



# Homeland Security

Science and Technology

# Arctic Domain Awareness Center (ADAC)

A DHS Science and Technology Center of Excellence



## ARCTIC DOMAIN AWARENESS CENTER

A DEPARTMENT OF HOMELAND SECURITY CENTER OF EXCELLENCE

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## Research Areas

- Maritime Domain Awareness
- Maritime Situational Awareness and Response Support
- Maritime Technology Research
- Integrated Education

**Mission:** To develop and transition technology solutions, innovative products and educational programs to improve situational awareness and crisis response capabilities related to emerging maritime challenges posed by the dynamic Arctic environment.



## Quick Facts

- Led by the University of Alaska Anchorage (UAA) in partnership with the University of Alaska Fairbanks.
- Engages a consortium of more than 15 partners and collaborators geographically distributed among a distinguished group of universities, research institutions, and industry leaders. Consists of experts in engineering and science, entrepreneurs experienced in technology transition and experienced executives from private industry.
- Addresses DHS Science and Technology Directorate's visionary goal to *Enable the Decision Maker*.
- ADAC seeks solutions to systematically observe, assess, predict, and alert stakeholders of key aspects in the Arctic Domain: environmental changes, vessel movement, waterway use, incursion, Arctic sea ice movement, storm surge and catastrophic events.
- Provides incident commanders with actionable information and decision support to respond to and prepare for events of concern.
- Develops future workforce through the ADAC Fellows Program and by mentoring students.

## Background

- Established in August 2014.
- First homeland security Center of Excellence (COE) established to focus on the Arctic.
- UAA is the first institution in Alaska to lead a DHS COE.
- USCG is a key stakeholder and related ADAC work will support the USCG 2013 Arctic Strategy and 2015 Arctic Strategy Implementation Plan.

## Academic Partners

Embry Riddle University  
Maine Maritime Academy  
Texas A&M University  
University of Idaho  
University of New Mexico \*  
University of Texas at El Paso \*  
University of Washington  
U.S. Coast Guard Academy, Center for  
Arctic Study and Policy  
Woods Hole Oceanographic Institute

## Industry Partners

Alaska Marine Exchange  
ASRC Federal Mission Solutions \*\*  
Axiom Data Science  
Dubay Business Services  
NOVA DINE-Kestral \*\*

## Cooperative Organizations

Alaska Ocean Observation System  
DoD Alaska Command and Alaska  
NORAD Region  
NASA Arctic Collaborative Environment  
NOAA and National Weather Service  
U.S. Coast Guard Headquarters,  
Research & Development Center,  
and District 17

\* *Minority Serving Institution (MSI)*

\*\* *Federally Designated Tribal Organizations (FDTO)*

## ADAC Highlights

### Building Research Capacity for Arctic-Related Incidents of National Significance (IONS)

ADAC is conducting a series of workshops to assist the U.S. Coast Guard (USCG) in identifying knowledge gaps in capabilities relevant to incidents of national significance. They will be based on mission relevant challenges and dialog with the research community. The workshops will identify research and technology gaps and define research questions for merit-based competitions to support DHS.

### Developing an Arctic Information Fusion Capability (AIFC) for Domain Awareness

ADAC is developing a new, integrated system to enhance the USCG's ability to prepare for and respond to events in the Arctic Ocean, to more safely and reliably conduct search and rescue missions, and to support broad DHS efforts to prepare and plan for disasters caused by large coastal storms. AIFC will provide predictive models that operators can use to prepare and plan for such events. Researchers will integrate and analyze data from remote sensors, event modeling, community based observer networks, databases, unmanned autonomous vehicles, and communication devices to develop these models.

### Community Based Observer Networks (CBONS)

This project will establish a community-based observing network and system (CBONS) to acquire fine scale, local data on a range of variables critical to USCG operations. Variables will include those associated with environmental change, subsistence activities/habitats and vessel transits. CBONS data may be used to enhance the preparedness of communities on the ground which can greatly increase the effectiveness of USCG in the Arctic while potentially reducing costs in the long term. The data will also generate community maps consisting of areas critical to culture and subsistence which will allow the Coast Guard to operate in ways that protect livelihoods and traditional lifeways.

### Forecasting Arctic Sea Ice and Storm Surge for Search and Rescue Missions

This project is developing new real-time, higher-resolution models for nowcasting and forecasting of sea ice (e.g., concentrations, thickness, flow) and ocean currents in the Northwest Passage that can be used to assist in navigation for search and rescue missions. Models will build on the Hybrid Coordinate Ocean Model developed by the U.S. Naval Research Laboratory, and the University of Washington's Marginal Ice Zone Modeling and Assimilation System. This will support DHS efforts to prepare and plan for disasters caused by large coastal storms and to more safely and reliably conduct search and rescue missions.

### Arctic Oil Spill Modeling

This project is developing a new General National Oceanic and Atmospheric Administration Oil Modeling Environment (GNOME) based oil spill response model to enhance capabilities to assess, predict, and monitor the effects and development of oil spills in the Arctic. The new model will provide real-time, high-resolution models that incorporate sea ice, temperature, ocean currents, and storm surges to enhance USCG's ability to prepare for and respond to oil spills in the Arctic.

### Low-Cost Wireless Sensors for Arctic Monitoring

ADAC is developing low-cost, wireless sensors that do not require batteries for remote Arctic monitoring. These low-power sensors can form ad-hoc sensor networks for remote vessel tracking, surveillance and monitoring of climate change (e.g., ice flow, depth).