OFFICE OF POLAR PROGRAMS (OPP)

$547,100,000
+$63,060,000 / 13.0%

OPP Funding
(Dollars in Millions)

	FY 2021 Actual	FY 2021 ARP Actual	FY 2022 (TBD)	FY 2023 Request	Change over FY 2021 Actual Amount	Change over FY 2021 Actual Percent
Research	**$115.84**	**$14.47**	**-**	**$130.14**	**$14.30**	**12.3%**
Long Term Ecological Research (LTER)	2.77	-	-	3.38	0.61	21.8%
STC: Center for OLDest Ice EXploration (COLDEX)	-	-	-	5.00	5.00	N/A
Education	**4.97**	**0.05**	**-**	**5.00**	**0.03**	**0.6%**
Infrastructure	**363.23**	**-**	**-**	**411.96**	**48.73**	**13.4%**
Antarctic Infrastructure Modernization for Science (AIMS)	0.22	-	-	-	-0.22	-100.0%
Arctic Research Support and Logistics	48.22	-	-	58.00	9.78	20.3%
Geodetic Facility for the Advancement of GEoscience (GAGE)	1.43	-	-	1.30	-0.13	-9.1%
IceCube Neutrino Observatory (ICNO)	3.56	-	-	3.83	0.27	7.7%
Polar Environment, Safety, and Health (PESH)	7.59	-	-	9.00	1.41	18.5%
Research Resources	8.00	-	-	5.29	-2.71	-33.9%
Seismological Facility for the Advancement of GEoscience (SAGE)	0.94	-	-	0.87	-0.07	-7.1%
U.S. Antarctic Facilities and Operations (AFO)	216.27	-	-	243.67	27.40	12.7%
U.S. Antarctic Logistical Support	77.00	-	-	90.00	13.00	16.9%
Total	**$484.04**	**$14.52**	**-**	**$547.10**	**$63.06**	**13.0%**

About OPP

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 2023 Request is influenced by three key priorities: (1) maintaining strong disciplinary programs that provide the basis for investments in cross-disciplinary system science; (2) supporting critical facilities that enable research in Earth's polar regions; and (3) the Antarctic Infrastructure Recapitalization (AIR) program. These priorities reflect opportunities for fundamental scientific discovery uniquely achievable in polar regions, as well as studies to investigate the causes and future trajectory of environmental, biological, and human system changes now being observed in the polar regions that have possible global implications.

Beginning in FY 2020 and carrying through FY 2022, Antarctic field science, infrastructure construction, and Arctic field science were substantially deferred due to global pandemic travel restrictions and the need to manage the health and safety concerns in remote enclosed settings that have limited medical capacities. In FY 2023, OPP is planning for a higher operating tempo relative to FY 2021-22 in both polar regions. However, the final operating plans and deployment schedules will be dependent on future changes in COVID protocols and border requirements.

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.

In addition to shared cross-directorate basic research objectives, OPP investments will be guided by recent sponsored studies, which are covered in the Program Evaluation and Monitoring Information section of the Performance and Management chapter, to identify priority areas and ensure effective polar research programs. Highlights of OPP's activities and collaborations include:

- In FY 2023, OPP research funding is $130.14 million. To accommodate its core research priorities, OPP will continue to leverage interagency and international partnerships.
- OPP will continue to support three Long-Term Ecological Research (LTER) projects, two in the Antarctic and one in the Arctic, at $3.38 million.
- IARPC's Arctic Research Plan informs Arctic science investment priorities and efforts to build an integrated research capacity that address the potential opportunities and challenges of Arctic change for the Nation's security and economics and for the well-being of Arctic residents.
- Arctic programs will continue to complement Agency wide investments in the Navigating the New Arctic (NNA) NSF-wide Big Idea that will support research needed to inform the economy, security, and resilience of the Nation, the larger region, and the globe in the face of a rapidly changing Arctic. OPP support includes logistical assistance for NNA projects.
- Arctic research support and logistics funding is increased by $9.78 million to $58.0 million to support Arctic field science programs as the deployment tempo is anticipated to increase as travel restrictions are lifted.
- The Center for Oldest Ice Exploration (COLDEX) is a new NSF Science and Technology Center launched in FY 2021 with the goals of finding and studying the oldest possible ice core records of Earth's climate and environmental history, and to help make polar science more inclusive and diverse. COLDEX is a collaboration among 13 universities and several community-serving non-profits. Over the next five years, the project will use its partnerships to expand the community of scientists, students, and educators working on Antarctic climate science and, with the support of OPP, conduct reconnaissance for new coring sites and collect and analyze new ice cores.
- In 2018, OPP initiated support of a multiyear deep-field program to study the Thwaites Glacier region that was the highest priority in a 2015 study by the National Academies of Science, Engineering, and Medicine.[1] The Thwaites program is jointly supported, including shared logistics, with the Natural Environment Research Council of the U.K. The intensive field work of this program was started in the 2019-2020 austral summer season, was largely suspended in FY 2021, and resumed with a marine cruise and some land-based work in FY 2022. Two major land-based field seasons are being planned to complete the field component by FY 2024.
- Support for climate change research, aligned with USGCRP, is a particular emphasis in FY 2023 and includes OPP's continued investment in the Southern Ocean Carbon and Climate Observations and Modeling (SOCCOM) project. This project integrates observations, using innovative autonomous floats, and modelling to unlock the mystery of the vast Southern Ocean and its role in climate change and global biogeochemistry. SOCCOM is now an integral component of the Global Ocean Biogeochemical Array (GO-BGC) project, a global network of chemical and biological sensors used to monitor ocean health.
- OPP is re-building its aging Ice Core Facility located within the Denver Federal Center and managed

[1] www.mosaic-expedition.org/

by the USGS. The facility stores and preserves the integrity of ice cores sourced from polar and alpine environments. These cores represent one of the most important high-resolution archives of past temperature and carbon dioxide change over the past million years. This facility is critical infrastructure for supporting climate change and USGCRP research.

- Education activities across OPP will be supported through existing programs including Research Experiences for Undergraduates (REU) Supplements, REU sites, and other polar education activities.
- OPP is enhancing investment in cutting edge biotechnological and computational studies needed to illuminate the interplay of environment, genotypes, and phenotypes of uniquely adapted polar organisms, and the implications of such information for future change, other ecosystems, and practical applications.
- To maintain U.S. leadership in the Southern Ocean marine science, OPP will invest $12.43 million in design studies of a future state-of-the-art ice-breaking research vessel.
- The U.S. Antarctic Logistical Support funding is increased by $13.0 million to $90.0 million. This will support field work in the Antarctic and reflects increases in heavy airlift flying hour rates, tanker and cargo ship charter rates, and bulk fuel prices.

Major Investments

OPP Major Investments

(Dollars in Millions)

				Change over FY 2021 Actual	
Area of Investment[1,2]	FY 2021 Actual	FY 2022 (TBD)	FY 2023 Request	Amount	Percent
Biotechnology	$1.60	-	$2.00	$0.40	25.0%
Climate: USGCRP	56.11	-	56.11	-	-

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

[2] This table reflects this directorate's support for selected areas of investment. In other directorate narratives, areas of investment displayed in this table may differ and thus should not be summed across narratives.

- Biotechnology: OPP, together with other NSF directorates and offices, will invest in fundamental research, infrastructure, and education that advance foundational knowledge needed to understand and harness biological processes for societal benefit.
- Climate: OPP's investments in climate change research are framed around five major themes: Ocean's Role in Climate Change, Terrestrial-Climate Interactions and Water Sustainability, Cryosphere and Climate Change, Forcings and Feedbacks, and Earth System Predictability.

OPP Funding for Major Facilities

OPP Funding for Major Facilities
(Dollars in Millions)

	FY 2021 Actual	FY 2022 (TBD)	FY 2023 Request	Change over FY 2021 Actual Amount	Percent
Antarctic Infrastructure Modernization for Science (AIMS)[1]	$0.22	-	-	-$0.22	-100.0%
Geodetic Facility for the Advancement of GEoscience (GAGE)	1.43	-	1.30	-0.13	-9.1%
IceCube Neutrino Observatory (ICNO)	3.56	-	3.83	0.27	7.7%
Seismological Facility for the Advancement of GEoscience (SAGE)	0.94	-	0.87	-0.07	-7.1%
U.S. Antarctic Facilities and Operations (AFO)	216.27	-	243.67	27.40	12.7%
Total	**$222.41**	**-**	**$249.67**	**$27.26**	**12.3%**

[1] Final design costs obligated in FY 2021.

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

Funding Profile

OPP Funding Profile

	FY 2021 Actual Estimate	FY 2022 (TBD)	FY 2023 Estimate
Statistics for Competitive Awards:			
Number of Proposals	411	-	530
Number of New Awards	234	-	225
Regular Appropriation	201		225
ARP	33		
Funding Rate	57%	-	42%
Statistics for Research Grants:			
Number of Research Grant Proposals	366	-	500
Number of Research Grants	208	-	200
Regular Appropriation	175		200
ARP	33		
Funding Rate	57%	-	40%
Median Annualized Award Size	$235,434	-	$245,000
Average Annualized Award Size	$309,130	-	$322,000
Average Award Duration, in years	2.9	-	2.9

In general, about 20 percent of the OPP portfolio is available for new research grants. In FY 2023, the number of research grant proposals is expected to increase by about 100 compared to the FY 2021 Actual.

People Involved in OPP Activities

Number of People Involved in OPP Activities

	FY 2021 Actual Estimate	FY 2021 ARP Actual Estimate	FY 2022 (TBD)	FY 2023 Estimate
Senior Researchers	848	115	-	1,000
Other Professionals	330	23	-	500
Postdoctoral Associates	124	15	-	150
Graduate Students	326	60	-	400
Undergraduate Students	241	59	-	300
Total Number of People	**1,869**	**272**	**-**	**2,350**