

NOAA's Engagement with U.S. CLIVAR

NOAA/OAR Climate Program Office

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NOAA Ocean Observing and Monitoring

U.S. CLIVAR Summit
Long Beach, CA
6 - 8 Aug 2019



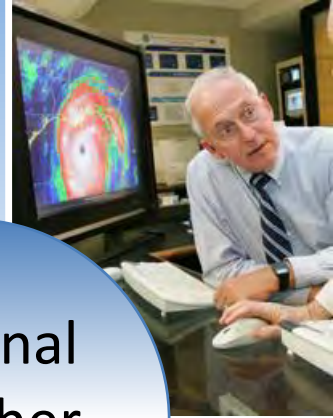
NOAA Line Offices



National
Ocean
Service



National
Weather
Service

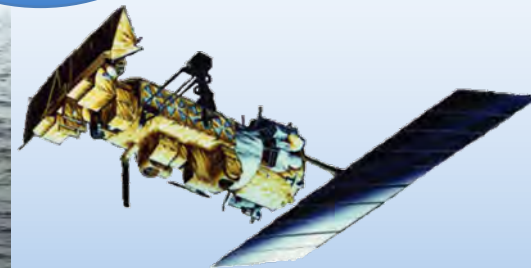
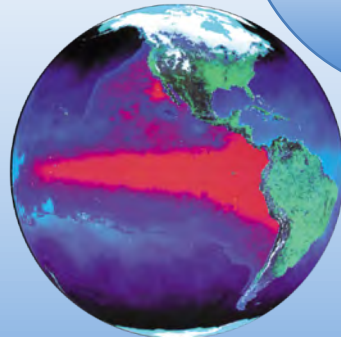


National
Fisheries
Service



NOAA
Research
(OAR)

National
Environmental
Satellite, Data,
and
Information
Service



NOAA has many parts - OAR has NOAA Labs, Cooperative Institutes, and Research Programs

Line Offices:

NOAA

OAR
(Research)

NWS
(Weather)

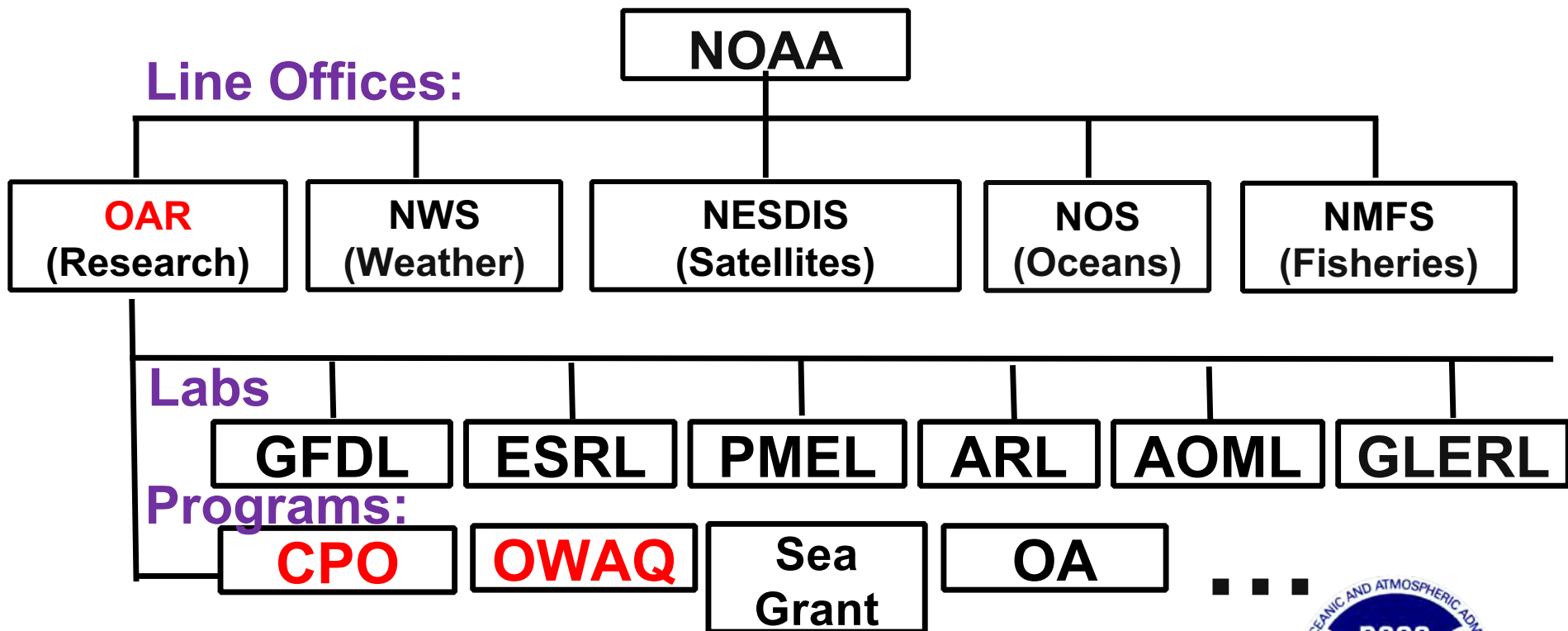
NESDIS
(Satellites)

NOS
(Oceans)

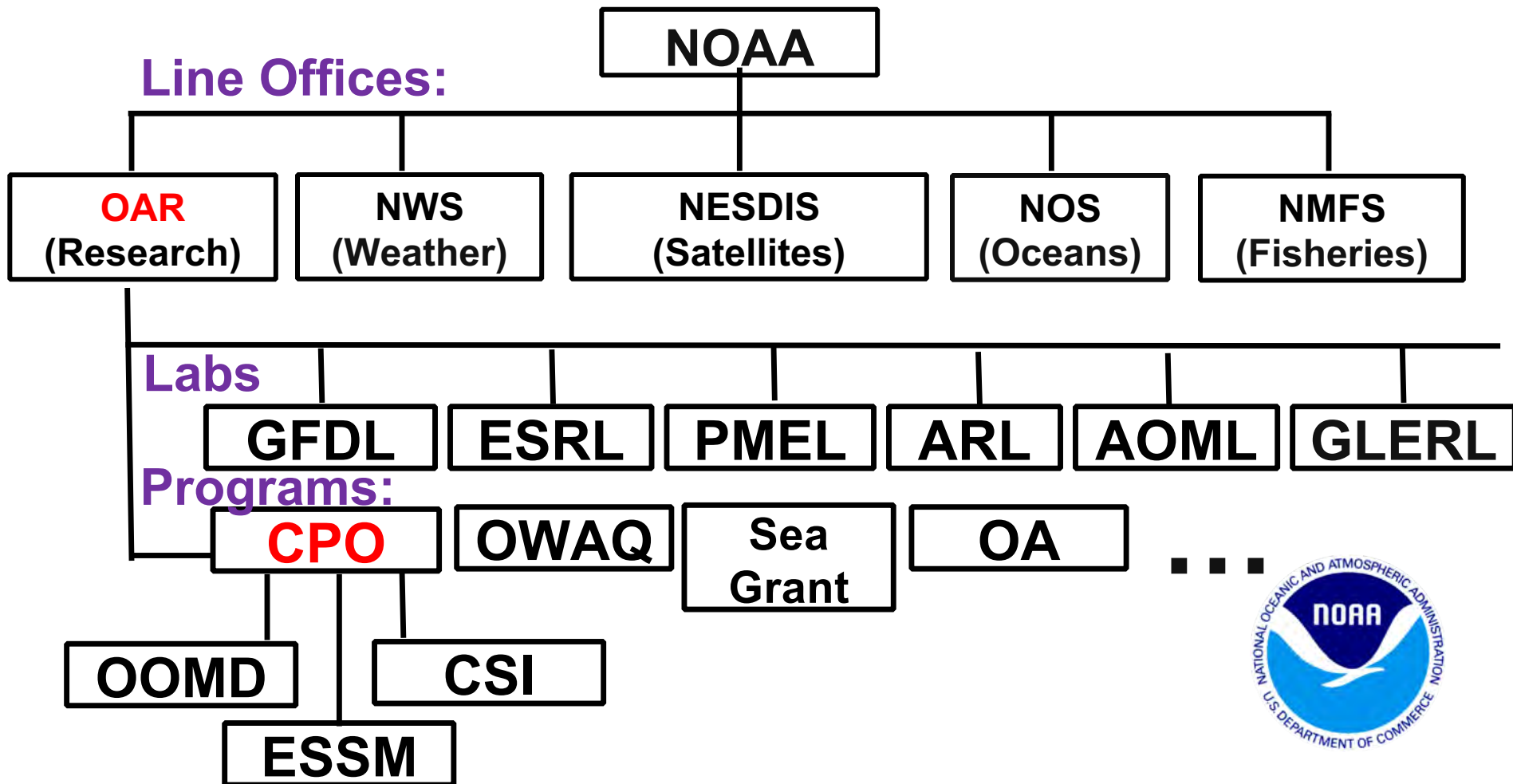
NMFS
(Fisheries)



NOAA has many parts - OAR has NOAA Labs, Cooperative Institutes, and Research Programs



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NOAA

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NMFS
(Fisheries)

Labs

GFDL

ESRL

PMEL

ARL

AOML

GLERL

Programs:

CPO

OWAQ

Sea
Grant

OA

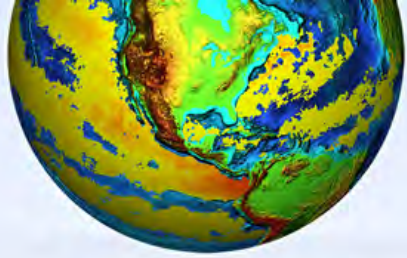
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OOMD

CSI

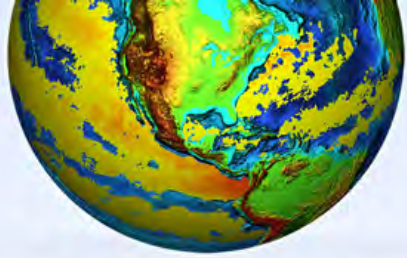
ESSM





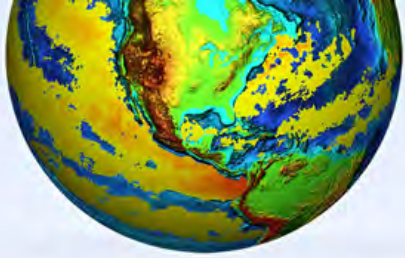
Recent U.S. CLIVAR-Relevant Activities Supported by NOAA

- Process Studies
 - Past: EPIC, NAME, VOCALS, DYNAMO;
 - Current: AMOC, ATOMIC, CPTs, CVP-TPOS, YMC
- Modeling
 - CMEP 1 & 2, CMIP5 & 6; >> Re-analyses: 20CR, CFSR
 - S2S – DYNAMO/YMC, MAPP S2S Task Force (S2S now managed by OWAQ)
 - Climate Test Bed prediction projects (e.g., NMME and SubX)
 - MAPP Process-level model diagnosis package
 - Drought understanding, monitoring, prediction
 - Experimental seasonal prediction of sea-level and marine resources
 - Arctic Sea Ice Growth and Loss, Ice Sheet Calving
- Sustained Ocean Observations
 - Argo, Tropical moored buoy array (e.g. RAMA, PIRATA, TPOS 2020), GO-SHIP, global surface drifters, air-sea flux moorings, gliders, new technologies, etc.



Long-range Climate Research Areas Related to U.S. CLIVAR

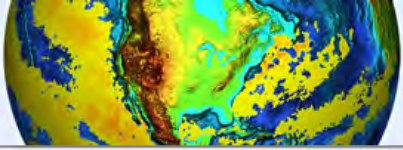
- Sustaining , evolving, and enhancing the ocean observing system (including the Arctic), over for the next decade, e.g. - Tropical Pacific Observing System-TPOS 2020 project, global biogeochemistry, etc. - will be a NOAA focus.
- Observing system impact and design studies, improved observation-based products
- Predictability, prediction and projections: improving understanding of climate processes, their predictability and their representation in models and prediction systems
- Increased focus on process-oriented metrics for model development (leverage CMIP6 experiments)
- Drought understanding, predictability and prediction.
- Climate re-analyses
- Information to support decision-making on a regional scale



Initial Climate Risk Areas

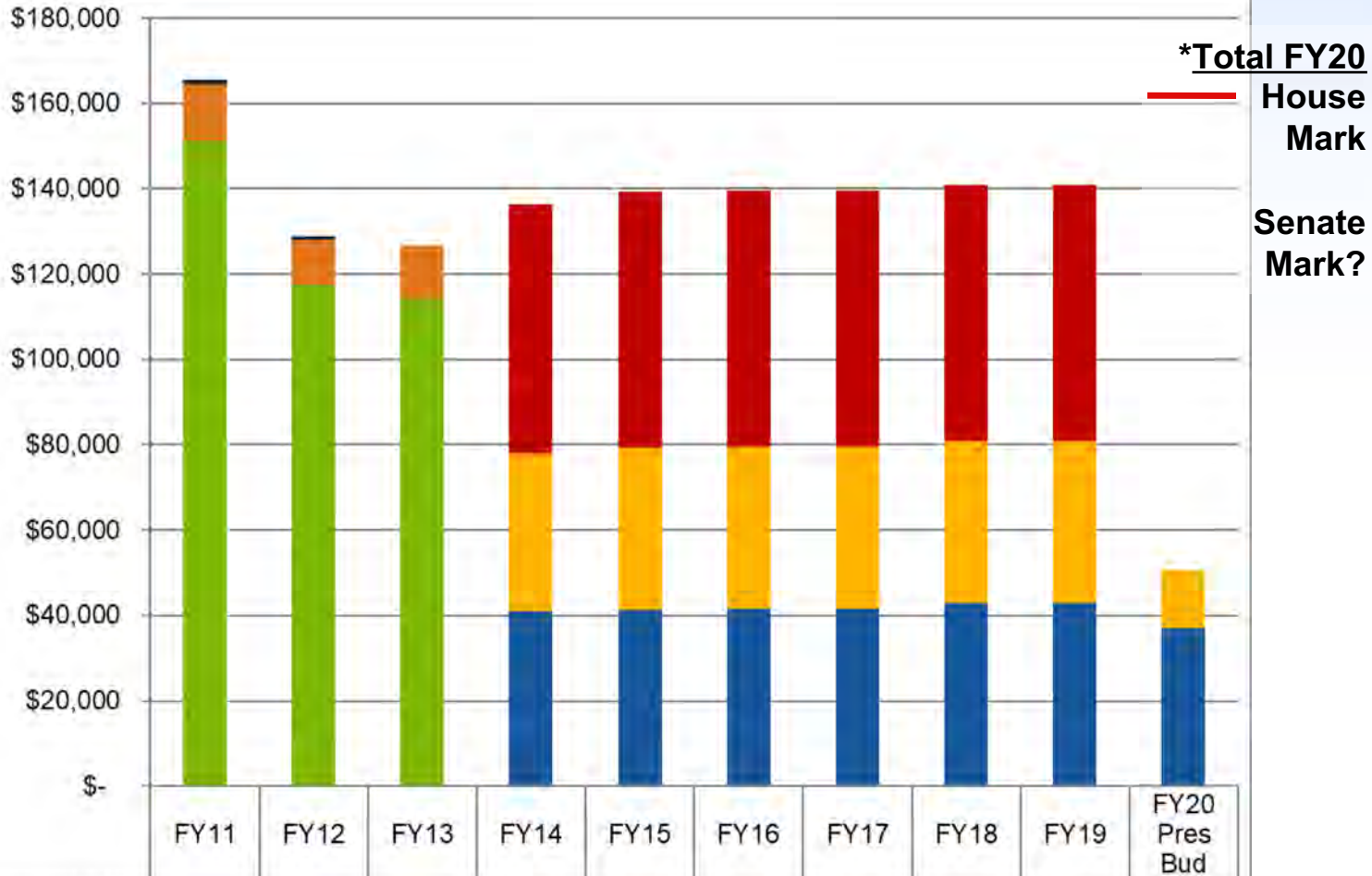
(CPO-Led, to align and support NOAA-wide interests)

INITIAL RISK AREAS	RISKS ADDRESSED	PRIMARY SECTORS ADDRESSED AT NATIONAL & REGIONAL SCALES	OAR STRATEGIC PRIORITIES ADDRESSED
EXTREME HEAT	Temperature Air Quality and Atmos Comp Wildfire	Human Health Built Environments/Transportation Agriculture, Forestry, Land-Use Management Energy	Make Forecasts Better Drive innovative science
MARINE ECOSYSTEMS	Ocean Temperature Composition	Fisheries Tourism Coastal Management Transportation	Detect changes in the ocean and atmosphere Explore Marine Environment Drive innovative science
COASTAL INUNDATION	Precipitation Storms Sea level rise Coastal Inundation	Coastal Management Built Environments/Transportation Emergency & Disaster Management Water Resource Management Reinsurance	Detect changes in the ocean and atmosphere Make Forecasts Better Drive innovative science
WATER RESOURCES	Temperature Precipitation Wildfire Drought Inland flooding	Water Resource Management Emergency & Disaster Management Human Health	Detect changes in the ocean and atmosphere Make Forecasts Better Drive innovative science

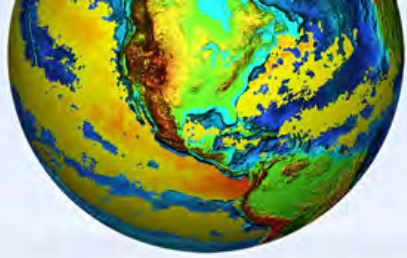


Climate Program Office Budget (in \$K)

*FY20 shows the President's Budget. The President's Budget has a cut of ~\$90M from FY19 for CPO; House Markup has an \$20M increase from FY19; The FY20 Senate Markup has not been released.



■ Climate Competitive Research (CCR)				\$58,500	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$0
■ Regional Climate Data and Information (RCDI)				\$37,000	\$38,000	\$38,000	\$38,000	\$38,000	\$38,000	\$38,000	\$13,546
■ Sustained Ocean Observations and Monitoring (SOOM)				\$41,000	\$41,300	\$41,596	\$41,596	\$42,823	\$43,000	\$43,000	\$37,140
■ Climate Operations (CO)	\$911	\$908	\$-								
■ Climate Data & Information (CDI)	\$13,049	\$10,406	\$12,115								
■ Competitive Research Program (CRP)	\$151,491	\$117,685	\$114,519								



Item of Interest - NOAA CPO FY20 Federal Funding Opportunity

LOI's due: August 23, 2019; Proposals Due: October 28, 2019

Earth System Science and Modeling (ESSM) Program FY20 competitions:

AC4 - Urban atmosphere in a changing climate: chemistry, carbon and composition

COM - Developing terrestrial-, marine-, and ice-atmosphere boundary layer datasets through collaborations between observations and modeling communities

MAPP - Characterizing and Anticipating U.S. Droughts' Complex Interactions

MAPP - Constraining Models' Climate Sensitivity

Multi-Program (MAPP, CVP, COM) - Explaining Climate Extreme Events: Developing a Rapid Assessment Capability and Understanding the Causes and Mechanisms of Extreme Events

Cross-Division FY20 competitions: Supporting the Needs of NOAA Fisheries

ESSM/CVP - Climate and Changing Ocean Conditions - Process Research and Modeling to Support the Needs of NOAA Fisheries

ESSM/MAPP - Modeling Climate Impacts on the Predictability of Fisheries and Other Living Marine Resources

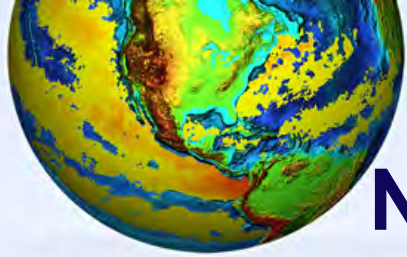
CSI/COCA - Understanding Climate Impacts on Fish Stocks and Fisheries to Inform Sustainable Fisheries Management

Please see <http://www.cpo.noaa.gov/> for additional information on the FFO

Background Slides

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NOAA Climate Program Office

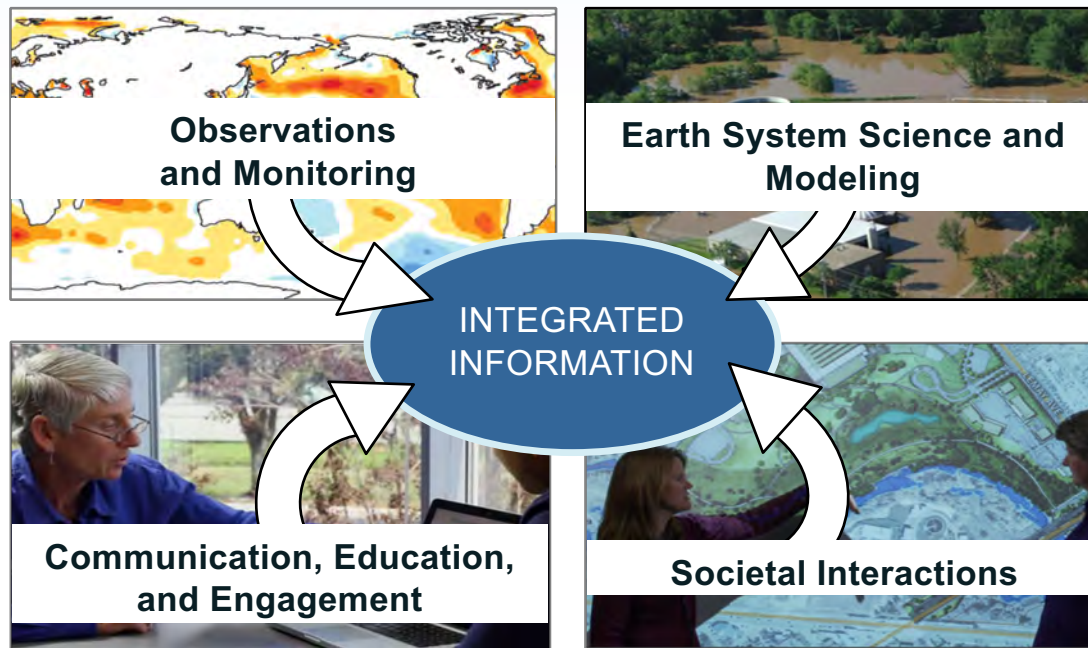




NOAA Climate Program Office (CPO)

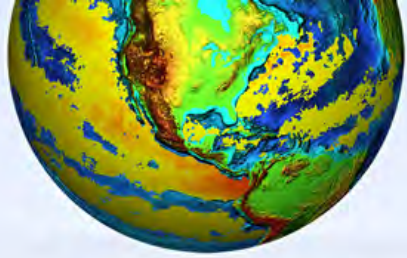
Director: Wayne Higgins

Mission: Advance scientific understanding, monitoring, and prediction of climate and its impacts to enable effective decisions



Activities:

- Support NOAA mission-driven research priorities
- Engage community in NOAA mission through annual Federal Funding Opportunity
- Facilitate coordination, collaboration, and integration
- Accelerate transition activities to improve NOAA operational services



CPO Grant Programs

OOMD - Ocean Observing and Monitoring

COM - Climate and Ocean Monitoring

AC4 - Atm. Composition, Chemistry, and Carbon Cycle

CVP - Climate Variability and Predictability Program

MAPP - Modeling, Analysis, Predictions and Predictions

SARP - Sectoral Applications Research Program

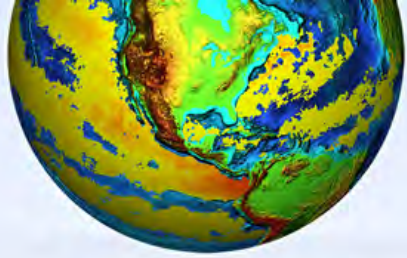
COCA - Coastal and Ocean Climate Applications

RISA - Regional Integrated Sciences and Assessments

IRAP - International Research and Applications Program



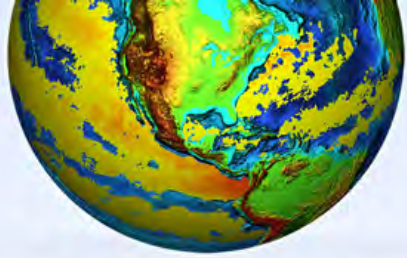
Each program develops a targeted call for proposals in the Notice of Funding Opportunity (NOFO), which is published annually at Grants.gov and posted on the CPO website.



NOAA Climate Program Office

(www.cpo.noaa.gov/) Wayne Higgins, Director

- **Ocean Observing and Monitoring (OOMB)** - Designs, deploys, and maintains an integrated global network of ocean-based observations to produce continuous records and products for research, forecasting, and assessments. The Arctic Research Program (in OOMB) is focused on sustained observing of the Arctic in support of commerce and sustainable systems. **Lead: David Legler; Program Manager: Jim Todd**
- **Earth System Science and Modeling (ESSM)** **Lead: Jin Huang**
 - **Climate and Ocean Monitoring (COM)** – focuses on the development and improvement of climate and Earth system related data sets, the transformation of climate and Earth system-related observations into authoritative products, and the interpretation of these products to better understand the past, current and changing state of the climate and Earth systems. **Program Manager: Virginia Selz**
 - **Climate Variability and Predictability (CVP)** – provides process-level understanding of the climate system through observation, modeling, analysis, and field studies to support the development of improved climate models and predictions in support of NOAA's mission. **Program Manager: Sandy Lucas**
 - **Modeling, Analysis, Predictions, and Projections (MAPP)** – aims to enhance the capability to predict and project variability and change in Earth's climate system; focusing on the coupling, integration, and application of Earth system models and analyses. **Program Managers: Annarita Mariotti, and Dan Barrie**
 - **Atmospheric Chemistry, Carbon Cycle, & Climate (AC4)** – Determine the processes governing atmospheric concentrations of greenhouse gases and aerosols in the context of the Earth System and Climate. **Program Managers: Monika Kopacz and Ken Mooney**
- **Climate and Societal Interaction (CSI)** – provides leadership in developing interdisciplinary science and services, including assessments, for application in climate-sensitive sectors and regions. **Lead: Claudia Nierenberg**



How US CLIVAR Can Engage & Provide Value

US CLIVAR:

- Organizes/Coordinates the research community to establish the needs and requirements for future scientific advancement (and current gaps) and to express where additional resources are needed.
- Helps coordinate interagency response to community research initiatives
- Helps to organize the community to deliver research results after resources are allocated.
- Helps link US research to international research initiatives

Examples (of where US CLIVAR can engage):

- NOAA will continue to need updated requirements for observation systems (e.g. OOPC, GCOS mechanisms)
- NOAA will continue to look to the research community to initiate new observing activities (e.g., BGC-Argo) and products to exploit them
- NOAA will need support in the area of technology development (e.g., Deep Argo)
- NOAA will continue to look to the research community for development of field campaigns.

NSF Overview

US CLIVAR Summit



Long Beach, CA
August 6th 2019

Xujing Jia Davis

Program Director

Arctic Natural Sciences (ANS)

Arctic Sciences Section (ARC)

Office of Polar Programs (OPP)

US CLIVAR Inter-Agency Group (IAG) NSF Members



Current

Eric DeWeaver: Lead Program Director of AGS/Climate and Large-Scale Dynamics Program (CLD)

Mete Uz: Lead Program Director of OCE/Physical Oceanography Program (PO)

Xujing Jia Davis: Program Director of OPP/Arctic Natural Sciences (ANS), OCE/PO previously

Previously



Eric Itsweire: 27 years with OCE/PO
Retired February 2018



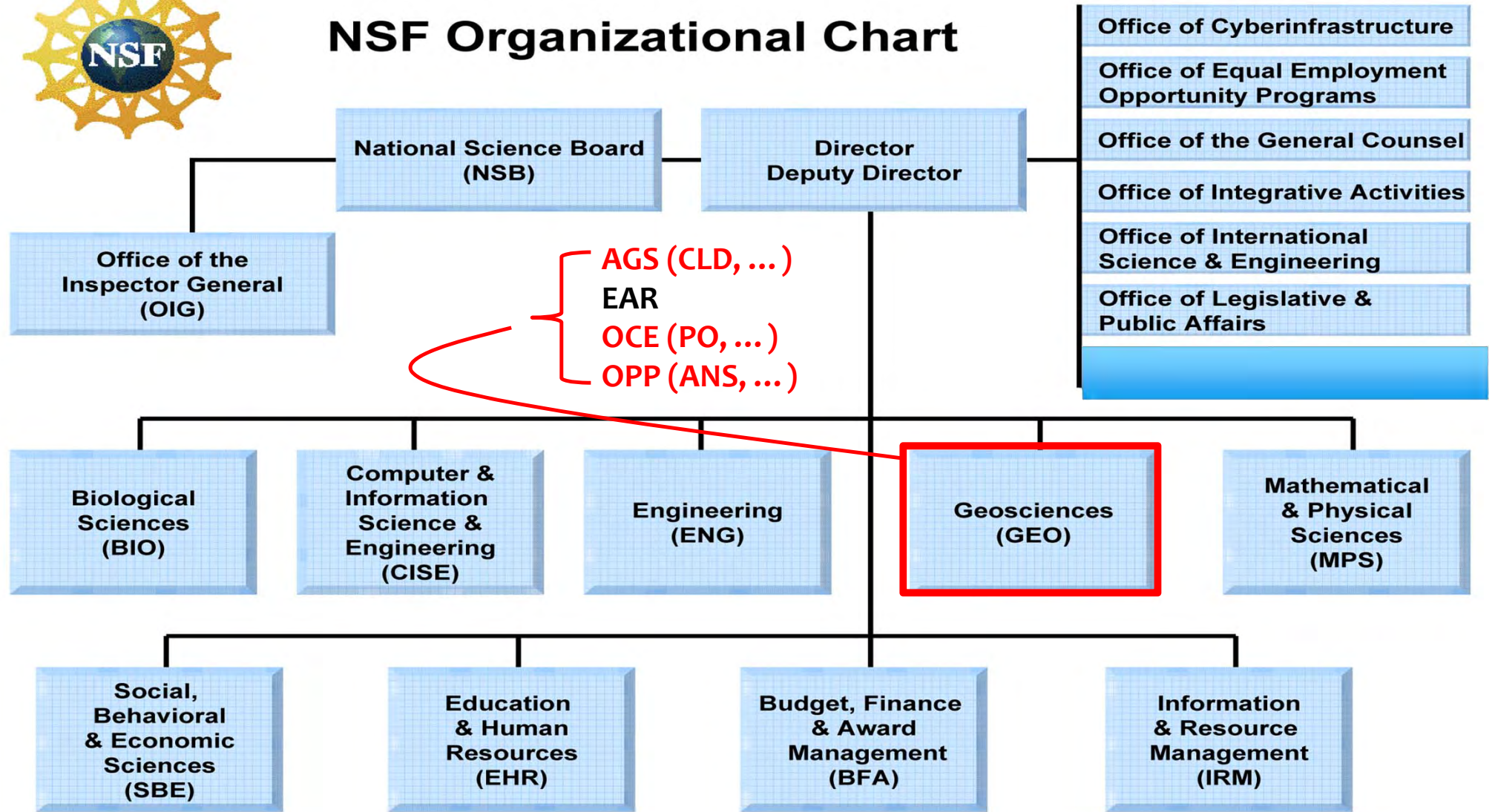
Anjuli Bamzai: Current AGS DD, previously Lead Program Director of AGS/CLD, OPP/ANS, DOE and NOAA

NSF with CLIVAR: Coordinate with other agencies (NOAA, NASA, DOE and ONR), support CLIVAR project office and activities that are of interest of NSF

E.g., Science Teams (e.g., AMOC), Working Groups (e.g., Large Ensemble, Arctic-midlatitude, ENSO), Workshops (e.g., Mesoscale eddy), Climate Process Teams (CPT), US GO-SHIP...



NSF Organizational Chart



NSF OPP Arctic Sciences Section (ARC)



Mission: Support fundamental research at the forefront of understanding the Arctic, including its human and natural components, and its global linkages.

**NSF wide effort /Multidisciplinary/
Global relevance:** e.g., mid-latitude Arctic connections, the role of Arctic in global ocean/atmosphere/earth system (with PO, CLD and other related programs)

ARC Science Programs relevant to CLIVAR

Arctic Natural Sciences
(ANS)

Arctic System Sciences
(ARCSS)

Arctic Observing Network
(AON)

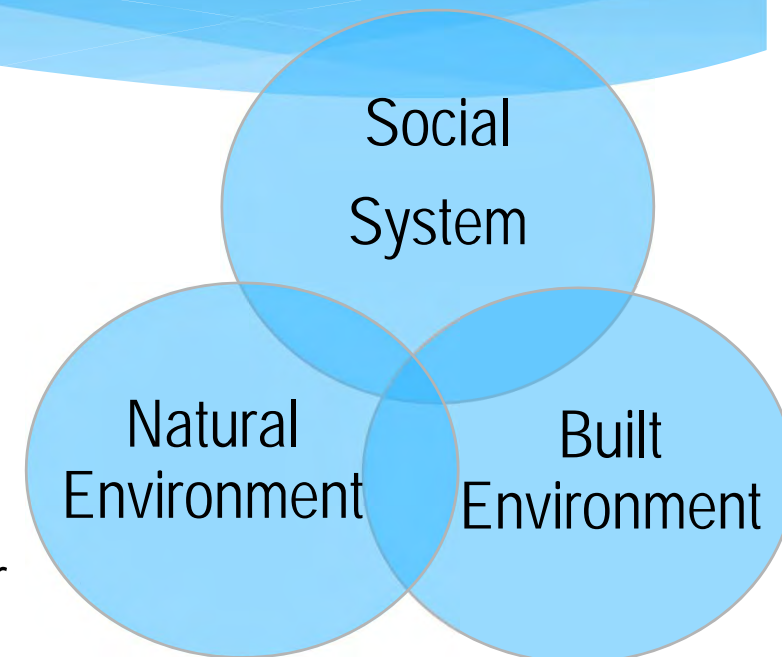


Highlights of Current Arctic efforts

Navigating the New Arctic (NNA)



- One of the NSF's 10 Big Ideas
- NSF-wide initiative to tackle *convergent scientific challenges* in the rapidly changing Arctic needed to inform the economy, security, and resilience of the Nation, the circumpolar region and the globe
- Solicitation NSF 19-511 (deadline Mar 4th), 5 year initiative



Questions: contact NNA Working Group nna@nsf.gov

Highlights of Current Arctic Efforts

MOSAiC

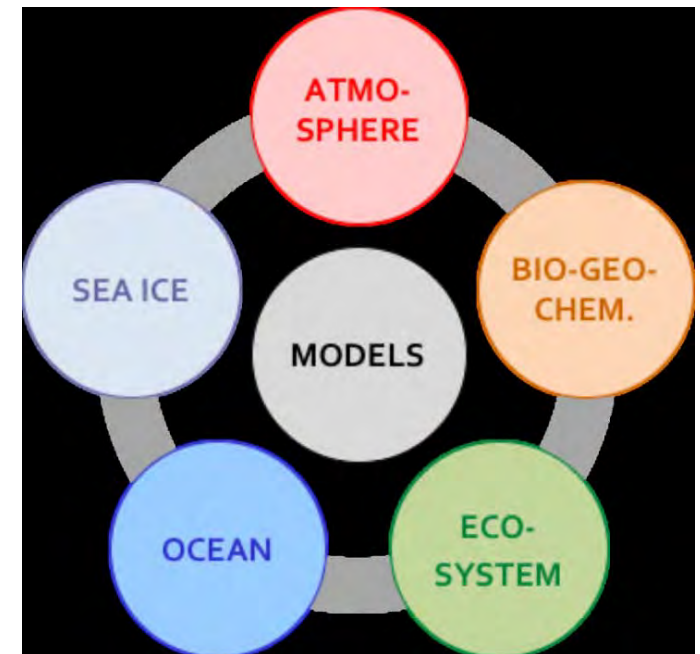


Supporting US Participation in the International Multidisciplinary Drifting Observatory for the Study of Arctic Climate (MOSAiC) Expedition

Largest Arctic research expedition ever

- >120 Mio€ budget
- More than 60 institutions
- 17 nations

NSF ARC funded: 23 awards, 12 projects, ~270 scientists, ~\$16.7 M for science component, and ~\$7M for logistics



NSF Budget



FY18 Actual: \$7.82B

President's request: \$7.47B (-0.4% from FY17)

FY19 Actual budget: \$8.06B

FY19 Requested budget: 7.47B (-4.5% from FY18)

New money for the 10 Big Ideas in FY19: \$282M

Program budget roughly flat in FY19

FY20 President's request: \$7.07B (-12% from FY19)

-19.0% for AGS

-14.0% for OCE

-19.6% for OPP



Thank you!

Eric DeWeaver, edeweave@nsf.gov
Climate Large-Scale Dynamics Program

Mete Uz, bmuz@nsf.gov
Physical Oceanography Program

Xujing Jia Davis, xdavis@nsf.gov
Arctic Natural Sciences Program

Other Opportunities and Resources



- * **Alaska Transportable Array** Solicitation - <http://www.usarray.org/alaska> (Roberto Delgado)
- * Prediction of and Resilience against **Extreme Events** (PREEVENTS) (NSF 16-562) (Mike Jackson)
- * **Mid-Scale Research Infrastructure** (NSF 19-537) (Alex Isern)
- * Dear Colleague Letter: Support for **Engaging Students and the Public** in Polar Research (NSF 18-103) (Lisa Rom)
- * **EarthCube** research grants and RCNs (NSF 16-514) (Colleen Strawhacker)

Resources

Arctic Data Center

ARMAP

Arctic Observing Viewer

Greenland Summit Station

Science Coordination Office for Summit Station and the Greenland Traverse

Toolik Station

Barrow Arctic Research Center

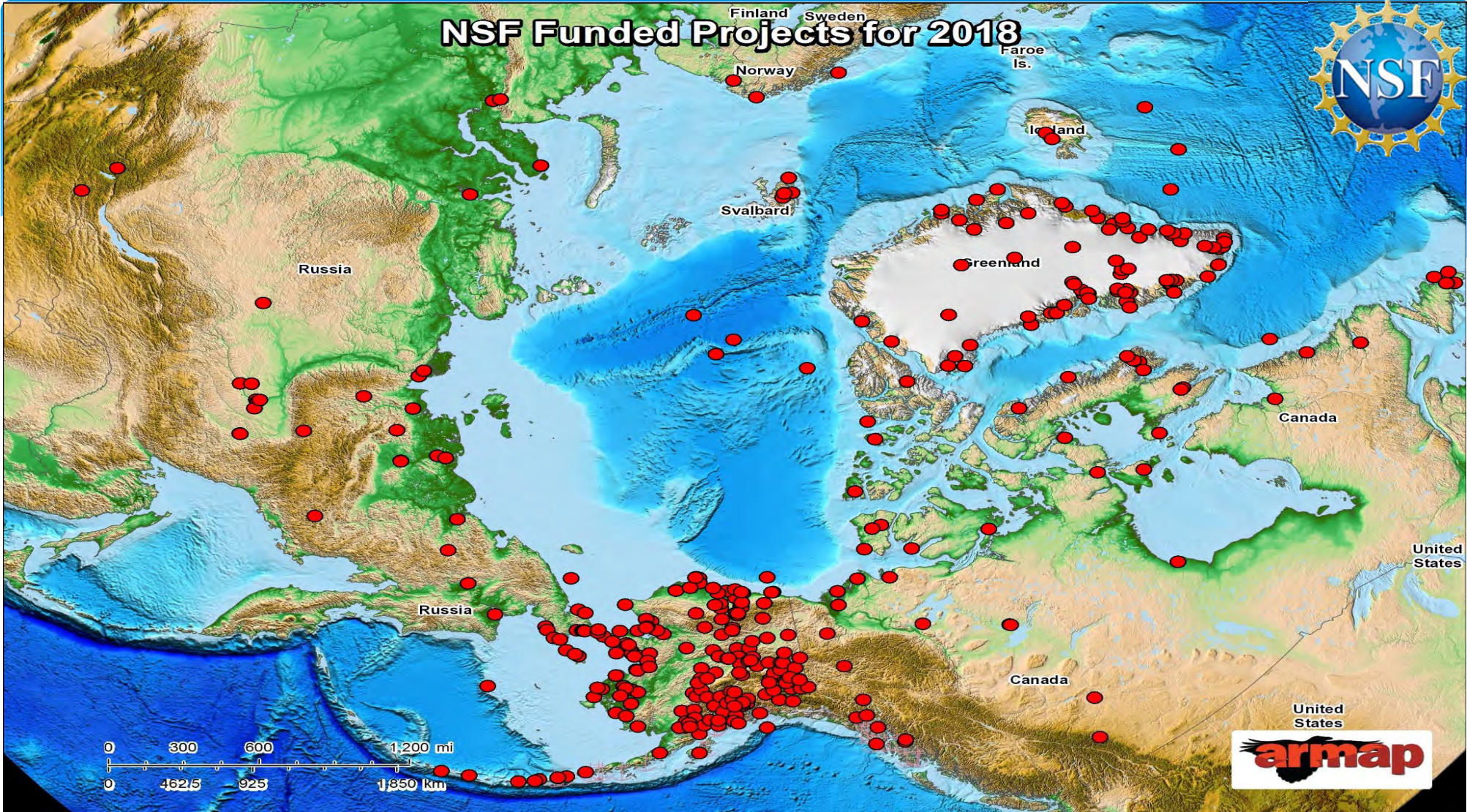
ArcticDEM

CH2M HILL Polar Services (CPS)

The U.S. Ice Drilling Program Office (IDPO)

... ..

NSF Funded Projects for 2018



0 300 600 1,200 mi
0 482.5 925 1,850 km

