Ikaaġvik Sikukun

Spring 2019 newsletter

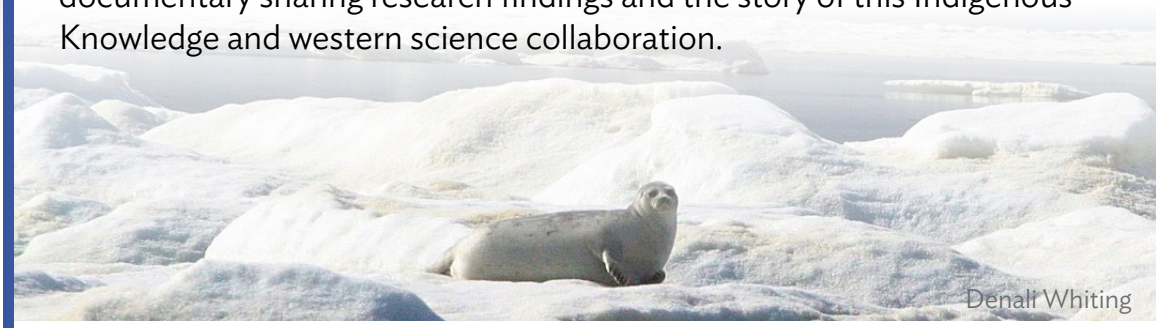
Bridging scientific & Indigenous communities: Sea ice change in Kotzebue

Ikaaġvik Sikukun - Ice bridges

Ikaaġvik Sikukun —Iñupiaq for ice bridges— is a research effort in Kotzebue, Alaska that connects the community with scientists to understand sea ice change in Kotzebue Sound. Under guidance from an advisory council of Elders, the project uses state-of-the-art observing techniques including unmanned aerial systems —commonly known as drones— to answer questions related to sea ice, ocean physics and marine mammal biology.

Several aspects of Ikaaġvik Sikukun set it apart from other scientific research. Most importantly, the advisory council was established from the beginning to define the research questions. This ensures that the science pursued by Ikaaġvik Sikukun is led through Indigenous knowledge and responds to local community concerns related to rapid sea ice and snow cover changes in Kotzebue Sound.

In addition to building bridges between the scientific community and Kotzebue residents, the legacy of Ikaaġvik Sikukun will include a video documentary sharing research findings and the story of this Indigenous Knowledge and western science collaboration.



Denali Whiting

Learn more!

To learn more about Ikaaġvik Sikukun visit us online at www.ikaagviksikukun.org or email questions/comments to ikaagvik_all_pis@lists.ldeo.columbia.edu.

Support

Ikaaġvik Sikukun thanks the Gordon and Betty Moore Foundation for funding and Selawik National Wildlife Refuge for logistical support.

Participants

NATIVE VILLAGE OF KOTZEBUE
KOTZEBUE IRA

UNIVERSITY OF ALASKA FAIRBANKS

Lamont-Doherty Earth Observatory
COLUMBIA UNIVERSITY | EARTH INSTITUTE

LATITUDE

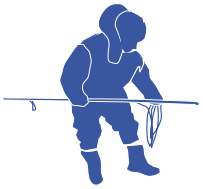
International Arctic Research Center
University of Alaska Fairbanks
PO Box 757340
2160 Koyukuk Drive
Fairbanks, Alaska 99775-7340

Research important to Kotzebue

Ikaaġvik Sikukun scientists and the advisory council of Elders spent a year identifying research questions that are: 1) important to the community of Kotzebue, and 2) possible to answer using unmanned aerial systems and other tools and expertise available to the team.

Q1. What environmental factors control marine mammal use of Kotzebue Sound?

Bearded seal and beluga need openings in the ice to enter Kotzebue Sound. These openings form during break-up, a process complicated by the enclosed nature of the Sound and the freshwater input from the Noatak and Kobuk Rivers. **Q1** identifies how these unique coastal characteristics influence sea ice openings.

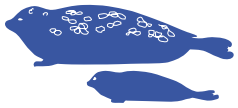


Q2. What environmental factors control the length of the bearded seal hunting season in Kotzebue Sound?

The community of Kotzebue hunts bearded seal when suitable sea ice habitat is accessible from town. This usually happens when freshwater from the Noatak River creates a channel through the landfast ice. In recent years changing sea ice conditions severely shortened the hunting season. **Q2** explores the complex processes that controls access to seal hunting.

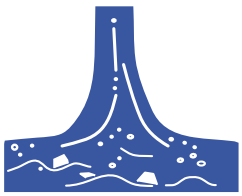
Q3. What determines ice transport processes in Kotzebue Sound?

Currents and wind move ice around Kotzebue Sound, but complex patterns can emerge as water levels fluctuate due to tides, wind and river discharge. The advisory council reported that recently east and west winds blow more often changing how ice openings and shorefast ice develop in the Sound. **Q3** investigates how these changes impact ice movement.



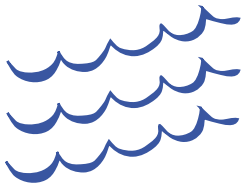
Q4. What snow and ice surface properties promote ringed seal denning and pupping?

The advisory council reported that ice develops in the Sound later than usual with less snow accumulation. This change could reduce the number of suitable ringed seal denning (lair) sites which are often found in snow drifts behind pressure ridges. **Q4** maps snow cover, sea ice roughness, and identifies denning sites.



Q5. What role does sea ice play in sediment transport / accumulation in Kotzebue Sound?

Wind and flooding rivers deposit sediment on the sea ice in Kotzebue Sound. Because the Sound is shallow and usually freezes to the sea bed, as sea ice becomes thinner, it is more likely to melt and deposit its sediment load before leaving the Sound. **Q5** explores sea ice and sediment interactions and how sediment may change the Sound's seafloor.



Q6. Why did no ice form in Kotzebue Sound during winter 2018/2019?

According to Kotzebue elders, 2017/18 was the first winter when Kotzebue Sound did not freeze over. The loss of sea ice compromised traditional harvest practices and this year looks set to have even less ice. Ikaaġvik Sikukun has responded by adding **Q6** to try and explain what has caused the unprecedented loss of winter sea ice in the Sound.

Diverse research approaches

Local Indigenous knowledge The advisory council of Elders is involved in all aspects of research from deciding research questions, collecting data, guiding how and when to make observations, to interpreting the significance of results.

Unmanned aerial systems Ikaaġvik Sikukun combines long-range unmanned aerial systems with an Indigenous way of looking at the ice to observe sea ice during critical periods for marine mammals and subsistence hunting.

On ice measurements Responding to recent sea ice thinning, Ikaaġvik Sikukun measures sea ice growth and melt over the winter and spring, and tracks snow depth, which insulates the ice keeping it warmer in winter (less sea ice growth) and cooler in spring (less ice melt).

Measuring seal habitat Ringed seals rely on specific snow and ice characteristics that are shifting with changing ice conditions. In spring Ikaaġvik Sikukun surveys the sea ice and snow roughness and depth to see how much habitat is available and if there are any used denning sites.

Filming the documentary Ikaaġvik Sikukun's filmmaker is documenting the project from start to finish. The final community-based film will bridge communication between local Indigenous knowledge and western science.

Oceanographic mooring Ikaaġvik Sikukun's ocean mooring measures how heat enters and leaves Kotzebue Sound. The mooring, which sits on the sea floor, also captures biological processes at the base of the ocean's food chain.

Meet our team

Advisory council of Elders

Rosswell Schaeffer Sr.
Kotzebue elder

Cyrus Harris
Sisualik elder

Bobby Schaeffer
Kotzebue elder

John Goodwin
Kotzebue elder

Our advisory council of Elders grew up out on the sea ice and waters of Kotzebue Sound hunting, fishing, learning from their Elders, and observing the environment and character of the Sound.

Project leaders

Chris Zappa
Research professor at Columbia University, studies air-sea-ice interactions.

Andy Mahoney
Research scientist at University of Alaska Fairbanks, studies sea ice & impacts to humans in the Arctic.

Alex Whiting
Environmental director at Native Village of Kotzebue.

Sarah Betcher
Documentary filmmaker at Farthest North Films, specializes in films of Indigenous cultures.

Ajit Subramaniam
Research professor at Columbia University, uses remote sensing to study marine ecosystems.

Donna Hauser
Research scientist at University of Alaska Fairbanks, focuses on marine mammal ecology.

Researchers

Vince Schaeffer
Kotzebue resident, collects snow, ice, and oceanographic measurements for Ikaaġvik Sikukun.

Scott Brown
Electronics & systems engineer at Columbia University, specializes in unmanned aerial systems.

Nathan Laxague
Post-doctoral researcher at Columbia University, focuses on sea ice break up in Kotzebue Sound.

Carson Witte
PhD student at Columbia University, studies air-sea-ice interactions.

Tej Dhakal
Aerospace engineer at Columbia University, develops air-sea-ice sensors for unmanned aerial systems.

Unmanned aerial systems engineers

Aaron Farber
Scientist at Latitude Engineering, focuses on integrating new sensors into unmanned aerial systems.

Cory Rosene
Pilot at Latitude Engineering, designs and creates unmanned aerial systems.

Collaborators

Jessie Lindsay
Master's student at University of Washington, focuses on ringed seal lairs & habitat characteristics.

Peter Boveng
Marine mammal scientist at NOAA, focuses on seals & co-management.

Kristin Laidre
Professor at University of Washington, studies Arctic marine mammal movements & feeding.