Observed Climate Change in Northern Alaska

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Alaska’s Arctic: Features of the Region

- Beaufort Sea
- Chukchi Sea
- Canada Basin
- Siberian Shelf
- Beaufort High
- Beaufort Gyre
- Beaufort Shelf
Alaska’s Arctic: Features of the Region

Beaufort High
Beaufort Gyre

Calm: <2%
Speed: 5 m/s

Prevailing winds
Alaska’s Arctic: Features of the Region

\[
\begin{align*}
T &= -12^\circ C \\
P &= 10 \text{ cm} \\
S &= 86 \text{ cm} \\
\text{Snowcover} &\quad \text{Sept - June}
\end{align*}
\]
Alaska’s Arctic: Features of the Region

Comparison to rest of Alaska

Annual Precipitation

(in)

www.prism.oregonstate.edu

(PRISM Data © OSU Spatial Climate Analysis Service, The Climate Source, Inc.)
Alaska’s Arctic: Features of the Region

Comparison to rest of Alaska

July Monthly Mean Temperature

Summer thermal gradient

www.prism.oregonstate.edu

(PRISM Data © OSU Spatial Climate Analysis Service, The Climate Source, Inc.)
Alaska’s Arctic: Features of the Region

Meteorological observing stations
Lack of spatial detail!!
- inland
- high elevation
Alaska’s Arctic: Features of the Region

Data Problems  anemometer icing

Hourly Wind Speed (m/s) at Petty Pingo (1 Jan - 20 Feb, 2002)
Alaska’s Arctic: Features of the Region

Data Problems  measuring precipitation accurately

US NWS 8" non-recording gauge
Photo by S. Berezovskaya (UAF)

Double Fence Intercomparison Reference (DFIR)
Photo by D. Yang (UAF)
Alaska’s Arctic: Changes in the Region

Mean Annual Temperature (°C)

Stations
- Barter Island
- Barrow
- Kuparuk
- Coleville Village
- Prudhoe Bay
- Umiat
- Deadhorse
Surface air temperature change: 1954 - 2003
annual - °C

Walsh and Chapman
http://arctic.atmos.uiuc.edu/
Geographical and Meteorological Background

Alaska's Arctic: Changes in the Region

winter

spring

summer

autumn

Walsh and Chapman

http://arctic.atmos.uiuc.edu/
Growing season increase

Alaska’s Arctic: Changes in the Region

Graphs showing the length of the growing season at Barrow over time.
Alaska’s Arctic: Changes in the Region

Sea ice decrease

Beaufort Sea
Alaska’s Arctic: Changes in the Region

Wildfire increase

Total Tundra Fire Area (Acres) Burned North of 68 deg. North Lat 1956-2007*

Thousands of Acres

Alaska Fire Service
http://fire.ak.blm.gov/content/aicc/stats/2007stats.pdf
Anaktuvuk Fire Statistics

- tundra
- limited protection
- 40% of total area
- > 200,000 acres
- > all historical fires north of 68°
Alaska’s Arctic: Upcoming products

>> New PRISM data (1971 - 2000)

>> Environmental data for the Arctic Network parks

>> New plant hardiness maps (USDA)

Climate Change in Northern Alaska

• **Temperature Increase**: Warming most pronounced in winter and spring

• **GGD increase**, lengthening of growing season

• **Precipitation decrease** seen in observations

• **Sea ice extent decrease**

• **Wildfire increase**