

Nunaaqqit Savaqatigivlugich: Working with Alaska communities to observe the Arctic

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Introduction

“What is a key environmental change in your community that you want people to know about?”

*“The sea ice and permafrost are melting too fast.” - Joe Mello Leavitt [Iñupiat], Utqiagvik
(AAOKH 2023).*

Indigenous Peoples across the Arctic have adapted to environmental change since time immemorial, yet recent climate change has imposed unprecedented and abrupt changes that affect the land and sea upon which communities rely. Co-created community-based observing programs offer an opportunity to apply the breadth of knowledge in communities to track Arctic environmental change and support local needs and priorities. [The Alaska Arctic Observatory and Knowledge Hub](#) (AAOKH) is a collaboration between university scientists and a network of five Iñupiaq observers in four northern Alaska coastal communities working together to monitor changes in the Arctic environment (Glenn-Borade et al. 2023). AAOKH (pronounced “A-OK”) provides long-term documentation of weather, ocean, sea ice, and landscape conditions and context to wildlife, harvesting, and cultural and community activities by creating space for Indigenous Knowledge holders to share their expertise and observations of environmental change. The primary objectives of AAOKH, determined by the observers, are to sustain Arctic observing by Indigenous observers, support Indigenous scholarship, and apply observations to inform decision-making in response to environmental change (Hauser et al. 2023). Five core functions of AAOKH have emerged: 1) long-term and sustained documentation of Arctic change

from the perspective of Indigenous observers; 2) effective communication strategies to reach local communities; 3) education and outreach; 4) create connections between Indigenous observations with scientists and policy-makers to support Indigenous-led decision-making; 5) support community- and Indigenous-led responses to Arctic change.

Here we outline actions taken to increase knowledge exchange of AAOKH observations and create locally relevant data products that can inform resource management and community planning. We also highlight ongoing efforts to shift toward a knowledge co-production framework as we plan to sustain AAOKH into the future.

Digital story-telling to share Indigenous insights of Arctic change

Since 2007, over 10, 000 observations have been made to document changes in Arctic Alaska (Observers of Coastal Arctic Alaska 2023). Iñupiaq observers have noted sea ice loss, warmer air and ocean temperatures, changing wind patterns, and increased intensity and frequency of coastal storms that contribute to flooding and erosion, as described in an [ArcGIS StoryMap](#) outlining insights from AAOKH observers on environmental changes in the context of community infrastructure, subsistence activities and travel safety (Glenn 2022). This StoryMap was developed in consultation with AAOKH observers and researchers through iterative conversations to ensure accuracy and appropriate use of observations, photos, audio clips and instrumental data to tell a more complete story of environmental change in AAOKH communities. It provides an example of our ongoing efforts to co-produce data products communicating local narratives of change, rooted in lived experiences and Indigenous worldviews. These changes have real impacts on community infrastructure, traditional activities, and access and availability of subsistence resources. Our work is increasingly turning to our

community partners to make use of these observations to support local priorities and needs (Hauser et al. 2023).

Informing policy and supporting Indigenous food sovereignty

“I think it is really important that our observations are being used by tribes for planning purposes. What about documenting storms or supporting food security?... How can tribes use our observations for planning?” - Bobby Schaeffer [Iñupiat], Kotzebue, 30 November 2022

Research and observing activities are guided by the priorities, concerns and expertise of AAOKH observers which are shared through annual advisory meetings and related knowledge exchange workshops. This iterative dialogue between Indigenous Knowledge holders and UAF researchers helps to establish shared understandings about Arctic climate and environmental change, impacts to Indigenous communities and people, and potential mechanisms for responding to change.

An increasing emphasis of AAOKH is to build connections across regional, national, and international scales, with entities such as wildlife co-management organizations, tribal governments and federal agencies that could use observations to equitably elevate Indigenous Knowledge and perspectives in decision-making. Through long-term community-based observing, local knowledge and observations can be applied to decision-making regarding Indigenous peoples, communities, and the land and resources on which they depend and thrive, leading to more sustainable and effective approaches to resource management and climate change adaptation (e.g., Carothers et al. 2021). For example, regular sea ice and weather observations help improve remotely-sensed data interpretation, which can lead to better forecasts and climate models (e.g., Fox et al. 2020; Simonee et al. 2021). Observer reports also inform hunters or travelers going out on the ocean or sea ice (e.g., Druckenmiller et al. 2013). Similarly,

observations of fish or wildlife presence, abundance, location, body condition, and other information can be used to elevate the use of Indigenous data in wildlife co-management decision-making about how and when Indigenous people can legally harvest their traditional foods (e.g., Breton-Honeyman et al. 2021).

AAOKH is continually exploring collaborations with Alaska Native organizations (i.e., Alaska's marine mammal co-management organizations) to apply observations in regional co-management policy and decision-making. An initial step in this process includes synthesis of relevant observations that have already been collected to understand what types of data products can be delivered to a co-management committee. Further work could include more focused efforts to collect detailed observations to inform specific harvesting policies.

Addressing data needs at the community-scale

Changing environmental conditions in northern Alaska are inextricably linked to hunting, gathering, sharing, and preservation of traditional foods. Correspondingly, AAOKH has shifted our observing activities and data collection methodologies to support food security and travel safety, such as mapping the ice thickness of trails across the landfast ice used by whalers during spring in Utqiagvik (Druckenmiller et al. 2013). Each spring Utqiagvik hunters build trails across the shorefast sea ice to access bowhead whale hunting sites. Since 2007, the whaling community, the North Slope Borough Department of Wildlife Management, and AAOKH scientists have mapped the trails to make sure they are safe for travel. These annual surveys reveal the average thickness of first-year shorefast ice, which is controlled by local freeze-up processes and timing, as well as weather, ocean, and ice conditions in the region throughout fall and winter. These maps are made available to the Barrow Whaling Captains Association.

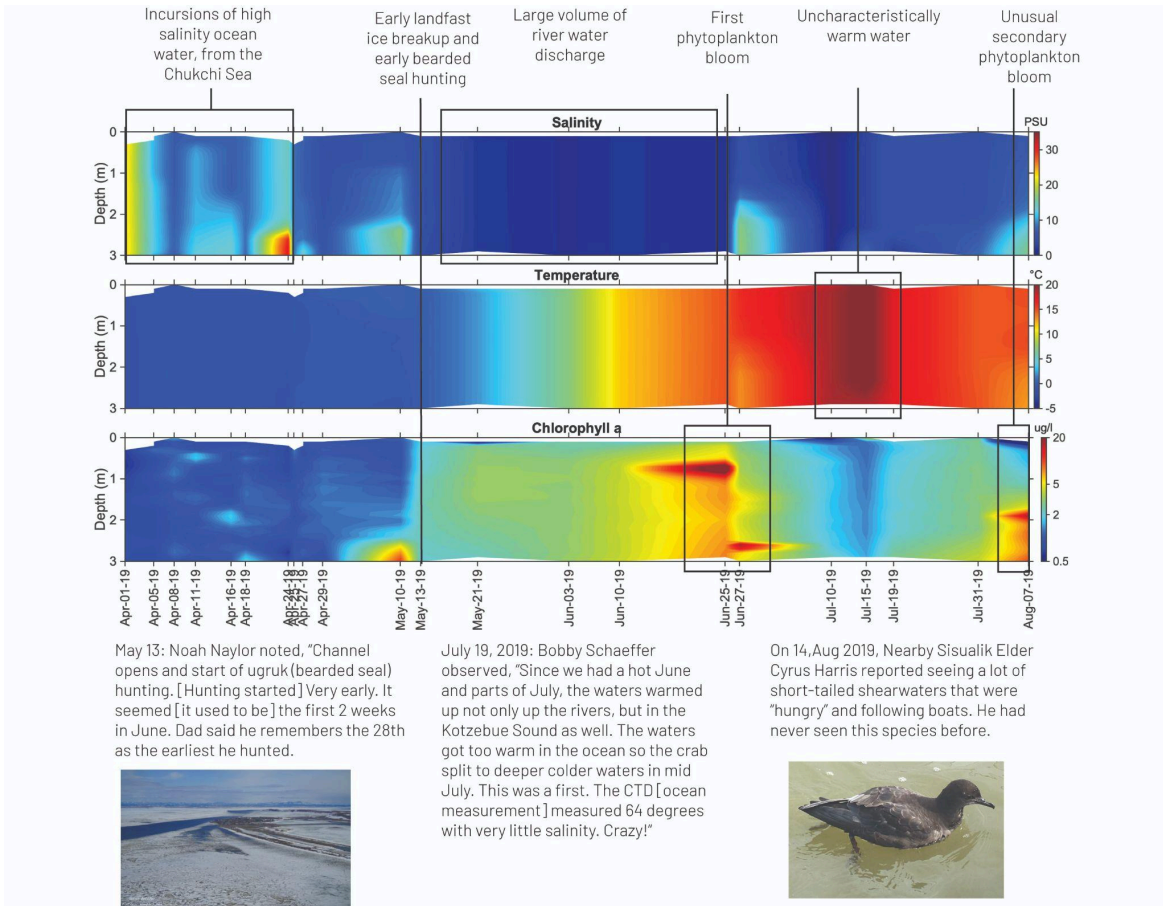


Figure 1. Time series of CTD measurements taken near the Kotzebue waterfront, taken in August 2019. Observations from community partners and observers provide additional context about implications for subsistence activities and travel safety (from Hauser et al. 2023).

New research objectives were also implemented based on locally identified research interests, including the use of CTD instruments to monitor ocean conditions. AAOKH observers in Kotzebue reported indications of increasing water temperatures in concert with reduced sea ice cover in recent years. To learn more, observers measured coastal ocean temperature, salinity, and productivity (specifically chlorophyll a, as a measure of phytoplankton biomass) using CTD oceanographic instruments and training provided by AAOKH. CTD measurements taken near Kotzebue in 2019 illustrate the timing of sea ice break-up, phytoplankton blooms, and unusually warm water during the summer months (see Hauser et al. 2023). Taken in concert with narrative

observations, a more complete understanding of the implications and effects of these conditions emerged (Fig. 1).

Collaboration to achieve a shared vision

Applying and centering Indigenous perspectives and observations of Arctic change supports holistic understandings of change and can lead to more inclusive, equitable, and community-led responses. We recognize the importance of collaborative research approaches that honor and uplift Indigenous Knowledge holders and their connections to the land and sea. By amplifying Indigenous Knowledge and observations, AAOKH aims to challenge the power imbalances inherent in conventional scientific practices and contribute to the transformation of Arctic observing protocols to better serve Indigenous Peoples and communities.

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