Community-Based Observations of Environmental Change Across Arctic Alaska coasts

Donna Hauser (UAF)
Robert Schaeffer (Kotzebue)
Billy Adams (Utqiaġvik)
Rick Thoman (UAF)
Elena Sparrow (UAF)
Roberta Tuurraq Glenn (UAF)
ALASKA ARCTIC OBSERVATORY AND KNOWLEDGE HUB

COMMUNITY-BASED OBSERVING TO PROVIDE SUSTAINED, LONG-TERM MONITORING OF COASTAL ARCTIC ALASKA

SCIENCE LEAD: DR. DONNA HAUSER

Wainwright 1/30/20
Steven Patkotak

Utqiaġvik 1/16/20
Billy Adams

Kotzebue 11/5/19

Point Hope 10/19/19
Guy Omnik

Utqiaġvik 4/14/19
Billy Adams

Kaktovik 10/10/19
Carla SimsKayotuk

Wainwright 1/15/20
Steven Patkotak
PRESENTATION OVERVIEW

- **Introduction to AAOKH:** Donna Hauser (AAOKH Science Lead & UAF Marine Biologist)
- **Observations from Kotzebue:** Bobby Schaeffer (AAOKH Kotzebue Observer)
- **Observations from Utqiagvik:** Billy Adams (AAOKH Utqiagvik Observer)
- **Ice, ocean, & temperature:** Rick Thoman (UAF Climatologist)
- **Education & outreach:** Elena Bautista Sparrow (AAOKH Education Lead & UAF Soil Scientist)
- **Example project - erosion monitoring in Wainwright:** Roberta Glenn (UAF Geoscience Graduate Student)
Billy Adams discusses ice conditions in Utqiagvik, April 2018

Photo: D. Hauser
“The high temperature today was 35 degrees. A friend...drilled a hole. He said [the ice] was less than a foot thick.”
Vince Schaeffer takes a CTD cast to measure ocean temperature, salinity, and productivity on 4/5/19.

Water temperature ~15 degrees warmer than July 31, 2018.

No cool water near the sea floor.
Special projects: Ocean and ice measurements

In 2001, the late Warren Matumeak hand drew the first known maps of Utqiagvik’s spring ice trails used for bowhead whaling. He worked with Craig George (North Slope Borough) to map those trails. UAF scientists have mapped and measured the trails since 2008. AAOKH has continued to support these efforts since 2017.
Also a forum for collaboration &
information exchange
Also a forum for collaboration & information exchange
How do we gather observations?

Guy Omnik, Point Hope
1/30/20: "-19 F, north 15-20mph. Clear skies 10 mile visibility. North side [ice] almost 2 feet thick. South side thicker in most places because more ice layer build up"
We gratefully acknowledge several partnering organizations that continue to support various projects and components of AAOKH.

AAOKH is coordinated by the International Arctic Research Center at University of Alaska Fairbanks. Funding for AAOKH results from Community Service Payments made by a corporate defendant convicted of federal environmental and maritime crimes.
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• Why are you interested in AAOKH?

• What environmental changes have you observed in the Kotzebue Sound region?

• Are there impacts to you or your community?

Photo: Sarah Betcher Farthest North Films
Winter 2019: storms, thin ice, open water

Mar 16: “total of 20 storms in February. Unheard of. High temp today was 35 degrees. A friend said the ice was less than a foot thick. Too much snow, warm temperatures, & overflow under the fresh snow will cause the strong currents to eat away at the already thin ice.”

Photo: Bobby Schaeffer
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Video: Bobby Schaeffer
Early spring break-up and bearded seal hunting*
May 13: start of ugruk hunting. Elders remember May 28 as earliest hunt, usually starts first 2 weeks of June

*learn more at the Ikaagvik Sikukun presentation today at 3:30 pm, room Tikhatnu C
Summer: warm ocean, impacts to seals and seabirds

July 19: “Since we had a hot June and parts of July, the waters warmed up not only up the rivers, but in the Kotzebue Sound as well. The waters got too warm in the ocean so the crab split to deeper colder waters in mid July. This was a first. The CTD [ocean measurement] measured 64 degrees with very little salinity. Crazy!”
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Fall warmth and late freeze-up
Sept 7: “My sister's birthday. We all remember that we would go skating back in the day. She mentioned it and we got a kick out of it as the temperature was 61 degrees.”

Nov 20: “Locals are ice fishing where it is safe to do so. Still avoiding channels and long distances on the ice due to warm temperatures.”
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Nov 20: “Locals are ice fishing where it is safe to do so. Still avoiding channels and long distances on the ice due to warm temperatures.”
Jan 29: “The ice continues to thicken as cold temperatures continue. The channel ice was 39.25 inches today. I took a ride...East of Cape Blossom and the new ice was 36 inches constant. No new snow. The constant wind has blown the tundra clear of snow. There are a lot of snow drifts on the ice with glare ice between them. Makes for rough riding on our trails.”
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Spring whaling in wide lead, strong currents
April 25-29: “high winds and waves have eroded the ice edge about 20 ft. Currents were at least 5 mph!”

Photo: Billy Adams
Changing timing of wildlife
June 9: “Walruses were seen on large floes of ice [earliest date of memory]. So we decided to take our small boats over the ice with snowmachines and 4 wheelers.”
Warm, wet, windy summer, contributing to flooding & beach erosion
Aug 19: “It has been a warm wet 2 weeks on the north slope. It got very windy and flooded the main road between Barrow and Browerville. People have been talking about erosion and how much more faster it is eroding in this present time as compared to the 1980’s. More open water, bigger waves, much more warm temperatures, and wet windy weather”
Aug 28: “Even with fairly light winds, waves are pulled to the shore and continue to erode the beach. We continue to look for ways to protect historic areas but looks like this method is not a good one.”
Sept-Nov whaling: large waves, late freeze-up, lack of whales
Oct 1: "temperature 41F. It has rained so much that the roads are falling apart and we may have broken a temperature record. People are still camping inland by boat when we should be on our snowmachines by last week. The bowhead whales are not close to Barrow yet either."
Oct 8: “The waves are bigger than normal and no bowheads in big numbers yet. The whalers have been trying since the 21st of September.”
Nov 16: Bowhead landed
Nov 18: “Shorter daylight and heavy slush is making whaling harder”

Photos: Billy Adams
KAKTOVIK
OBSERVER: CARLA SIMSKAYOTUK

**Erosion** Oct. 2: “One section of the snow fence collapsed (this winter) due to erosion of the ground...At the other end...the fence looks like it was placed in the water. Over the past 3 or so years the water level has gotten high and eroded the sand beach and ground there. We used to be able to drive or walk that area but the water is so high we can not and it has pretty much become an island of its own.”

Photos: Carla SimsKayotuk

**Oct. 28: Prolonged polar bear presence.**
"Bears, bears, bears"

Photos: Carla SimsKayotuk

**Nov. 7: Unusual wildlife timing**

**Nov. 11: Late fall freeze-up**

Photo: P. Sittichinli
WAINWRIGHT
OBSERVER: STEVEN PATKOTAK

Warm, wet, windy summer-fall - affecting boating, barge re-supply
July 31: Water temperature ~42°F and ~15 degrees warmer than 2018
Aug 1: “Bad weather. Rain. Wind driven big surf larger than regular coastal ice years.”

Oct-Nov: Late fall freeze-up of ocean, warm weather, & strong swell
Nov 25: getting “early fall weather in Nov. Snowing and slush on ocean”

Photos: Steven Patkotak
Autumn: Late river and sea freeze-up. Wet, warm weather Oct 4: “40°. Rain all night and morning. Here's a picture from 2011 on today's date. I had my net under the ice. Look like the ice was almost 4 inches. From that date till now freeze up is later and later.”

November storm and open water Nov 26: “Strong winds last night winds gust to 60+. Old buildings blowing away, peoples roofing blew off last night. South side beach filled with slush”
2019 Themes Across the AAOKH Network

- **Winter-spring**: early break-up, shifts in hunting season
- **Summer**: warm, windy and rainy, warm ocean, shoreline erosion and flooding, impacts to timing/distribution/health of marine wildlife
- **Fall**: warm and wet, late freeze-up, warm ocean, shoreline erosion, prolonged whaling
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2019 Ice and Ocean Review

Rick Thoman
ACCAP
Summer 2019 Ice Season

- Chukchi Sea: very early melt out of ice
  - Kotzebue Sound open before Memorial Day
- Beaufort Sea opened early
  - Much less ice than 2018
- Early August-early October: no ice within 100 miles of Alaska
CHUKCHI SEA DAILY ICE EXTENT
1979 TO 2019

Sea Ice Extent (Percent of Basin)

Data source: NSIDC Sea Ice Index, Version 3
CHUKCHI OPEN WATER DURATION

Chukchi Sea, 1979-2019
Days per Year ≥50% Open Water

Data source: NSIDC Sea Ice Index, Version 3
BEAUFORT SEA DAILY ICE EXTENT
1979 TO 2019

Data source: NSIDC Sea Ice Index, Version 3
2019 OCEAN SURFACE TEMPERATURES

Average Sea Surface Temperature Departure from Normal

May 2019
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ALASKA ARCTIC OBSERVATORY AND KNOWLEDGE HUB

EDUCATION AND OUTREACH

EO Lead: Dr. Elena Bautista Sparrow

Research Coordinator: Josh Jones

Goals

- Engage students in learning science by doing science
- Engage students in understanding their changing environment
Alaska Arctic Observatory and Knowledge Hub

Education and Outreach Activities

Cloud Observations:
- type
- height
- % cloud cover
Sea Ice Field Day for Utqiagvik Middle School Students
Alaska Arctic Observatory and Knowledge Hub

Education and Outreach Activities

Arctic Marine Food Web game

- ice dependencies of some species,
- effects of human caused events and actions on the ecosystem
Education and Outreach Activities

- Flying Kites with sensors
- Ice observations
- Landscape observations
- Weather Parameters
Alaska Arctic Observatory and Knowledge Hub

Education and Outreach Collaborators

Arctic & Earth STEM Integrating GLOBE & NASA

UIC Science

The GLOBE Program

AEROKATS & ROVER Education Network

AAOKH
First Grade students from Venetie who have been observing the depth of soil freezing

https://www.youtube.com/watch?reload=9&v=uu-_K_S4IOA
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Documenting Coastal Change: A Grad Project by Roberta Tuurraq Glenn

- Iñupiaq from Utqiagvik, AK
- M.S. Geography student
- Coastal change & community-based monitoring
- Bristol Bay & North Slope
Documenting Coastal Change

- Historical change
- “Current” conditions
- Community-based methods for monitoring future change
Community-Based Monitoring

3 types of Monitoring Systems
1. Stake site
2. Stake & time-lapse camera
3. Cross-shore profile sites

Local observers, trained & equipped to collect data & maintain monitoring sites, will collect & send data every 1-3 months or after a significant storm/erosion event

Quyanaq!
Any Questions?
CONNECT AND LEARN MORE!

https://arctic-aok.org/

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Alaska Forum on the Environment 2020