



# Coastal Observers of Barrow Community-Based Monitors

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## The Story

Many coastal communities on the west and north coast of Alaska are threatened by coastal hazards (erosion, storm surge, permafrost thaw, sea ice loss) and that vulnerability is increasing as the environment changes with rapid warming. Using thermal sensors for thaw, an Argus camera system for wave dynamics, and survey instruments for erosion, Community-Based Monitors measure 9 beach profiles over time to determine changes from these hazards in collaboration with the North Slope Borough Office of Emergency Management (NSB OEM) and Applied Research in Environmental Sciences Nonprofit, Inc. (ARIES) because it is a serious threat to the critical infrastructure and informs public safety decisions. The monitoring measurement protocol provides workforce skills about survey equipment and a spatial reference framework as well as risk education activities by the monitors for all ages. Seven years of collected data have shown changes to the beach profiles and provides calibration and validation data for hydrodynamic forecast models by the Navigating the New Arctic team.

## Why

Coastal communities of Arctic Alaska are threatened by coastal hazards. The hazard cycle includes erosion, storm surge, permafrost thaw, sea ice loss and flooding often results. This vulnerability is increasing as the environment changes with rapid warming. The loss of sea ice from warming results in open ocean for longer fetch in specific directions, which effects wave dynamics with wind speed and increased surface friction. This applied research is to record the shoreline risks of critical infrastructure in Barrow, AK.



## How

The measurement protocol uses auto levels, stadia rods, and survey tapes so provides workforce skills about profile surveys. A spatial reference framework is utilized with georeferenced control points for the transects, sensors, and cameras. An array of thermal sensors are in boreholes at 1.5 meters with surface data loggers at 4 bluff sites and FLIR cameras record waves and run up (Fixed-Mount Thermal Imaging). For survey details, see the training video developed by students at the QR code.



# Coastal Hazards

## Acknowledgement (Who)

The North Slope Borough Office of Emergency Management and Applied Research in Environmental Sciences Nonprofit, Inc., partnered with the following for :

- survey equipment and training by the University of Alaska Anchorage, Geomatics and AK Sea Grant
- hydrodynamics modeling by George Mason University
- thermal sensors for permafrost monitoring by the University of Alaska Fairbanks
- Argus Camera System used by USGS (Pt. Barrow Example)
- public data repositories by AK Coastal Hazards and USGS Coastal Change in Arctic AK

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## Preliminary Results (When)

Seven years of collected data have shown changes to the beach profiles and provides calibration and validation. data for hydrodynamic forecast models by the Navigating the New Arctic team. The hydrodynamic models contribute to the USACE designs for a federally funded shoreline road raised as a seawall. See QR code for the AK Coastal Hazards website as the erosion data repository.



## What and Where

Using thermal sensors for thaw (map on left), an Argus camera system for wave dynamics, and survey instruments for erosion transects (map on right), Community-Based Monitors measure 9 beach profiles over time to determine changes from these hazards because it is a serious threat to critical infrastructure identified by the NSB OEM, and informs public safety decisions.

