National Science Foundation

Research Support, Logistics, & Operations in the Arctic

Leveraging Agency Partnerships to Advance Key Capabilities

Dr. Jennifer Mercer
Program Manager for Arctic Research Support & Logistics (RSL)
Program Director (acting) for Arctic Observing Network (AON)

NORAD/NORTHCOM Arctic Science & Technology Symposium, May 2018

In this presentation…

- *NSF's Arctic mission*
- *Geographic reach and NSF's Arctic Operations & Logistics*
- *Synergistic activities between NSF and partner agencies*
- *Requirements for key capabilities: technology development and areas for synergism/collaboration*

NSF Arctic Sciences Program Mission

NSF supports fundamental research at the forefront of understanding the Arctic, including its human and natural components and its global linkages. The scope entails research targeting basic processes through to system-scale studies and linkages to global questions.

2017 Footprint
1260 people
30,797 person days

NSF supports good Arctic stewardship through:

- *Efficient research support and logistics capabilities*
- *Education and training of the next generation of STEM practitioners*
- *Dialogue with Arctic residents to understand priorities and increase participation*
- *Planning with the research community*
- *Partnerships with other U.S. agencies*
- *Partnerships with international government organizations*
- *Open data sharing*

Program Context:

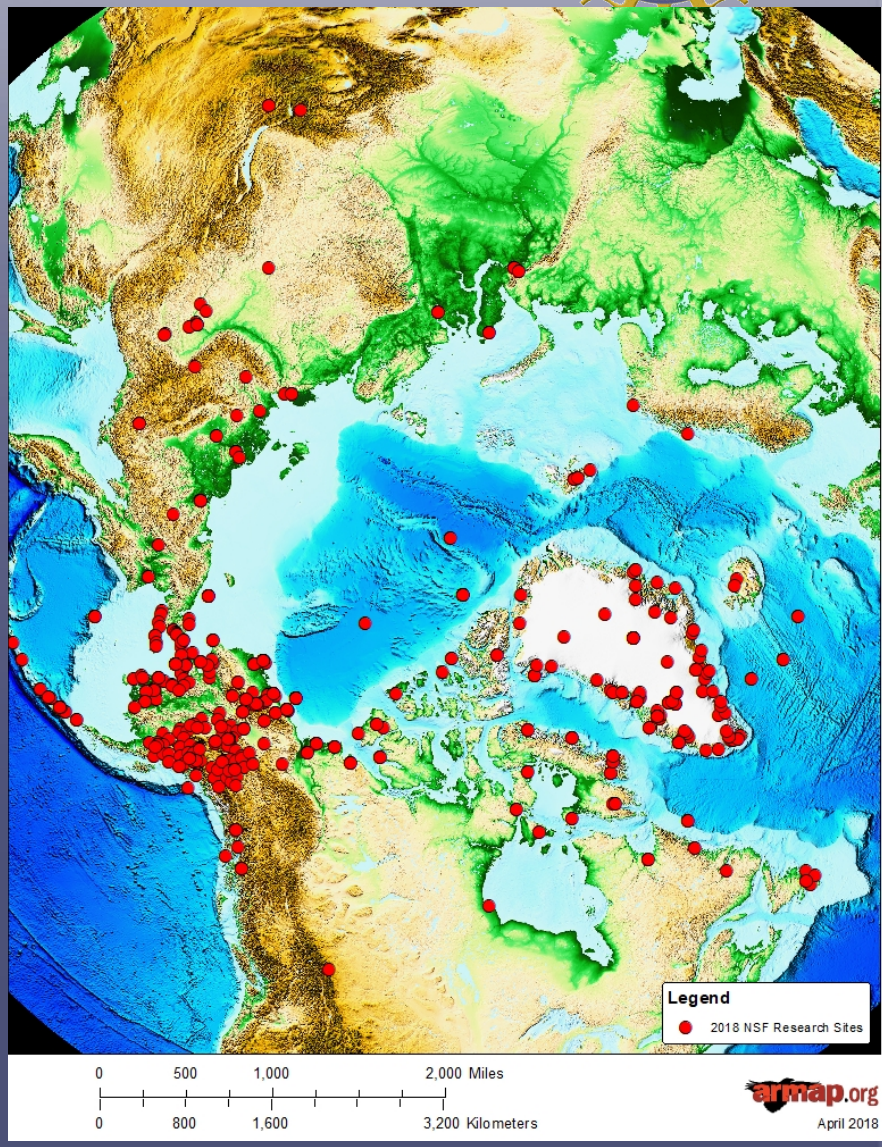
4 million people live in the Arctic

- *The NSF Arctic program utilizes a number of local services*
- *The NSF Arctic program recognizes health services, search and rescue capabilities and other resources of Arctic communities*

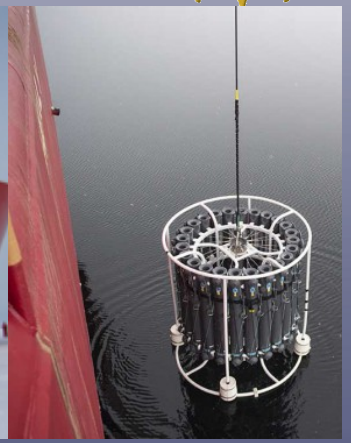
Geographic Reach and NSF's Arctic Research Support & Logistics (RSL)

RSL Program Vision

- *Improve efficiency and safety of U.S. researchers working in the Arctic by providing equipment, services, infrastructure, communication, and training*
- *Develop agreements that increase access to the Arctic*
- *Improve communication and collaboration between Arctic people and Arctic researchers*
- *Manage prime logistics support contract*
- *Provides services, on a reimbursable cost basis, to other USG research programs (DoD, NOAA, NASA, Smithsonian)*
- *Relies on partnering with other organizations*
  - *USAF, USACE-CRREL, Air National Guard, USCG, etc.*
- *Primary Research Hubs: Toolik and Utqiaġvik, AK; Summit, Kangerlussuaq, Raven, Thule, GR*



USCG I/B Healy and STARC



- I/B capabilities complement UNOLS fleet capabilities
- NSF funds research projects to work aboard the Healy, paying for ship time
- NSF fully funds the Ship-based Science Technical Support in the Arctic (STARC) Capabilities on the Healy – services available on reimbursable basis
  1. to plan, coordinate and deliver science technical support onboard *Healy* and *Polar Sea*, augmenting the role of the USCG marine science technicians and
  2. to coordinate with NSF, USCG and the academic community to provide for the operation, maintenance and upgrade of science equipment installed or used on *Healy* and *Polar Sea*.

Air National Guard 109th Airborne supports science in the Arctic

- *Through SAAM'd missions, ski-equipped LC-130's support science by delivering PAX, cargo, and fuel to remote locations, including on the GrIS*
- *Synergistic relationship allows ANG/109th to complete training in Greenland prior to deploying to Antarctica*
- *Conduct landings on prepared skiways, open snow, and air drops*
- *IcePod, developed by scientists, mounts to rear PAX door and measures ice properties.*

Thule Air Base Enables Scientific Research

"The mission of the 821st Air Base Group is to enable force projection, space superiority ***and scientific research*** *in the Arctic Region for our nation and allies through integrated base support and defense operations." …science was added ~5 years ago.*

Thule High Arctic Atmospheric Observatory (THAAO)

Deep water port enabled Joint US/European Research Cruise in 2015 to study Nares Strait and Petermann Glacier

Working out of Thule saved nearly 2 weeks of ship transit time, next nearest port was Halifax

Smithsonian-led Telescope Installation - First light occurred in 2018

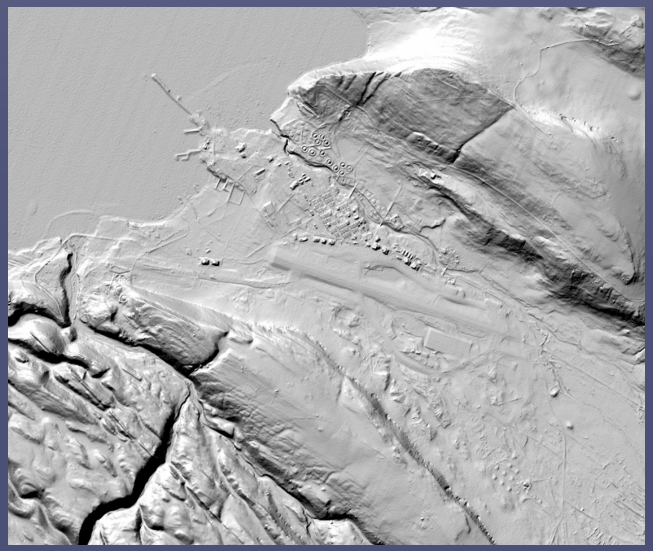
Greenland Inland Traverse (GrIT)

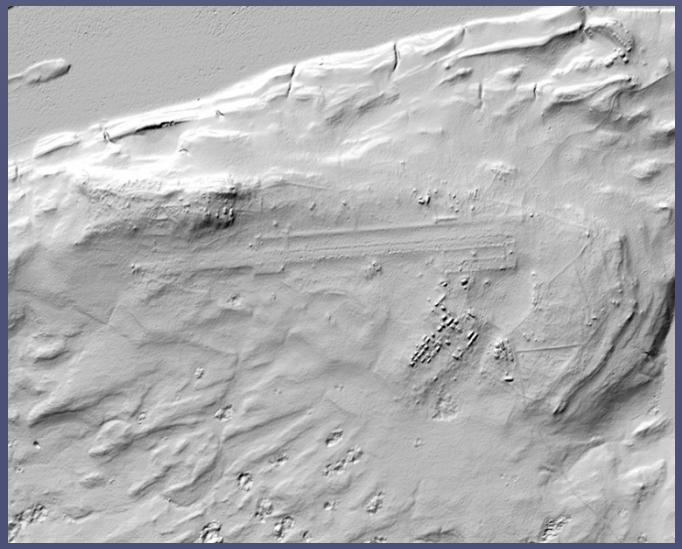
- *740 mile tractor traverse hauling fuel/cargo to inland stations*
- *Low emissions compared to aircraft*
- *Hauls cargo too large or heavy for LC 130s*
- *First 60 miles heavily crevassed, takes ~6 weeks to Summit*

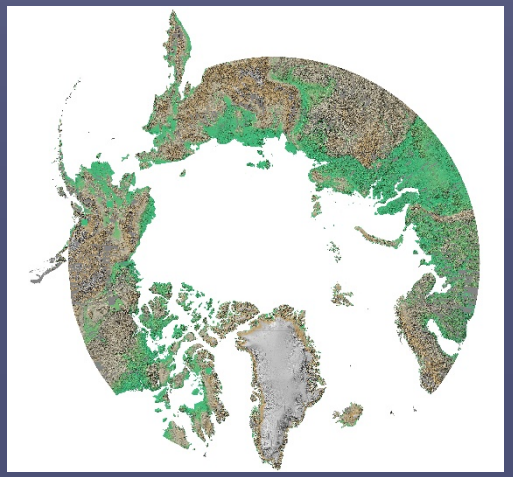
Arctic Digital Elevation Model (DEM)

A *National Science Foundation/National Geospatial Intelligence Agency* initiative to produce a *publically available* two meter posting, one meter accuracy Digital Elevation Model of the Earth north of 60° including Alaska, Greenland and Kamchatka

- Produced through a close collaboration between NGA St Louis, University of Minnesota and Ohio State University
- Covers the Arctic an average of 4 times
- Produced using NGA licensed DigitalGlobe imagery, NSF's Blue Waters supercomputer and open source software
- Product is fill source for T-Rex
- Final public 500TB release in September 2018





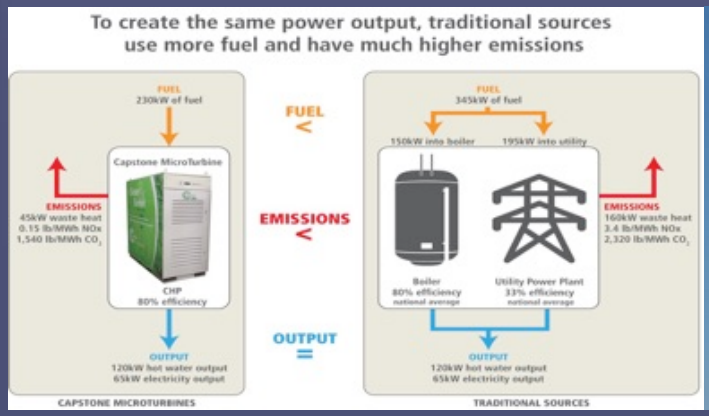


ArcticDEM extent

Technology Development and Capability Advancement - Areas for Synergism/Collaboration

Areas of mutual interest?

- Transportation
  - Air Ships, Access Points, Overland Vehicles, Aircraft and Vessels
- Energy, Fuel Efficiency, and Renewables
  - Energy production and storage advancements, cold wx capabilities, autonomous ops
- Facilities
  - Arctic construction advancements, shared resources
- Autonomous instruments and operation
  - Energy storage, data collection and transmission, winterization capabilities



Arctic Research Coordination across the U.S. Government and Internationally

Interagency Arctic Research Policy Committee (IARPC)

- NSF lead agency, Dr. France Cordova, Chair
- White House Office of Science and Technology Policy (OSTP)
- Collaboration website http://www.iarpccollaborations.org

Forum of Arctic Research Operators (FARO)

- 20 member nations, Dr. Jennifer Mercer is US NPOC and serves on ExComm
- Aims to facilitate/optimize logistics and operational support across the Arctic
- Encourages international collaboration for all involved in Arctic research
- Acts as a forum for information exchange, establishment of cooperation, and development of new ideas among the national logistics operators in countries with Arctic research activities

Contact Information

The presenter thanks the photographers for use of their excellent photos. Photo credits available upon request.

Questions/Discussion: jmercer@nsf.gov, +1-703-292-7453