures are held close to 0°C all summer. These areas are likely to undergo major changes in climate if the perennial sea ice vanishes.

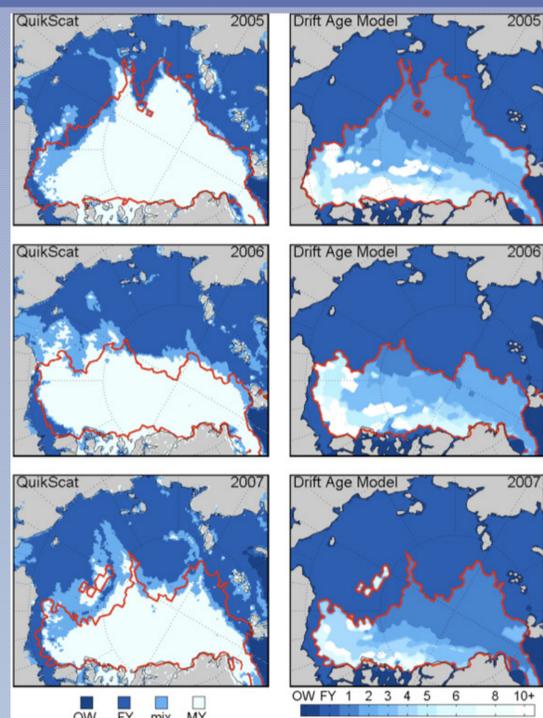


Fig. 2. Observed and modeled sea ice for 2005-2007. OW=Open Water, FY=First Year, MY=Multi-year. Nghiem et al. 2007, *Geophysical Research Letters*, 34:doi:10.1029/2007GL031138

## Lessons from 2007:

- Recognition that Subzone A is in the region of heaviest multiyear ice along the western Canadian Archipelago, N. Svalbard and Arctic Russian Islands.
- If summer arctic ice vanishes, so does Subzone A.
- **Isachsen and Mould Bay are in the region of the likely last perennial multi-year ice in the Arctic.**
- **Subzone A is a rare and endangered bioclimate subzone!**

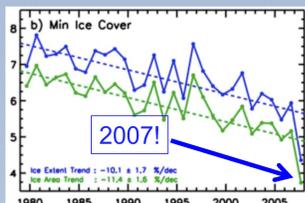


Fig. 3. Trends in sea ice. Comiso et al. 2008, *Geophysical Research Letters*, 35:L01703.

## Subzone A is characterized by:

- Located within the perennial sea ice
- Very cold summers  
Mean July temperature <3°C
- Extremely small vascular-plant flora  
~60 species for the entire subzone, but rich cryptogamic flora
- No sedges, woody plants, or peat deposits
- Dominance of rushes, grasses and a few small hardy forbs



Isachsen

## Reasons to Establish Research Sites at Isachsen and Mould Bay Soon:

- Subzone A is a rare and endangered bioclimate subzone that may vanish if the perennial sea ice is eliminated.
- Subzone A is a unique bioclimate subzone, recognized by Russian geobotanists as a separate Bioclimate Zone.
- Sites could serve for sea-ice, oceanographic, and snow studies and could be linked to a truly integrated examination of the ocean-land observations.
- These are the only zonal research sites in Subzones A and B with good logistics for long term studies in North America.



Barren landscapes

Massive ground ice



Small non-sorted polygons and research grid

Vegetation in troughs of non-sorted polygons

## Existing Logistic Resources at Isachsen and Mould Bay Sites:

- Long term climate record at both sites dates back to the 1940s
- Runways for air transport of personnel, equipment, and supplies at both sites
- There are camp facilities for long term stays at both sites
- Foundation of observations for future studies from our Biocomplexity studies
  - Plant community information
  - Map of snow depth
  - Active layer depth
  - Climate stations with air and ground temperatures (to 2-m depth) and soil moisture
  - Plant biomass
  - Invertebrate populations
  - Nitrogen mineralization
  - Ground measurements of NDVI and LAI
- Information is summarized in detailed data reports ([http://www.geobotany.uaf.edu/library/reports/#bc\\_reports](http://www.geobotany.uaf.edu/library/reports/#bc_reports))



Biocomplexity research grid

Tent camp



Mothballed camp

Landing strip

## Conclusions:

- Critical need for baseline studies in Subzone A and B (Isachsen and Mould Bay)
- Will require close coordination with Canadians (Arctic Net) and inclusion of other terrestrial monitoring programs, including CBMP, CALM, TSP and flagship observatories (Toolik, Barrow, Zachenburg, etc.), as well as ocean and sea ice studies
- Step in developing standardized protocols at a network of sites for a coordinated **Circumpolar Terrestrial Ecosystem Baseline** along the complete arctic bioclimate gradient

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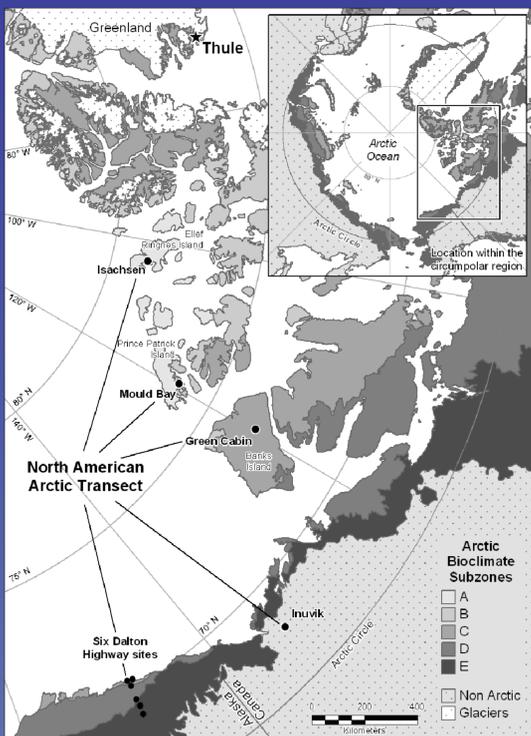


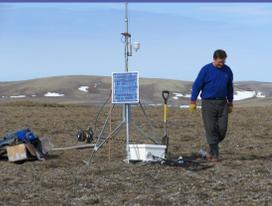
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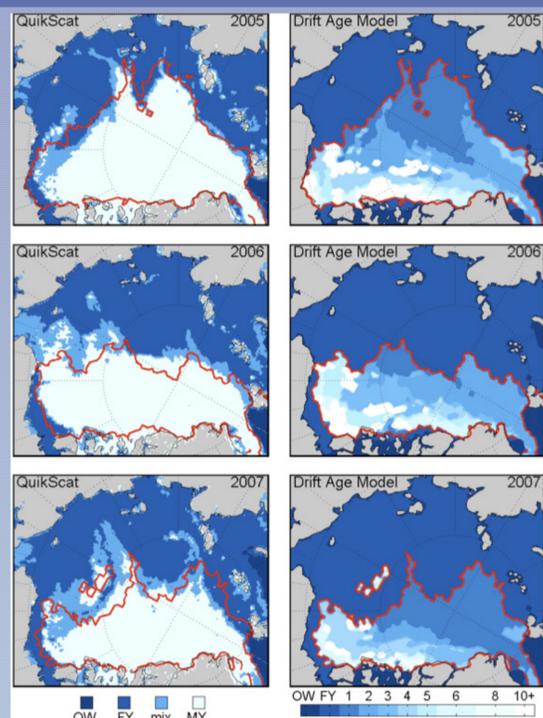


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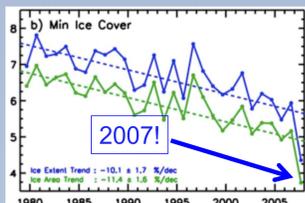


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