

# Arctic Research Support & Logistics (RSL)

## Program Overview

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### RSL Program Review 7-9 October 2013



National Science Foundation  
Geosciences Directorate (GEO)  
Division of Polar Programs (PLR)



# RSL Program – What is it?

The Arctic Research Support and Logistics (RSL) program supports field research by providing planning, transportation, logistics, facilities and infrastructure



# RSL in the Past – Vision for the RSL program?

- Improve safe access to the arctic for research
  - 1997 Report by the Arctic Research Commission – improve year-round access, instrumentation capability, safety and communication with communities
    - 1999 program created with \$25M and Simon Stephenson as the program manager
    - Rent, lease or buy infrastructure needed for research
    - Provide expertise in arctic logistics and infrastructure to researchers
    - Provide training, telemedicine, satellite phones etc. to researchers
- Cost savings through contracts and other agreements
  - Low overhead of contracts vs universities
  - Cost savings using pooled equipment and leasing facilities for multiple projects
- Save researcher time and broaden participation in arctic research
  - RSL provides expertise and training to enable new PIs to work in the Arctic
- Improve communication b/t researchers and arctic communities
  - Provide travel support to reach out to communities before and after research
- Develop relationships and agreements for improved access/efficiency
  - Russia, Canada, foreign research vessels, etc.

# RSL Program in the Present – Who is it?

2 NSF Program Managers, \$40M/year

- Prime support contractor - \$30M/year



- Other government agencies – e.g. USCG, DoI, DoD
- Academic institutions – e.g. Scripps Institute of Oceanography and Oregon State University
- Non-profit organizations – e.g. ARCUS
- Small companies – e.g. ALEX-Alternative Experts

# Prime Contractor

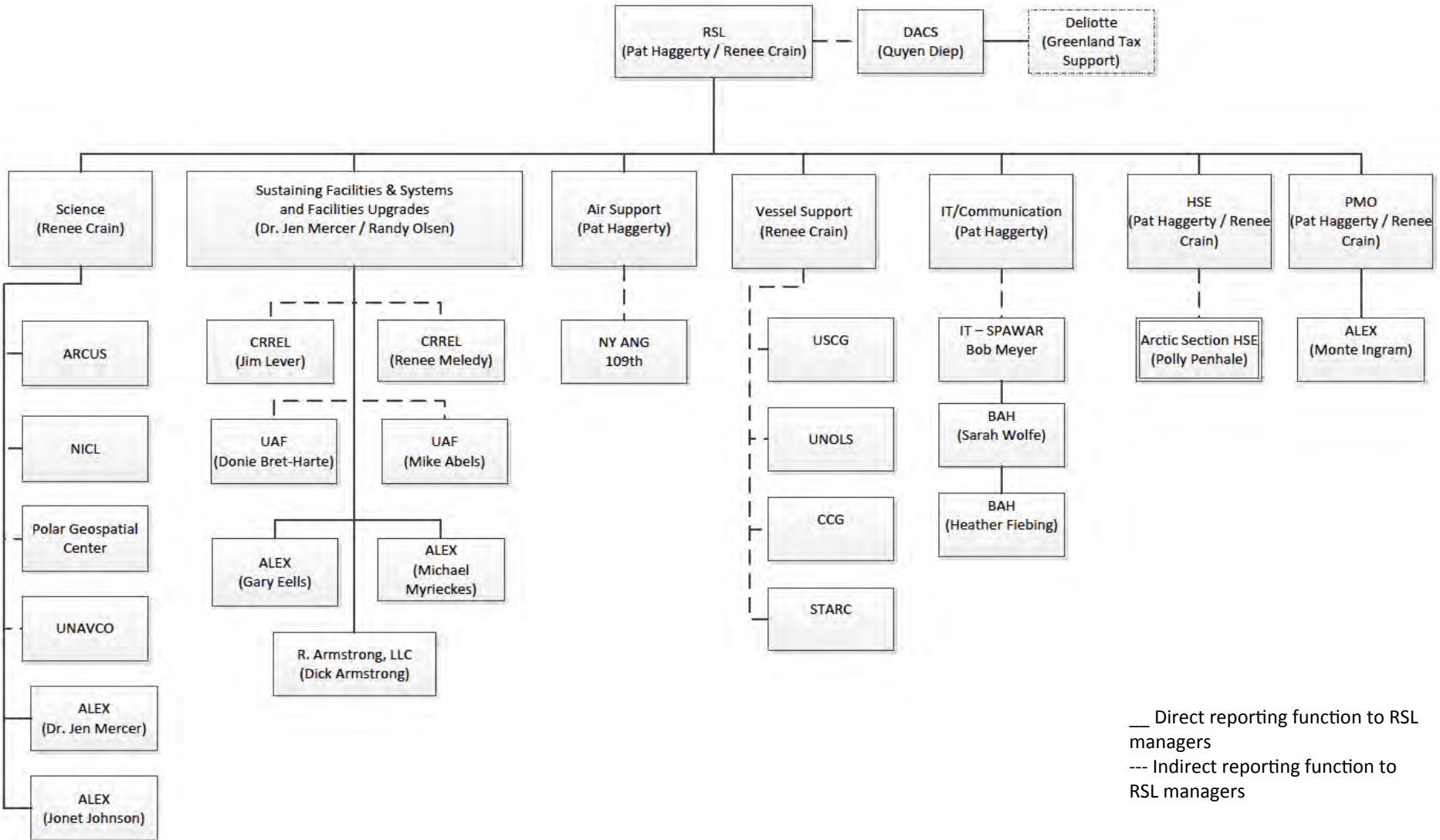
## CH2M HILL Polar Services

- Provide science support to researchers from proposal estimates, planning, execution and outbriefs
- Operate NSF facilities in Greenland
- Operate the Greenland Inland Traverse
- Manage and oversee subcontractors for design, construction, operation, maintenance, upgrades, leases
- Jointly maintain facilities at Toolik Field Station with UAF/Institute of Arctic Biology
- Provide IT infrastructure and resources for PIs
- Provide services like the Summit paramedic and the training offered to researchers
- Work with 109<sup>th</sup>, CRREL, ALEX, the research community and other experts to develop long-range plans and deliver support
- Manage strategic relationships with providers in Alaska, Greenland, Russia, Canada, Svalbard
- ARMAP.org – a link to the database of projects and PIs

# Other Services for Arctic Research

Alternative Experts (ALEX) • Arctic Icebreaker  
Coordinating Committee • Arctic Research Consortium of  
the U.S. • Chukotka Science Support Group • CRDF • U.S.  
Army Cold Regions Research and Engineering Laboratory  
(CRREL) • Ice Drilling Design & Operations (IDDO/IDPO) •  
Kings Bay, Svalbard • National Ice Core Lab • North East  
Science Station, Russia • Polar Geospatial Center •  
Science Coordination Office (Summit) • Ship-based  
Science Technical Support (STARC) • SPAWAR • Tiksi,  
Russia • UNAVCO • UNOLS • U.S. Coast Guard • 109th  
Airlift wing • Canadian Coast Guard • DOD • DOI

# RSL Program Functional Responsibility



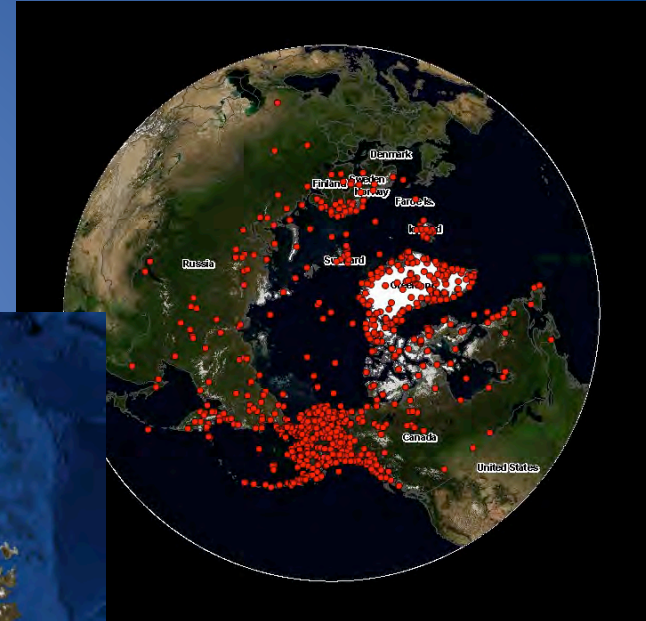
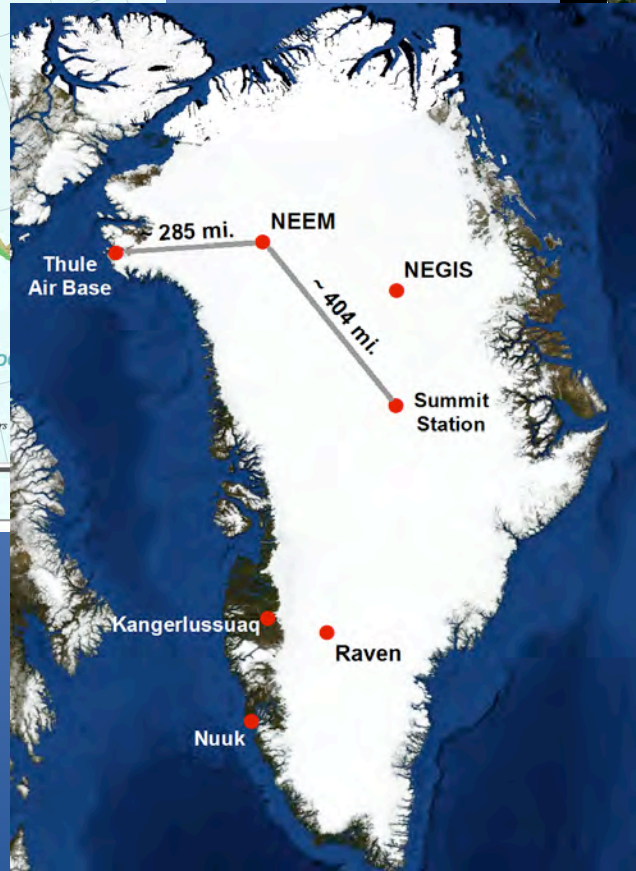
\_\_\_ Direct reporting function to RSL managers  
 --- Indirect reporting function to RSL managers

# Leveraging RSL Expertise and Resources: Other users

- Dept. of Defense/Defense Advanced Research Projects Agency
- Dept. of Energy/Next-generation Ecology Experiment (NGEE)
- Dept. of State/Extended Continental Shelf survey
- NOAA
- NASA
- Other NSF Directorates: Astronomy, Biology, Geosciences, Social/Behavioral/Economic Sciences
- Smithsonian Institution
- Danish Meteorological Service
- University of Copenhagen



# RSL Program in the present – Where is it?



# RSL Program – Where is it?



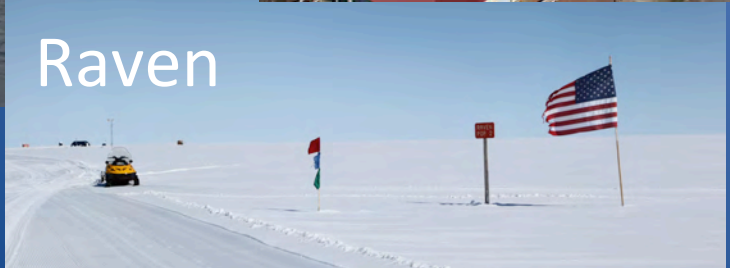
Toolik



Summit



Raven



Barrow



Thule

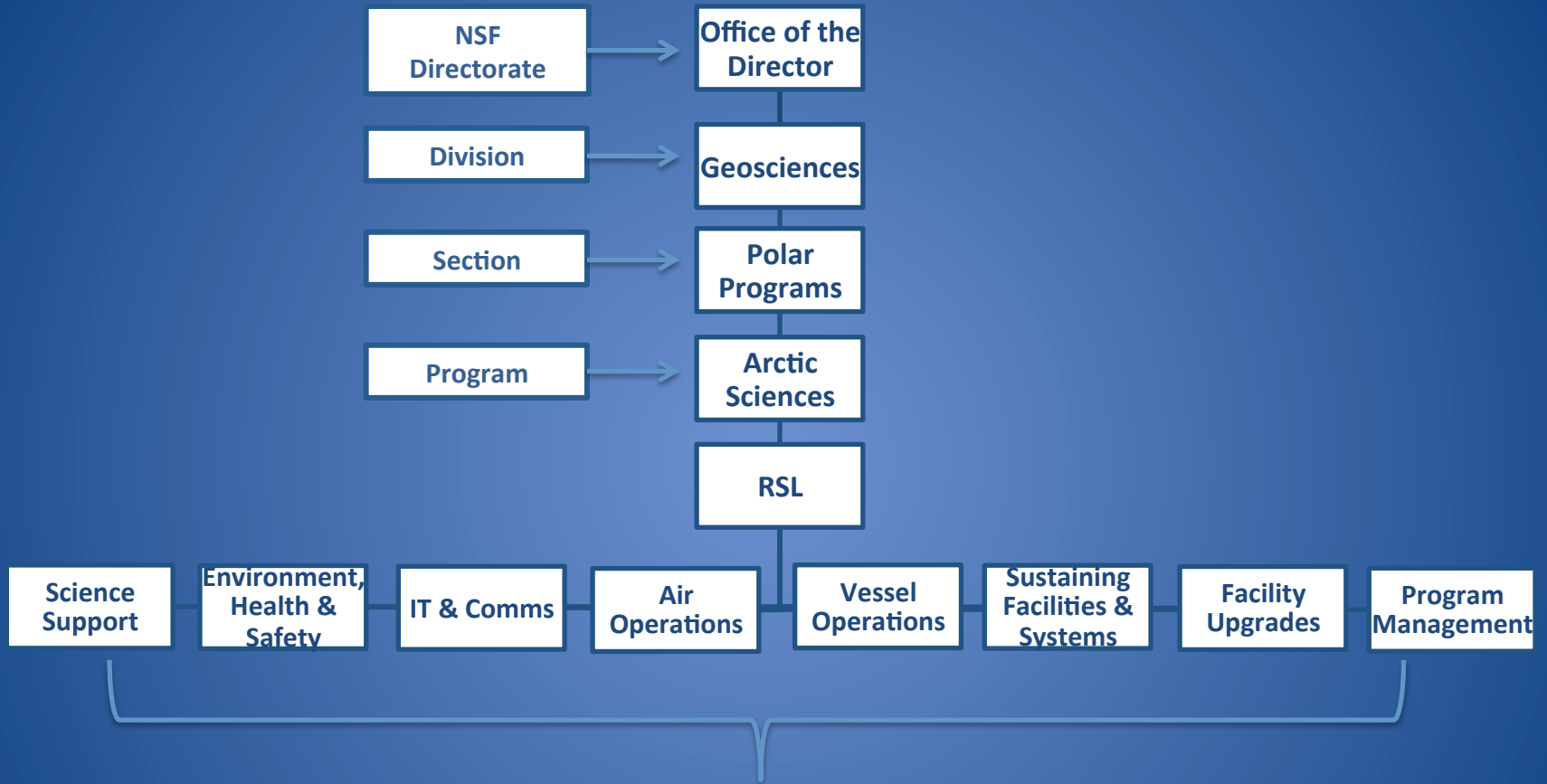


Kangerlussuaq

# Arctic Research Support and Logistics



# RSL Program Portfolios

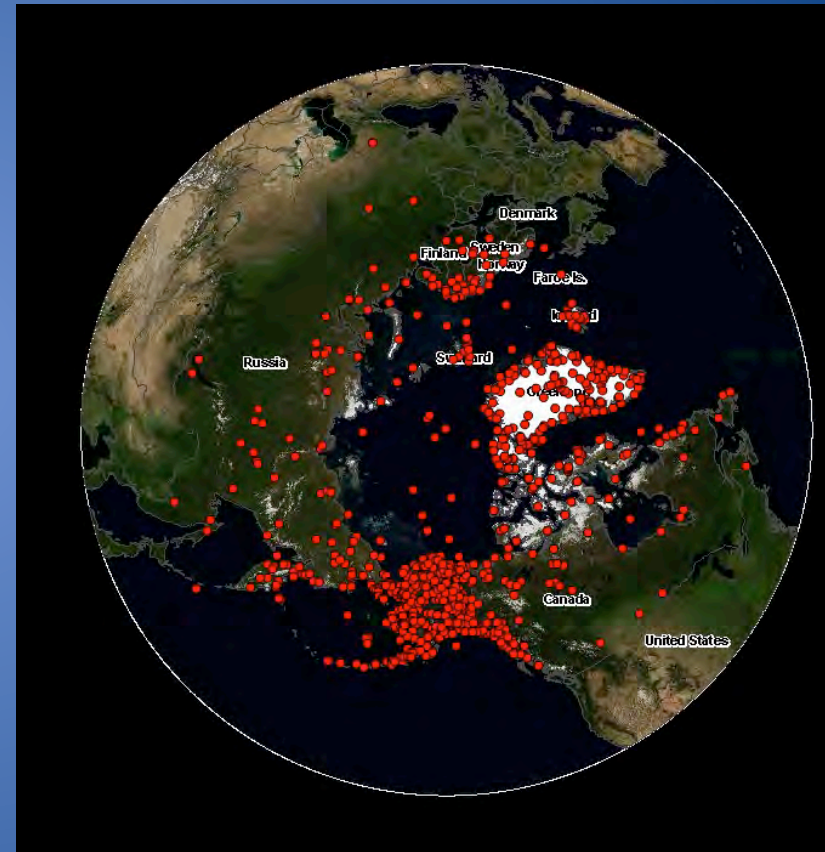


Organization into 8 Portfolios allows managers to define and organize logistics support scope more accurately and specifically

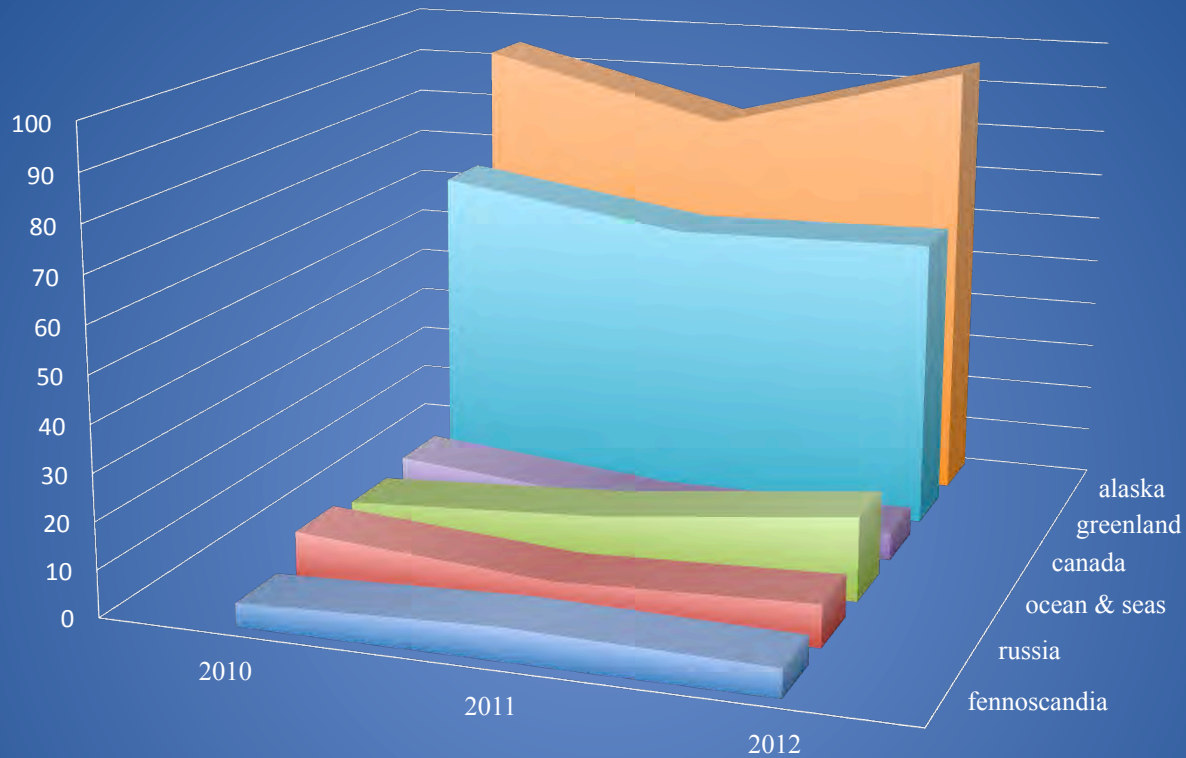
Portfolio  
#1

# Science Support

- Activities tied to a particular proposal number
  - Direct to grants, not including ships, aircraft and facilities: \$12-13M/year
- SETA Awards (Science, Engineering & Technical Assistance)
  - Arctic Consortium of the US (ARCUS)
  - Polar Geospatial Center – satellite imagery for researchers
  - Ice Drilling Design and Operations (IDDO/IDPO)
  - National Ice Core Laboratory
- 120-150 projects/year
- 1200 people/year



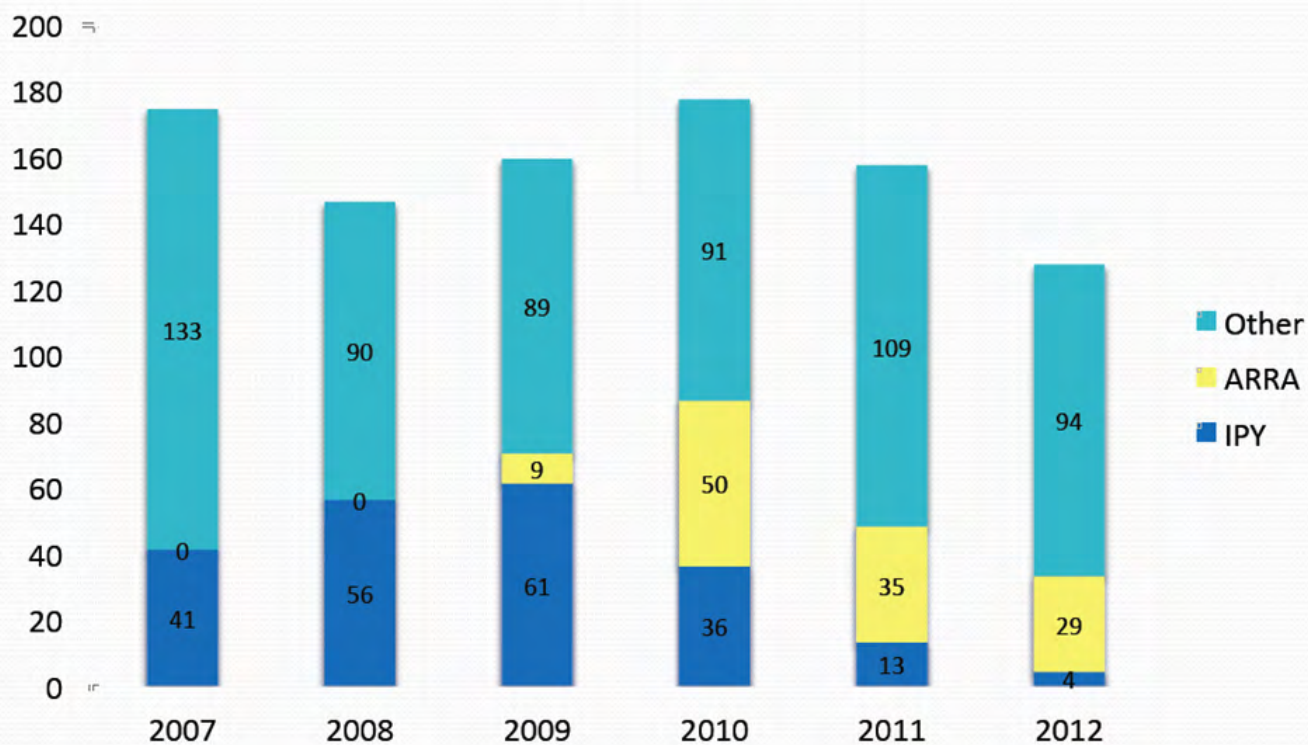
# Projects by Region



	2010	2011	2012
fennoscandia	5	7	6
russia	11	7	9
ocean & seas	9	12	18
canada	11	6	6
greenland	69	61	62
alaska	94	81	95

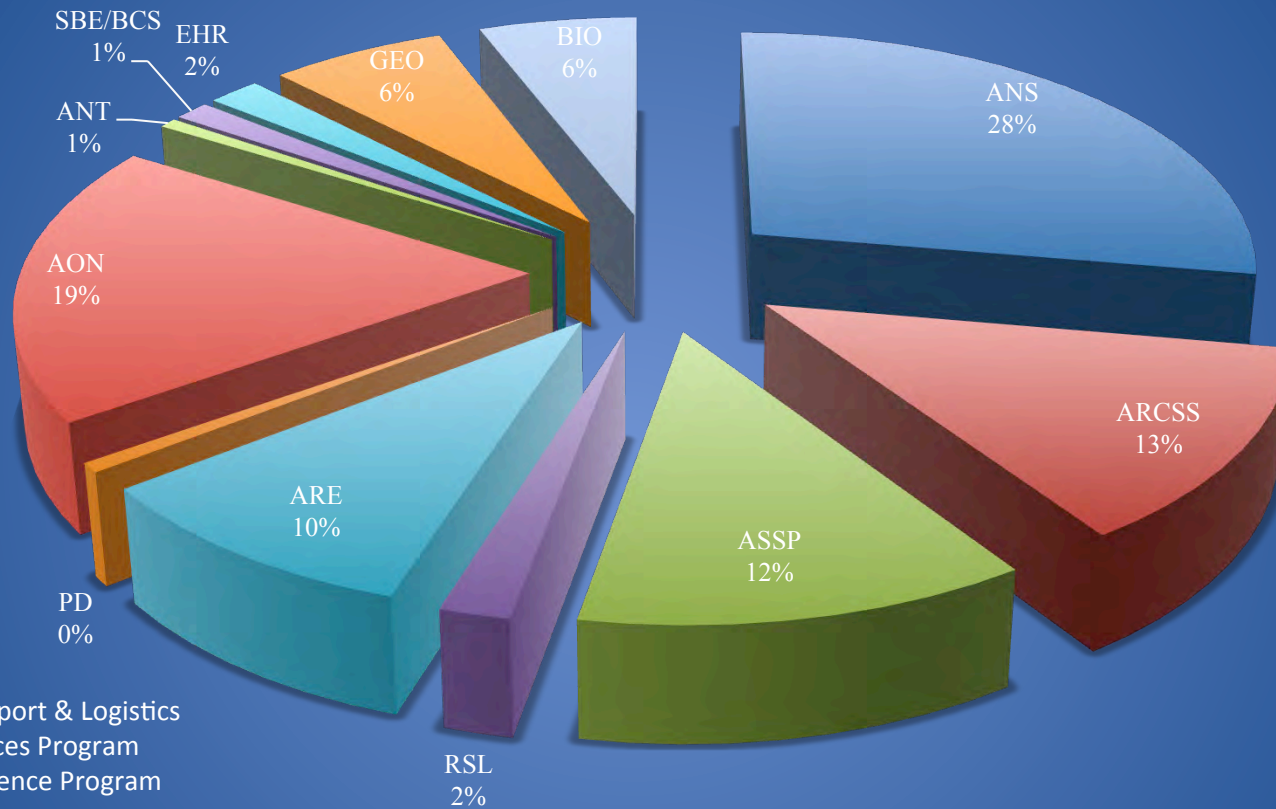
## IPY & ARRA Project Impacts 2007-2012

*2012 data as of 10.14.11*



Participant Type Totals	2009		2010		2011		2012	
	# pax	# days	# pax	# days	# pax	# days	# pax	# days
All	1283	58663	1459	61760	1461	61746	1009	45472
NSF Researcher	990	46288	1124	47693	1196	51615	808	36293
Billable Support Researcher	18	269	21	786	18	702	17	375
Interagency Researcher	84	2780	143	4525	80	927	53	1321
Other Researcher	23	1015	26	989	10	316	18	273
DV/Media	54	241	33	202	48	376	15	139
Support Personnel	114	8070	112	7565	109	7810	98	7071

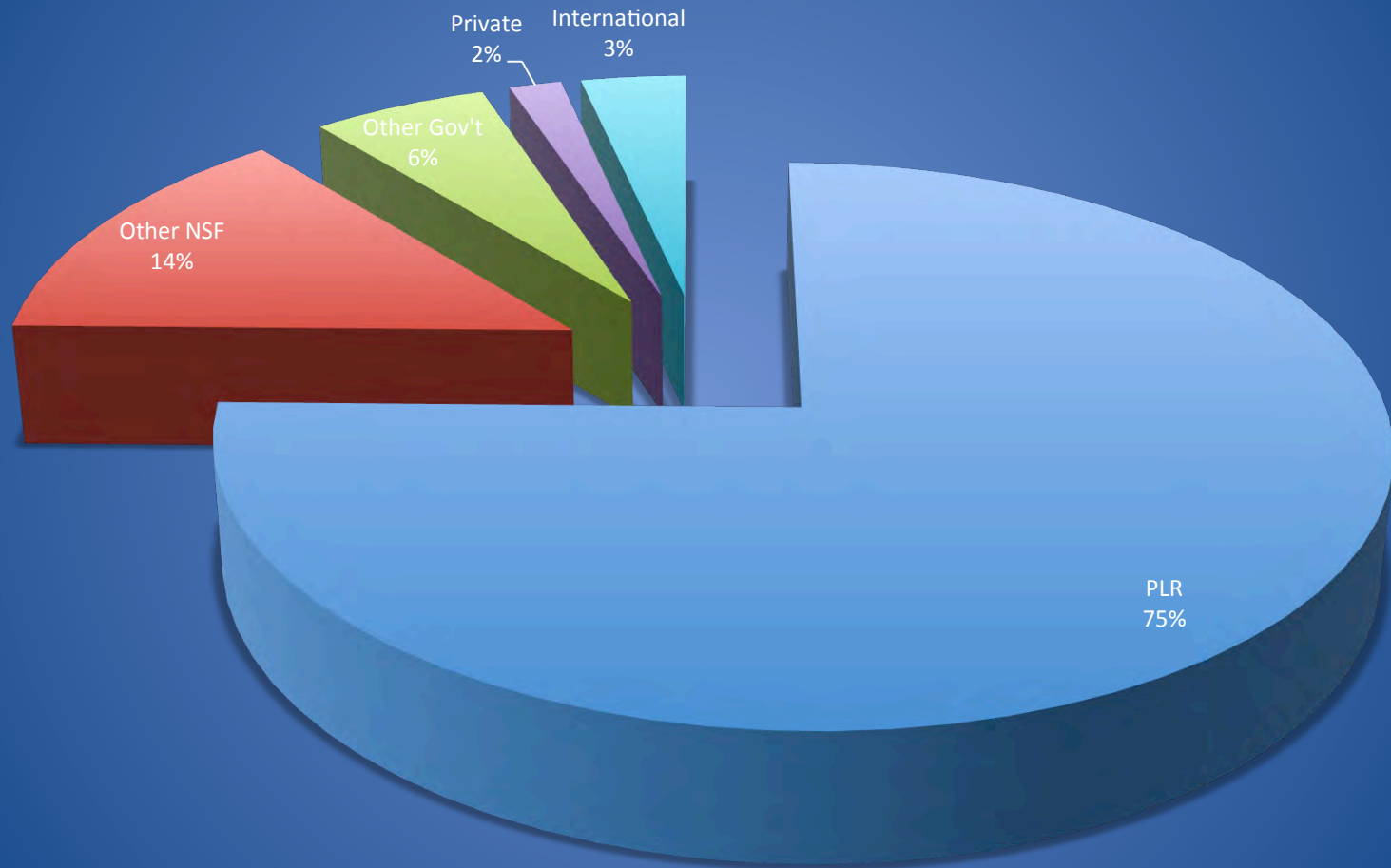
# 2012 NSF-funded CPS Projects by Program



- RSL – Arctic Research Support & Logistics
- ASSP – Arctic Social Sciences Program
- ARCSS – Arctic System Science Program
- ANS – Arctic Natural Sciences
- BIO – Directorate for Biological Sciences
- GEO – Directorate for Geosciences
- EHR – Directorate for Education and Human Resources
- SBE/BCS – Directorate for Social, Behavioral and Economic Sciences/Behavioral and Cognitive Sciences
- ANT – Section for Antarctic Sciences
- AON – Arctic Observing Network
- PD – NSF Post-Doc Awards
- ARE – Arctic Research & Education



# 2012 CPS Projects by Funding Source



Portfolio  
#2

# Health, Safety & Environment

## Field Safety Risk Management: \$1M/year

- Assist with risk management for researchers
  - Training: bears, boats, fieldwork
  - Paramedic at Summit Station
  - Bear guards for sea ice work
- Maintain safe working environment for employees
- Documentation of environmental compliance
  - Meet NSF's NEPA requirement (National Environmental Policy Act)
  - Comply with other applicable laws
- Assist with permitting
- Field Safety Risk Management Workshop Allington Oct 29-30, 2013

Postponed





Portfolio  
#3

# IT & Communications

Pooled equipment and services for researchers:  
\$3M/year

- Satellite phones
- Real-time data transmission from the field
- Remote power and autonomous instrumentation
- Internet connectivity at research hubs
- Compliance with federal laws for protection of sensitive information and network integrity

Portfolio  
#4

# Air Operations



Contract aircraft: \$5-7M/year

- Helicopters at Toolik Field Station
- Fixed-wing aircraft from cargo planes to single engine, sea ice landings to winter crew turnover at Summit
- New York Air National Guard 109<sup>th</sup> Airborne Wing (C-130 and ski-equipped LC-130)
- Funding to awardees to arrange own flying

# Vessel Operations

Contract vessels \$5-7M/year

- U.S. Coast Guard – MOU to operate Healy as a research icebreaker, Polar Star as needed: (\$45K/day)
- Foreign icebreakers (\$50K/day)
- University-National Oceanographic Laboratory System (UNOLS) vessels – the academic research fleet
  - Ship-based Science Technical Support (STARC)
  - Arctic Icebreaker Coordinating Committee
  - Sikuliaq
- Charter small boats or provide portable watercraft

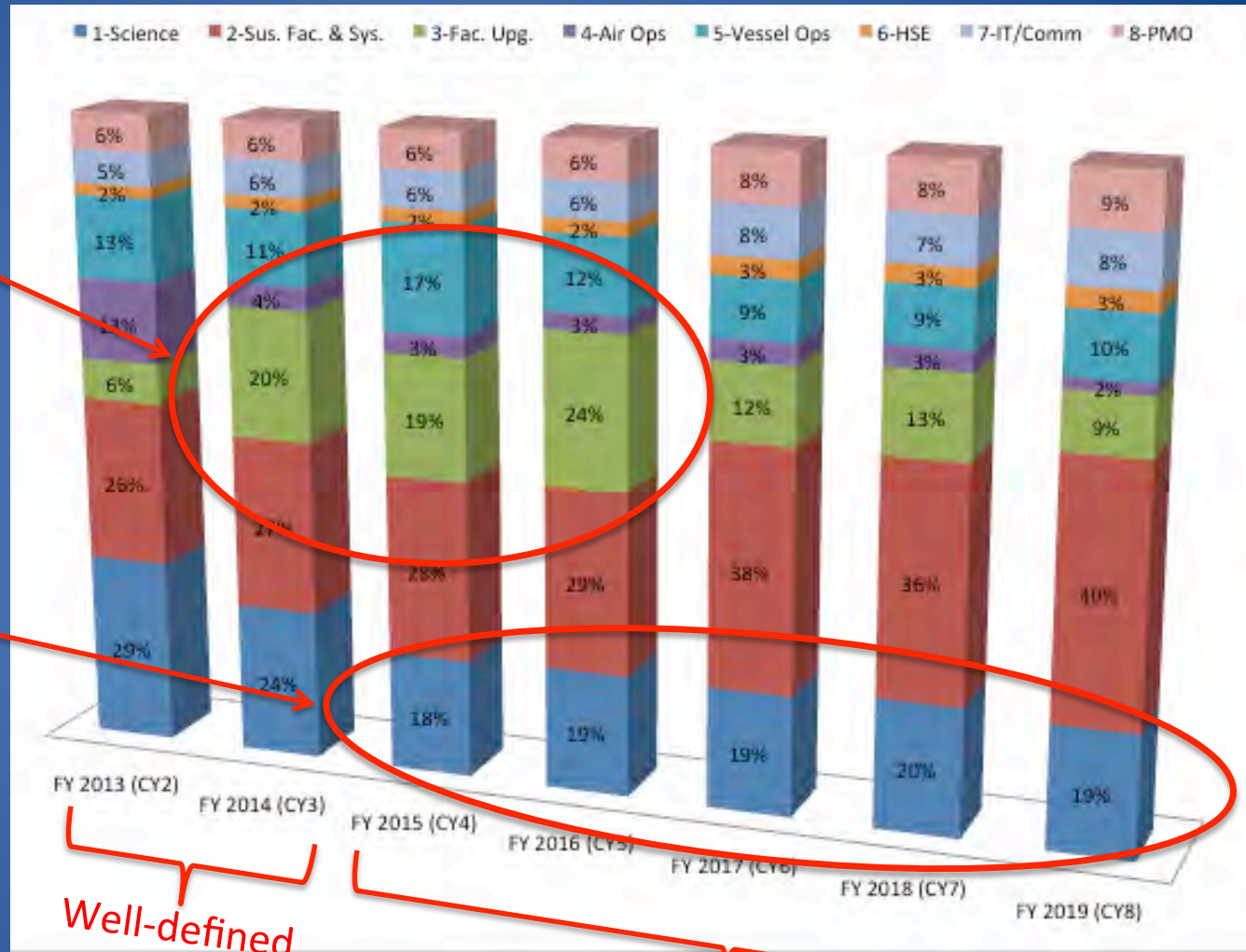
# Sustaining Facilities

Baseline operation and maintenance of current facilities and services - \$14M

- Alaska
  - Toolik Field Station, own and UAF/IAB operates jointly
  - Barrow, lease facilities
- Greenland
  - Summit Station, own and operate
  - Kangerlussuaq and Thule, lease facilities
  - Raven, own and operate
  - Greenland Inland Traverse (GRIT), own and operate to transport fuel/cargo
- International
  - Support services/facilities rental
- CPS Sites
  - Denver, Alaska offices

# RSL Budget Out-Year Planning by Portfolio


- Upcoming Facility Upgrades
- Science Support will increase in out years as additional projects are funded and budgeted for




Well-defined


Not Well-defined

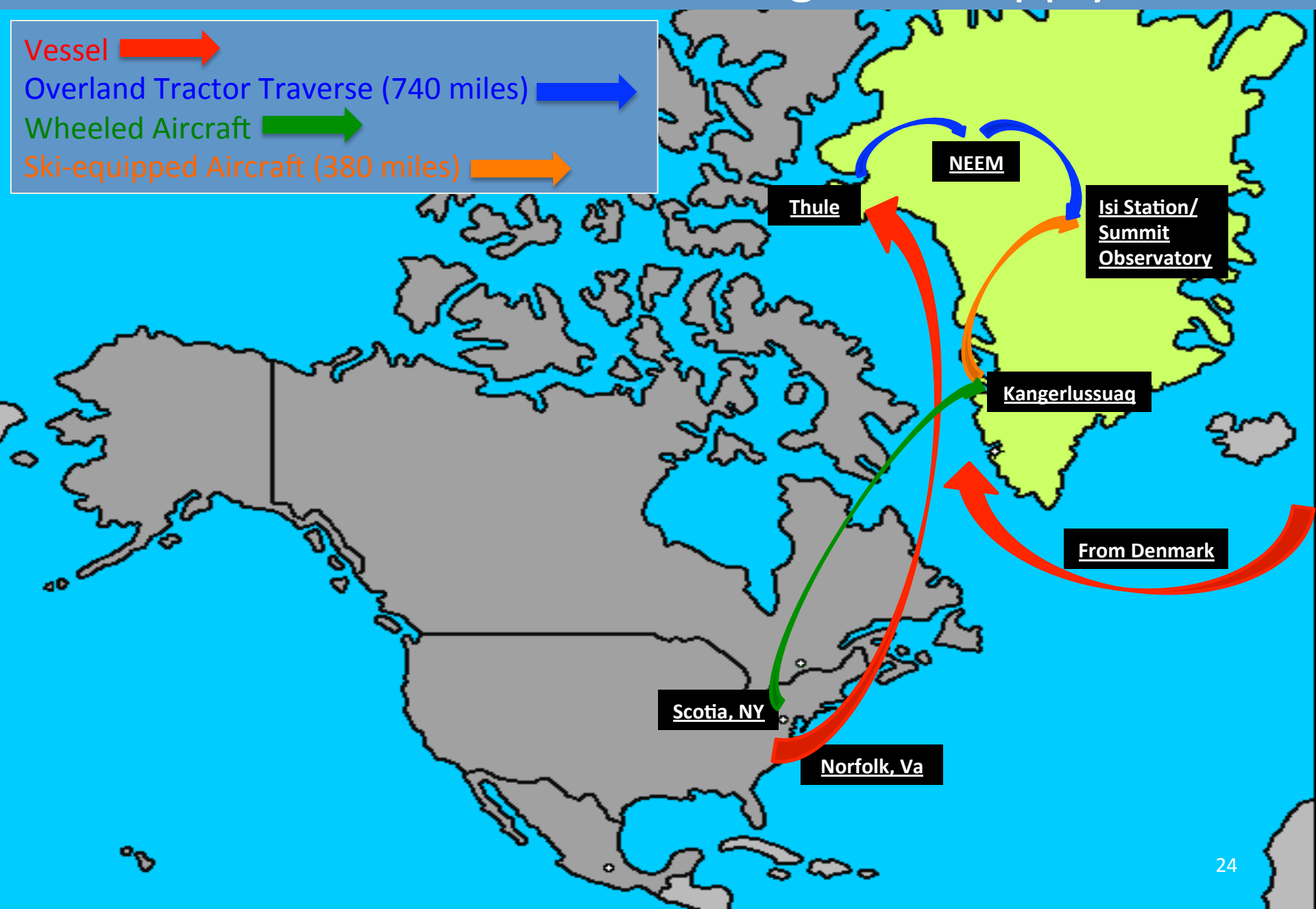
# NSF Access to Greenland – Logistics/Supply Chain

Vessel 

Overland Tractor Traverse (740 miles) 

Wheeled Aircraft 

Ski-equipped Aircraft (380 miles) 







Portfolio  
#7

# Facility Upgrades

Redevelopment, new acquisitions and new services: \$3-10M/year

- Construct or acquire new facilities, new assets or new systems
  - Toolik Dining Facility, NEON Lab, Garage
  - Atmospheric Watch Observatory (AWO) for Greenland
  - Isi Station Infrastructure for Greenland
- Refurbish existing infrastructure
  - Interior work at Thule
- Long-range planning



Portfolio  
#8

# Program Management

Methods to oversee the RSL program: \$3M/year

- Contractor support through Alternative Experts-ALEX
  - Integrated Master Schedule
  - Assistance with Program Oversight
  - Facilities maintenance and upgrade consultation
  - Traverse development expertise and management
- Project management tools
  - Government provided estimates
  - Earned Value Management
  - Competitive subcontracting by CPS for construction
- Monthly reports from service providers
- Development of new tools, like Klabjan operations model for Greenland

# Science Community Involvement in Long Range Planning

- Greenland – Science Coordination Office (SCO) provides input on ice sheet projects and RSL plans
- Toolik – Toolik Steering Committee provides input on station functions and long range planning
- NSF Committee of Visitors (COV) review of RSL Program – *report pending*
- NSF RSL Program Review Workshop – *this meeting*
  - Organizing Committee comprised of science community members
  - Literature/information review
  - Survey of broader science community

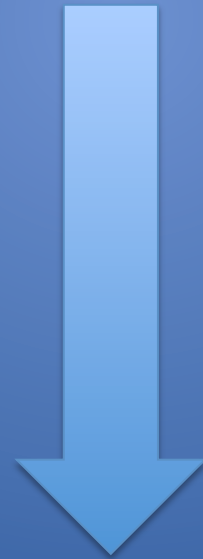
# Challenges for RSL

- Maintaining the right balance among competing demands to support research
  - Stood down Greenland Inland Traverse in 2013 to develop more efficient operation and spend resources elsewhere
  - Lease rather than own most facilities to maintain flexibility
- Maintain expertise and entrepreneurial capacity in polar infrastructure and services
  - Crevasse detection, sea ice analysis, ice coring
  - high-latitude engineering and construction
  - Technology development like electric snowmobiles, cargo sleds, robotics
- Rising fuel prices and value of the dollar
- International relationships to facilitate science

# Summary

- Focus of RSL program is to support grantees – where and when they need to be in the Arctic
  - RSL provides safe, efficient access that broadens participation, saves researchers' time and lowers costs
  - Dynamic program, responding to emerging needs and research
- Management structure allows two NSF employees to oversee entire program through portfolio structure
  - RSL maintains a pool of experts through its varied approach of a prime contractor and employing experts as needed from other agencies and organizations
- Safety and access for broad group of researchers is fundamental
- Prime Contractor brings expertise and cost savings to plan and execute science support and save money with low overhead /fee
- Additional services provided for researchers
  - Requests for satellite imagery can be met
  - Science services on Healy improved

# Extra Slides



# Greenland Inland Traverse (GrIT)

- 1200 Km over snow tractor traverse from Thule Air Base to Summit Station – aimed at reducing # of flights to Summit
- In development since 2007
- Annually delivers fuel and cargo to Summit, and NEEM
- Benefits include low emissions and ability to haul oversize cargo
- Joint development effort with US Antarctic Program
- Supports research on the ice sheet
- First 80 Km heavily crevassed and increasing due to melt
- 2010
  - 97,800 lbs. fuel
  - 27,290 lbs. cargo
  - Including 17K lbs. fuel/cargo to NEEM
  - Support of education project, GoNorth Polar Huskies
- 2011
  - 177,860 lbs. Fuel
  - 7000 lbs. Cargo
  - Including 42K lbs. fuel to NEEM
  - Support of Hawley/Courville NSF and IceBridge project
- 2012
  - 175,874 lbs. Fuel
  - 66,000 lbs. Cargo
  - Including 63K lbs. fuel to NEEM
  - 10,000 lbs cargo retro'd



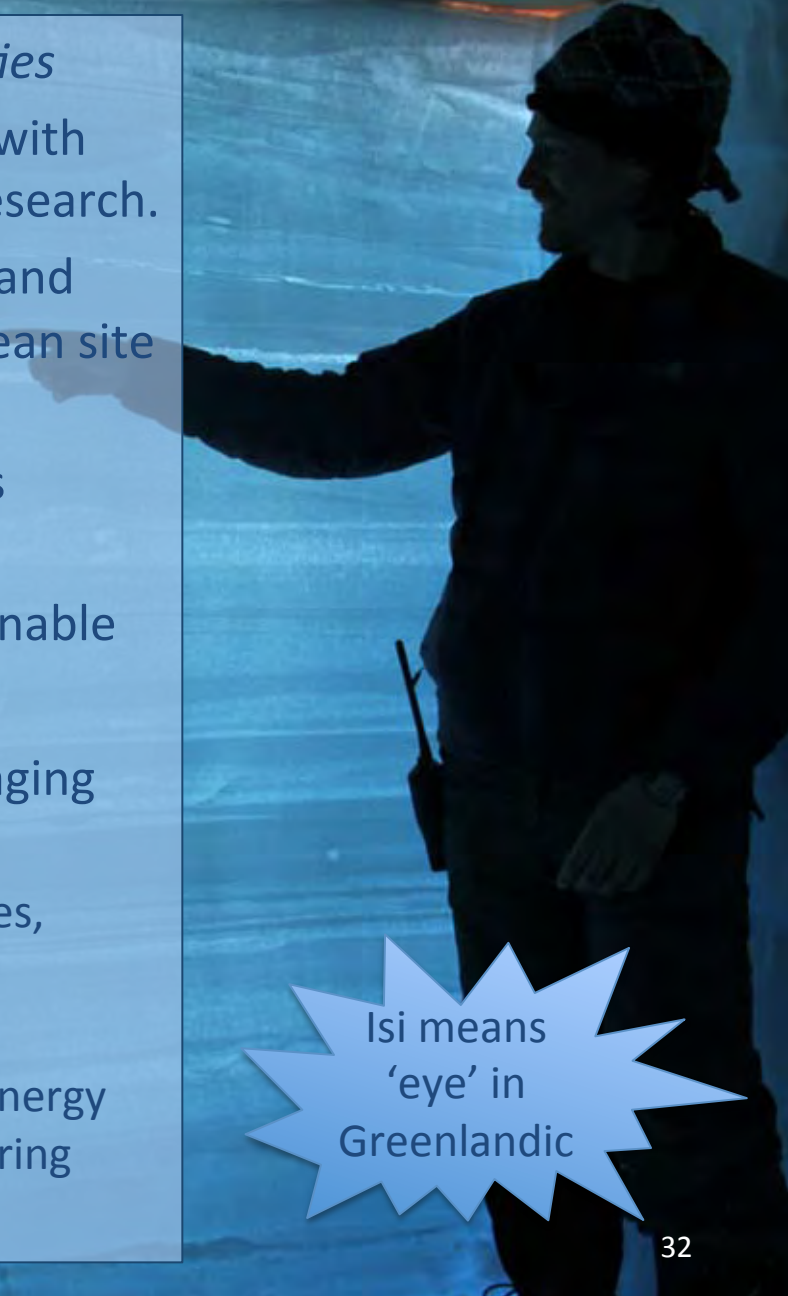
Photo Credit: Robin Davies



# Vision for Summit Observatory, Isi Station

## *...Moving Science Forward with Sustainable Facilities*

- Current site will become Summit Observatory with new facility for continued long-term climate research.
- Operational activities, infrastructure, runway, and scientific research efforts that don't require clean site will move 5 Km North to new Isi Station.
- Install efficient facilities to better serve today's science (originally designed for drilling)
- Buildings will be efficient, safe, scalable, sustainable
- Will employ renewable power capabilities
- Accomplished through team approach by engaging experienced stakeholders across organizations
  - Core Stakeholders - NSF, CH2MHill Polar Services, Greenland Science Coordination Office and Government of Greenland
  - Subject Matter Experts – National Renewable Energy Lab, US Army Cold Regions Research & Engineering Laboratory

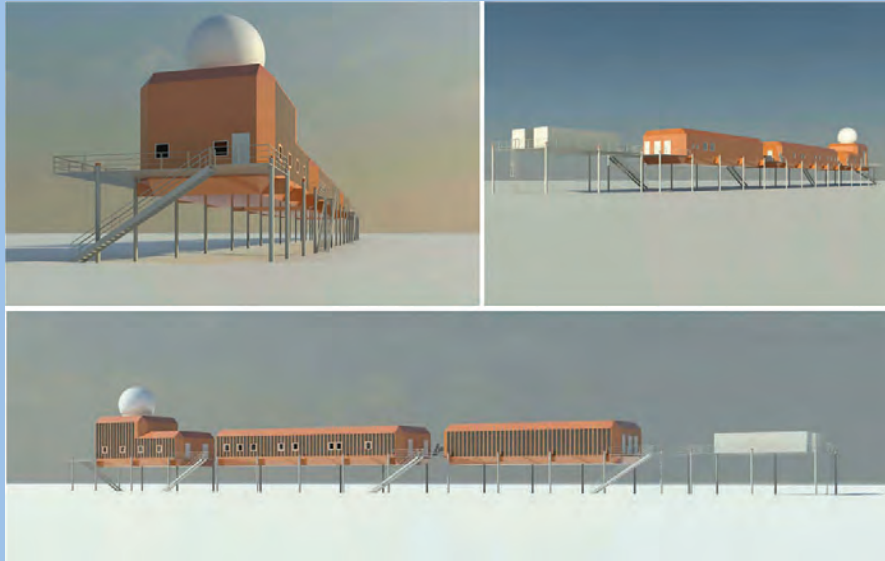


Isi means  
'eye' in  
Greenlandic



# Greenland Facility Upgrade Plans – Isi Station and Summit Observatory

## New Isi Station Concept



- Residence
- Dining
- Power Plant/Emergency Power Plant
- Lab/Balloon Inflation
- Garage

Cost loaded schedules and long-range planning essential

## New Summit Observatory Concept



- Elevated 'Big House' will remain for wx shelter
- Atmospheric Watch Observatory (AWO) building will be installed
  - Based on Halley VI design with modern, efficient technology
  - Will house NOAA's ESRL instrumentation & NSF PI instruments
  - Building can be raised using integrated hydraulic leg-lifting design to mitigate snow accumulation

# Greenland Telescope

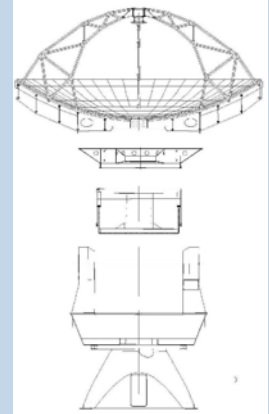


## *Project Synergies-*

- Collaboration between Smithsonian Astrophysical Observatory (SAO) and Academia Sinica Institute of Astronomy and Astrophysics (ASIAA).
- In 2011, NSF awarded SAO a 12-m radio telescope, built as a prototype antenna for the ALMA array in Chile, with understanding of no further NSF funding for refurbishment or installation.
- Project seeks to relocate antenna to a high, dry site suitable for sub-mm and terahertz science observations, including mm VLBI, science objective is to image a super-massive black hole.
- Site characteristics such as low water vapor, low temperatures and high altitude make Summit/Isi ideal.
- Leveraging SAO/ASIAA resources to install at NSF site benefits existing NSF operations and science community, and plans for moving all non-clean air/snow activities away from Summit Station.
- Plans are to allocate 70% of telescope time to project science objectives, with remaining 30% available for other outside science groups (including international partners).

## *Current Status-*

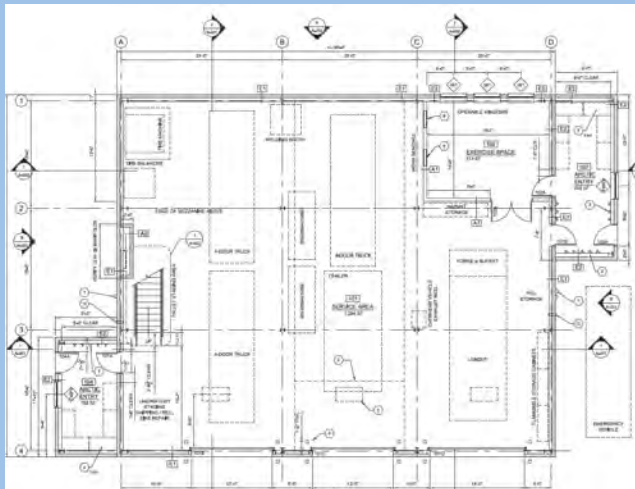
- Telescope being retrofitted for Arctic operations
- Will arrive at Thule in 2014 for reassembly and testing
- Unique engineering and logistical challenges
  - Large size and heavy weight requires overland transport on specially designed sleds
  - Snow Foundation and special 'elephant stool' platform at Isi Summit to support 20 years of operation



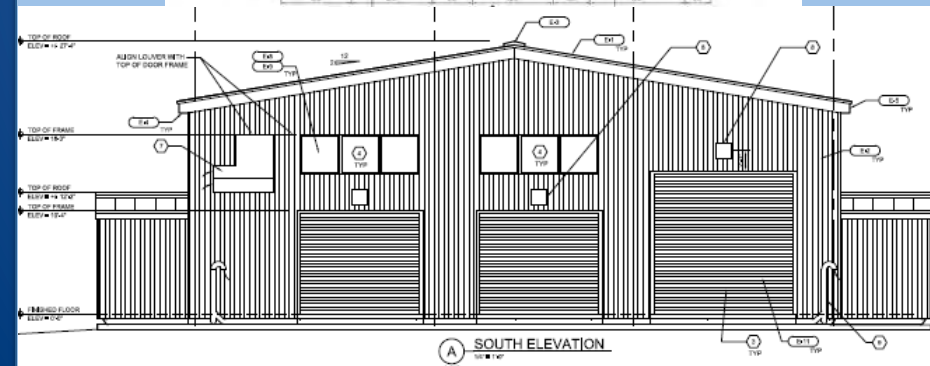
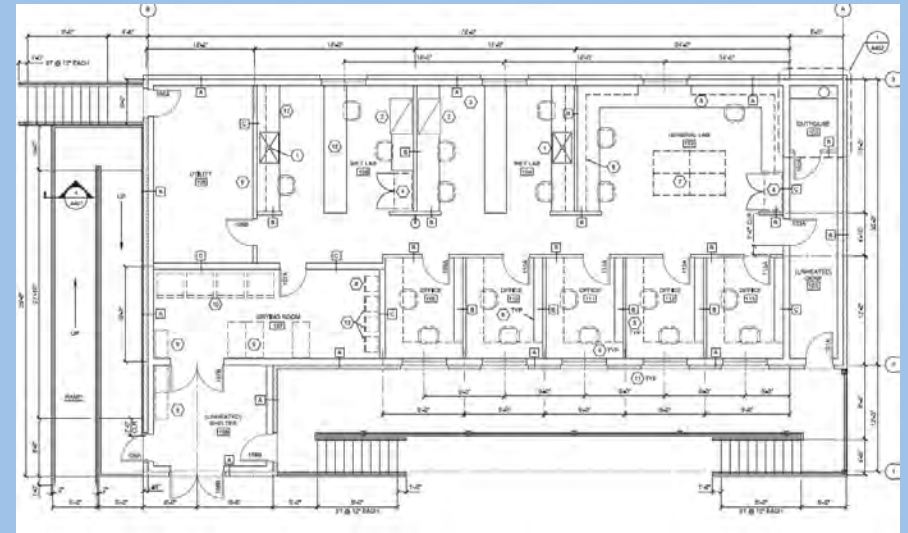
# Alaska Facility Upgrade Plans – Toolik Field Station

National Ecological Observatory Network (NEON) is providing funds for facility upgrades at Toolik

## Garage



## Laboratory



Future dormitory design and construction also planned