OFFICE OF POLAR PROGRAMS (OPP) **$506,290,000**
+$22,940,000 / 4.7%

OPP Funding
(Dollars in Millions)

	FY 2020 Actual	FY 2021 Estimate	FY 2022 Request	Change over FY 2021 Estimate Amount	Change over FY 2021 Estimate Percent
Research	**$124.01**	**$127.16**	**$134.31**	**$7.15**	**5.6%**
Long Term Ecological Research (LTER)	2.97	3.38	3.38	-	-
Education	**0.95**	**0.75**	**0.75**	**-**	**-**
Infrastructure	**355.63**	**355.44**	**371.23**	**15.79**	**4.4%**
Academic Research Fleet	0.79	-	-	-	N/A
Arctic Research Support and Logistics	50.15	53.00	58.00	5.00	9.4%
IceCube Neutrino Observatory (ICNO)	3.50	3.50	3.65	0.15	4.3%
U.S. Antarctic Facilities and Operations	208.02	207.30	216.02	8.72	4.2%
U.S. Antarctic Logistical Support	77.00	77.00	77.10	0.10	0.1%
Geodetic Facility for the Advancement of GEoscience (GAGE)	1.53	1.20	1.30	0.10	8.3%
Seismological Facility for the Advancement of GEoscience (SAGE)	0.83	0.85	0.87	0.02	2.4%
Major Research Instrumentation (MRI)	0.39	-	-	-	N/A
Midscale Research Infrastructure Programs (MRIP)	2.65	-	-	-	N/A
Research Resources	2.12	5.29	6.29	1.00	18.9%
Polar Environment, Safety, and Health (PESH)	8.63	7.30	8.00	0.70	9.6%
Total	**$480.59**	**$483.35**	**$506.29**	**$22.94**	**4.7%**

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 2022 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 2021, 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 2022, OPP is anticipating a lower operating tempo relative to the pre-COVID-19 pandemic period in both polar regions. OPP will therefore focus on investments in research that can be supported during this period of reduced field activities. This is also true for infrastructure, where only investments in critical infrastructure systems consistent with safe personnel deployments in the coming season will be made.

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 studies and workshops section below, to identify priority areas and ensure effective polar research programs:

- 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.
- 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 (NASEM).[1] The Thwaites program is jointly supported, including shared logistics, with the National 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 2020-2021, and will be resumed in 2021-2022.
- Support for climate change research and the U.S. Global Change Research Program (USGCRP) is a particular emphasis in FY 2022. Investments 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.
- Specific contributions include, for example, 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, which is a global network of chemical and biological sensors to monitor ocean health.
- 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.

Major Investments

- In FY 2022, OPP research funding is $134.31 million. To accommodate its core research priorities, OPP will continue to leverage interagency and international partnerships.
- Arctic programs will continue to focus on integrating sustained observations, process studies, theory, and modeling of the natural and social systems to understand and improve predictions of the changing Arctic and its role in the Earth system. This has in prior years, and will in FY 2022, include investments in polar cyberinfrastructure, data analytics, and software. A major FY 2019 investment was made in the Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC),[2] an international study of the sea ice, ocean, and atmospheric interactions driving weather and climate in the central Arctic Ocean with a year-round field presence that extended into FY 2020. NSF will continue to invest

[1] www.nap.edu/catalog/21741/a-strategic-vision-for-nsf-investments-in-antarctic-and-southern-ocean-research
[2] www.mosaic-expedition.org/

in this effort as the project transitions to analysis of the data generated by the intensive observation phase.

- 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.
- Antarctic science will maintain funding in priority areas as outlined in the 2015 National Academies report and the NSF's Windows on the Universe (WoU) and Understanding the Rules of Life (URoL) Big Ideas. Antarctic core programs will maintain funding in Antarctic glaciology, astrophysics and space weather sciences, ocean and atmospheric sciences, earth sciences, and organisms and ecosystems, as well as integrated system science, instrumentation and research facilities, and cyberinfrastructure.
- 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.
- Education activities across OPP will be supported through existing programs including Improving Undergraduate STEM Education (IUSE), Research Experiences for Undergraduates (REU) Supplements, REU sites, and other polar education activities.
- Arctic research support and logistics funding is increased by $5.0 million to $58.0 million to support Arctic field science programs that can be safely recovered in the summer of 2022.
- In FY 2022, Antarctic Facilities and Operations funding is increased by $8.72 million to $216.02 million. This will cover higher deployment costs and accommodate continued operation of the stations, as well as support for priority science activities including the International Thwaites Glacier Collaboration.[3]
- The U.S. Antarctic Logistical Support will be funded at $77.10 million. This will support the limited commitments for field work in the Antarctic in the first half of FY 2022 and reflects higher LC-130H sustainment costs.
- To maintain U.S. leadership in the Southern Ocean marine science, OPP will invest $8.0 million in design studies of a future state-of-the-art ice-breaking research vessel.

OPP Funding for Major Facilities

OPP Funding for Major Facilities

(Dollars in Millions)

	FY 2020 Actual	FY 2021 Estimate	FY 2022 Request	Change over FY 2021 Estimate Amount	Change over FY 2021 Estimate Percent
Total	**$214.68**	**$212.85**	**$221.84**	**$8.99**	**4.2%**
IceCube Neutrino Observatory (ICNO)	3.50	3.50	3.65	0.15	4.3%
U.S. Antarctic Facilities and Operations (AFO)	208.02	207.30	216.02	8.72	4.2%
Academic Research Fleet (ARF)	0.79	-	-	-	N/A
Geodetic Facility for the Advancement of GEoscience (GAGE)	1.53	1.20	1.30	0.10	8.3%
Seismological Facility for the Advancement of GEoscience (SAGE)	0.83	0.85	0.87	0.02	2.4%

For detailed information on individual facilities, please see the Major Research Facilities chapter. The Antarctic Infrastructure Modernization for Science (AIMS) project will be subsumed into the Antarctic Infrastructure Recapitalization (AIR) program, which will encompass a broader capital plan for NSF's

[3] thwaitesglacier.org/

Antarctic infrastructure. For detailed information on this, please see the Major Research Equipment and Facilities Construction chapter.

Funding Profile

OPP Funding Profile

	FY 2020 Actual Estimate	FY 2021 Estimate	FY 2022 Estimate
Statistics for Competitive Awards:			
Number of Proposals	413	500	530
Number of New Awards	194	150	160
Regular Appropriation	194	150	160
CARES Act	-		
Funding Rate	47%	30%	30%
Statistics for Research Grants:			
Number of Research Grant Proposals	407	450	500
Number of Research Grants	190	130	140
Regular Appropriation	190	130	140
CARES Act	-		
Funding Rate	47%	29%	28%
Median Annualized Award Size	$211,248	$187,800	$190,000
Average Annualized Award Size	$303,039	$292,800	$295,000
Average Award Duration, in years	2.8	2.6	2.6

In general, about 20 percent of the OPP portfolio is available for new research grants. In FY 2022, the number of research grant proposals is expected to increase by about 100 compared to the FY 2020 Actual.

Program Monitoring and Evaluation

The Performance and Management chapter provides details regarding the periodic reviews of programs and portfolios by external Committees of Visitors and directorate Advisory Committees. Please see this chapter for additional information.

People Involved in OPP Activities

Number of People Involved in OPP Activities

	FY 2020 Actual Estimate	FY 2021 Estimate	FY 2022 Estimate
Senior Researchers	876	900	900
Other Professionals	455	500	500
Postdoctoral Associates	129	100	100
Graduate Students	404	400	400
Undergraduate Students	302	300	300
Total Number of People	**2,166**	**2,200**	**2,200**