

GEOSCIENCES: OFFICE OF POLAR PROGRAMS (OPP)**\$588,830,000****OPP Funding¹**
(Dollars in Millions)

| | FY 2023 | | | Change over | |
|---|-------------------|----------|-----------------|-------------------|-------------|
| | Base | FY 2024 | FY 2025 | FY 2023 Base Plan | |
| | Plan ² | (TBD) | Request | Amount | Percent |
| Research | \$109.07 | - | \$100.69 | -\$8.38 | -7.7% |
| Education | 3.92 | - | 3.93 | 0.01 | 0.3% |
| Infrastructure | 425.63 | - | 484.21 | 58.58 | 13.8% |
| U.S. Antarctic Logistical Support (USALS) (054 Functional Classification) | 94.20 | - | 106.00 | 11.80 | 12.5% |
| U.S. Antarctic Facilities and Operations (AFO) | 224.71 | - | 269.94 | 45.23 | 20.1% |
| Antarctic Research Vessel (ARV) | 12.43 | - | 22.00 | 9.57 | 77.0% |
| Total | \$538.62 | - | \$588.83 | \$50.21 | 9.3% |

¹ The Office of Polar Programs (OPP) is a division within the Geosciences Directorate. Due to the nature of the activities funded by OPP, this division is provided a full, separate writeup in NSF's Congressional Budget Submission.

² For comparability with FY 2025, the FY 2023 level does not include this organization's share of Mission Support Services that was funded through the R&RA and EDU directorates and offices.

About OPP

OPP is the primary U.S. supporter of fundamental research in the polar regions. In the Arctic, NSF helps coordinate research planning as directed by the Arctic Research Policy Act of 1984, and the NSF Director chairs the Interagency Arctic Research Policy Committee (IARPC) created for this purpose. In the Antarctic, per Presidential Memorandum 6646, NSF manages all U.S. activities as a single, integrated program, making Antarctic research possible for scientists supported by NSF and by other U.S. agencies. The latter include the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, the U.S. Geological Survey, the Smithsonian Institution, the Department of Energy, and the National Institute of Standards and Technology. NSF's U.S. Antarctic Program (USAP) research activity also supports leadership by the U.S. Department of State in the governance of the continent and Southern Ocean under the aegis of the Antarctic Treaty System.

OPP invests in polar scientific research and education and provides research support and logistics, including infrastructure, such as permanent stations and temporary field camps in the Antarctic and the Arctic. OPP's FY 2025 Request is influenced by three key priorities: (1) maintaining strong research investments that provide the basis for cross-disciplinary system science; (2) supporting critical facilities and vessels that enable research in Earth's polar regions; and (3) the Antarctic Infrastructure Recapitalization (AIR) program (discussed in the MREFC portion of the Research Infrastructure theme). These priorities create opportunities to investigate the causes and future trajectory of environmental, biological, and human systems being observed in the polar regions that are tightly coupled to the global Earth system.

Beginning in FY 2020 and continuing through FY 2023, Antarctic field science and infrastructure construction were mostly deferred due to global pandemic travel restrictions and to manage the health and safety concerns in remote enclosed settings with limited medical capacities. In FY 2025, OPP is planning to operate its field science stations at closer to the pre-pandemic tempo.

In addition to participating in cross-directorate research themes, such as Build a Resilient Planet and Advance Emerging Industries for National and Economic Security, OPP investments will also be guided by recent sponsored studies, as noted below, to identify priority areas and ensure effective polar research programs.

Highlights of OPP's FY 2025 activities and collaborations include:

- Research funding is \$100.69 million. To accommodate its core research priorities, OPP will continue to leverage intra-agency, interagency, and international partnerships. This includes \$3.38 million for two Antarctic and one Arctic Long-Term Ecological Research projects.
- The current IARPC five-year Arctic Research Plan¹ will continue to inform Arctic science investment priorities and help build an integrated research capacity to address the opportunities and challenges of Arctic change for the Nation's security and economics and for the well-being of Arctic residents.
- Support will continue for fundamental research into Antarctic systems, biota, and processes, to improve our understanding of the region and its interactions with other Earth system elements.
- A key portion of OPP's research portfolio in support of Build a Resilient Planet includes investments in climate observations, monitoring, modeling, and impact on communities in polar regions. Examples include:
 - Funding will continue for the Center for Oldest Ice Exploration (COLDEX), an FY 2021 NSF Science and Technology Center. The goal of this center is to find and study the oldest ice core records of Earth's climate and environmental history, and to bring more diversity and inclusivity to polar science.
 - Investment will continue in the Southern Ocean Carbon and Climate Observations and Modeling (SOCCOM) project. SOCCOM is now a component of the Global Ocean Biogeochemical Array (GO-BGC), a global network of chemical and biological sensors used to monitor ocean health.
 - Development of next-generation technology to better understand permafrost thawing and methane emissions from frozen Arctic wetland area soils. Methane is a more concentrated greenhouse gas than CO₂ and understanding permafrost thaw is critical to better constraining global methane estimates in model scenarios.
 - To study significant alterations in Arctic biogeography and movement patterns of animals, including polar bears, caribou, and beaver, OPP will support chemical analysis of Woolly Mammoth tusks and teeth to map migration and utilization of resources before and after the Last Glacial Maximum. This will increase our understanding of how megafauna is able to mitigate fluctuating environmental conditions.
 - Two *R/V Sikuliaq* cruises off the coast of Alaska studying the effects of diminishing landfast ice on waves and sediment transport. OPP and U.S. Coast Guard will support a *Healy* cruise in the Eastern Siberian Sea, monitoring the interface between the Atlantic and Arctic Oceans.
- OPP will support existing programs including Research Experiences for Undergraduates (REU) Supplements and other polar education activities.
- To maintain U.S. leadership in the Southern Ocean marine science, OPP will invest \$22.0 million in design studies of a potential future ice-breaking research vessel (ARV). It will also continue developing the Summit Station Recapitalization project.

¹ www.iarpccollaborations.org/uploads/cms/documents/final-arp-2022-2026-20211214.pdf

- Antarctic Facilities and Operations funding will increase by \$45.23 million to \$269.94 million, accounting for economic factors driving material, labor, freight, and fuel costs. The U.S. Antarctic Logistical Support funding will increase \$11.80 million to \$106.0 million, due to higher heavy airlift flying hours and cargo ship charter rates.

Major Investments

OPP Major Investments

(Dollars in Millions)

| Area of Investment ^{1,2} | FY 2023 | FY 2024 (TBD) | FY 2025 Request | Change over | |
|--|--------------|------------------|--------------------|-----------------------------|---------|
| | Base Plan | | | FY 2023 Base Plan Amount | Percent |
| Biotechnology | \$1.60 | - | \$1.67 | \$0.07 | 4.4% |
| BaRP: U.S. Global Change Research Program (USGCRP) | 197.26 | - | 206.14 | 8.88 | 4.5% |

¹ Major investments may have funding overlap and thus should not be summed.

² This table reflects this directorate's support for selected topics. Investment priorities and presentation may differ by organization and so should not be summed across narratives.

To learn more about cross-agency themes and initiatives supported by OPP, including Biotechnology and BaRP: USGCRP, see individual narratives in the NSF-Wide Investments chapter.

OPP Funding for Centers Programs

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(Dollars in Millions)

| | FY 2023 | FY 2024 (TBD) | FY 2025 Request | Change over | |
|--|--------------|------------------|--------------------|-----------------------------|---------|
| | Base Plan | | | FY 2023 Base Plan Amount | Percent |
| STC: Center for Oldest Ice Exploration | \$5.00 | - | \$5.00 | - | - |

For detailed information on individual centers programs, please see the Cross Theme Topics section of the NSF-Wide Investments chapter.

OPP Funding for Major Facilities

OPP Funding for Major Facilities

(Dollars in Millions)

| | FY 2023 | FY 2024 (TBD) | FY 2025 Request | Change over | |
|---|-----------------|------------------|--------------------|-----------------------------|--------------|
| | Base Plan | | | FY 2023 Base Plan Amount | Percent |
| IceCube Neutrino Observatory (ICNO) | \$3.83 | - | \$4.15 | \$0.32 | 8.4% |
| National Geophysical Facility (NGF) | 2.17 | - | 2.03 | -0.14 | -6.5% |
| Geodetic Facility for the Advancement of GEoscience (GAGE) | 1.30 | - | 1.23 | -0.07 | -5.4% |
| Seismological Facility for the Advancement of Geoscience (SAGE) | 0.87 | - | 0.80 | -0.07 | -8.0% |
| National Geophysical Facility (NGF) | - | - | - | - | N/A |
| U.S Antarctic Facilities and Operations (AFO) | 224.71 | - | 269.94 | 45.23 | 20.1% |
| Total | \$230.71 | - | \$276.12 | \$45.41 | 19.7% |

For detailed information on individual facilities and construction projects, please see the Research Infrastructure section of the NSF-Wide Investments chapter.