



## Arctic Science and Security Initiative

*This Sandia initiative addresses emerging and imminent security concerns and research opportunities in the Arctic.*

### A RAPIDLY CHANGING ARCTIC

Rapidly changing conditions in the Arctic have increased access to natural resources and maritime routes, enabling more commercial shipping, resource extraction, and an increased security presence. Permafrost thaw and coastal erosion impact infrastructure, communities, and ecosystems. These security and environmental issues are exacerbated by the enormity of the region, a lack of infrastructure (including communications and rescue operation capabilities), limited interconnectivity between regions, and scarce monitoring. Evolving Arctic conditions also present significant challenges for scientists and policy makers looking to gain a better understanding of the long-term consequences of climate change. To ensure proper stewardship and security of this critical region, many issues must be addressed in the near future.

### ARCTIC SCIENCE & SECURITY INITIATIVE

Sandia National Labs leads an initiative to better understand and address science and security issues in the Arctic. Our deep science and engineering experience enables us to discuss technical challenges, develop possible solutions, and partner and collaborate to address Arctic-specific national security concerns.

### SANDIA-OPERATED ARCTIC FACILITIES

Sandia operates the North Slope Alaska (NSA) Atmospheric Radiation and Measurement (ARM) Climate Research Facility on behalf of the Department of Energy (DOE) Office of Science Biological and Environmental Research program. The NSA observatory provides researchers with a unique and strategic window into the Earth's atmospheric processes at high latitudes. Data collected at the facility is used to refine models and parameterizations as they relate to the Arctic. By focusing on this region, climate researchers are better able to understand the interactions between the atmosphere, land, and ocean systems.

Sandia also manages Special Use Airspace at Oliktok Point, Alaska for the DOE Arctic Energy Office. This resource, along with a Sandia facility at Oliktok Point, offers unique opportunities to collect data at various altitudes across terrestrial, marine, and cryosphere conditions using tethered balloons, unmanned aerial systems, and manned aircraft.



*An Atmospheric Radiation Monitoring sensor array outside of Barrow, Alaska. Photo: Sandia National Laboratories.*

### SANDIA CAPABILITIES LEVERAGED IN THE ARCTIC

In addition to managing the DOE ARM site, Sandia has developed the following Arctic-related capabilities:

- Measurements and model development for Arctic coastal erosion,
- Energy assessments for Alaska native villages
- Nuclear materials management for the US Air Force
- Search and rescue drills with the US Coast Guard
- Remote sensing of permafrost
- Computer modeling of the melting Greenland ice sheet
- Airborne Synthetic Aperture Radar (SAR) to detect crevasses in land ice sheets of Greenland and Antarctica, as well as characterization of sea ice
- Arctic-capable measurement platforms including tethered balloon systems and uncrewed aerial systems (UAS)
- Testing and development of Arctic resilient technologies

### COLLABORATION WITH THE UNIVERSITY OF ALASKA FAIRBANKS

As part of Sandia's Arctic Science and Security Initiative, Sandia partners with the University of Alaska Fairbanks (UAF) on two Arctic initiatives: the Arctic Infrastructure Simulation Analysis Center and the US High Arctic Research Center.

## THE ARCTIC INFRASTRUCTURE SIMULATION ANALYSIS CENTER

Sandia and UAF collaboratively aim to increase resilience across infrastructure and natural systems through modeling and analysis. The Center's efforts include:

- **Disaster planning:** to enhance planning and response in Alaska and the Arctic
- **Increased resilience:** to improve understanding of risks, adaptation, and engineered and social systems in Alaska and the Arctic to increase resilience
- **Long-term planning:** to adapt to changing climate and environmental conditions, new activities and land uses, and community transitions



US High Arctic Research Center (USHARC). Photo: Sandia National Laboratories.

## US HIGH ARCTIC RESEARCH CENTER (USHARC)

Sandia and UAF have proposed the development of a comprehensive, year-round, multi-disciplinary Arctic research station to support cooperative scientific research. USHARC would encompass several facilities in the Alaska North Slope region, including existing ones like the Barrow Arctic Research Center in Utqiagvik, Oliktok Point, and Toolik Field Station.

Existing assets include:

- **Access:** 1 km from the Arctic Ocean; with access to the lower 48 states via the northern-most road in the U.S.
- **Controlled airspace:** Domestic and international airspaces to provide researchers with access to areas at Oliktok Point and 700 miles north across the Arctic Ocean
- **Research support:** Lab space, logistical and operational support, UAS facilities, and test equipment

Planned features of USHARC include:

- **Collaboration:** Collaborative space for Arctic stakeholders, e.g., federal agencies, local governments, industry, and universities
- **Ocean access:** A year-round road from the station to the shoreline to provide direct ocean access for marine engagements Shared use: On-site support equipment, a UAS hangar, real-time observations, meteorological data, and lodging
- **Secure Communications:** Depending on the mix of USHARC users, the facility could include classified and secure communications and workspace

## CONTACT

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