

**INTERNATIONAL OCEAN DISCOVERY PROGRAM (IODP)****\$45,800,000**  
**-\$1,750,000 / -3.7%****International Ocean Discovery Program Funding**

(Dollars in Millions)

FY 2018	FY 2019	FY 2020	Change over	
			FY 2018 Actual	
Actual	(TBD)	Request	Amount	Percent
\$47.55	-	\$45.80	-\$1.75	-3.7%

The International Ocean Discovery Program began in FY 2014 as the replacement for the Integrated Ocean Drilling Program and the prior Ocean Drilling Program. The IODP represents an international partnership of the scientists, research institutions, and funding organizations of 23 nations to explore the evolution, structure, and behavior of Earth as recorded in the ocean basins. The program management structure focuses on maximizing facility efficiency, while retaining the intellectual cooperation and exchange with NSF's international partners. NSF, the Ministry of Education, Culture, Sport, Science and Technology (MEXT) of Japan, and the European Consortium for Ocean Research Drilling (ECORD) continue to provide drilling platforms. The IODP platforms provide sediment and rock samples (cores); in-situ monitoring, sampling, and measurement from borehole observatories; shipboard and shore-based descriptive and analytical facilities; down-hole geophysical and geochemical measurements (logging); and opportunities to conduct experiments to determine in-situ conditions beneath the sea floor.

**Total Obligations for IODP**

(Dollars in Millions)

	FY 2018	FY 2019	FY 2020	<b>ESTIMATES<sup>1</sup></b>				
	Actual	(TBD)	Request	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Operations & Maintenance	\$47.55	-	\$45.80	\$45.80	\$45.80	\$45.80	\$45.80	\$45.80

<sup>1</sup> Outyear estimates are for planning purposes only.

Annual operations and maintenance support for operating the *JOIDES Resolution*, the most-used IODP platform, represents NSF's primary contribution to the program. The *JOIDES Resolution* is leased from an offshore drilling contractor under a long-term contract. Due to the long lead-time in planning IODP science expeditions, the FY 2020 Request of \$45.80 million for operations and maintenance of the *JOIDES Resolution* will support up to four expeditions per year in the ship's calendar year 2022 schedule. The exact number and the complexity of the expeditions will be determined when the final FY 2020 Appropriation information becomes available. Another commercial contractor provides down-hole-logging services. Databases and core repositories, preparing scientific publications emerging from *JOIDES Resolution* IODP expeditions, and management of international program proposal review through the IODP Science Support Office, represent additional NSF IODP science integration costs, made at minimal cost to NSF because of international contributions to the program. NSF also provides support for U.S. scientists to sail on IODP drilling platforms and to participate in IODP advisory panels through an associated program. The annual costs for the associated science integration and science support (not included in the table above) for FY 2019 are projected to be approximately \$8.50 million, funded separately through the Division of Ocean Sciences (OCE).

The IODP scientific program emphasizes the following research themes:

- Climate and Ocean Change: Reading the Past, Informing the Future;
- Biosphere Frontiers: Deep Life, Biodiversity, and Environmental Forcing of Ecosystems;
- Earth Connections: Deep Processes and Their Impact on Earth's Surface Environment; and
- Earth in Motion: Processes and Hazards on Human Time Scales.

The umbrella IODP Forum provides a venue for all IODP entities to exchange ideas and views on the scientific progress of the program. In the current IODP, each drillship is governed by independent facility boards, each of which is unique and optimized for their respective drilling platform. In the case of the *JOIDES Resolution* Facility Board (JRFB), two advisory panels review proposals and provide science and safety advice. A U.S. scientist leads the JRFB, with other members from the scientific community, funding agencies, and the facility operator. The other IODP platforms use the JRFB advisory panels for drilling proposal review.

IODP participants include the United States, Japan, ECORD (Austria, Canada, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom), Brazil, the People's Republic of China, Korea, India, Australia, and New Zealand, with all participants except Japan providing financial contributions to *JOIDES Resolution* operations. Japan provides program support through substantial investment in *Chikyu* operations, with U.S. and Japanese scientists enjoying reciprocal rights on each drilling vessel, and through curation of *JOIDES Resolution* core samples at Japan's Kochi Core Center.

The importance of scientific ocean drilling is underscored by these remarkable facts—since its inception, scientists from 98 countries have participated, resulting in more than 35,000 publications of which more than 11,000 were peer-reviewed, and more than 700 theses and dissertations. U.S. scientists serve as first authors on about 40 percent of the papers currently being published. U.S. scientists from over 150 universities, government agencies, and industrial research laboratories participate in the program. Samples and data have been distributed to well over 1,000 additional U.S. scientists. Scientists from these groups propose and participate in IODP cruises, are members of the program's advisory panels and groups, and supply data for planning expeditions and interpretation of drilling results.

### **Management and Oversight**

- NSF Structure: OCE in GEO manages IODP operations of the *JOIDES Resolution* and the IODP Science Support Office under the NSF Ocean Drilling Program (ODP). NSF's ODP is located within the Integrative Programs Section, with one Program Director dedicated to its oversight. The Program Director has responsibility for three cooperative agreements supporting IODP:
  - *JOIDES Resolution* operations;
  - IODP Science Support Office; and the
  - IODP U.S. Science Support Program (USSSP).
- External Structure: NSF provides the *JOIDES Resolution* as the light IODP drillship through a cooperative agreement with Texas A&M University. MEXT provides the *Chikyu* as the heavy IODP drillship through the Japan Agency for Marine-Earth Science and Technology (JAMSTEC), while the British Geological Survey manages ECORD drilling contributions through single-use Mission-Specific Platforms. Each entity providing an IODP drilling platform is responsible for sample and data storage, publications, and other science costs associated with the respective platform operations.
- IODP *JOIDES Resolution* operations are determined by the JRFB, using advice and recommendations provided by the Science Evaluation Panel (SEP) and the Environmental Protection and Safety Panel (EPSP). Representation on the panels is determined by contribution level to *JOIDES Resolution* operations and exchange with other facility boards. NSF is a member of the JRFB.
- Reviews: Performance of the *JOIDES Resolution* facility is reviewed yearly by an NSF panel, in consultation with the JRFB. Substantive review of management performance regarding *JOIDES Resolution* operations occurred in the third year of the cooperative agreement (FY 2017) to guide potential renewal or re-competition decisions. Review of scientific progress in broader thematic areas is conducted under the authority of the IODP Forum.

**Renewal/Recompetition/Termination**

In FY 2013, to facilitate support for drilling proposal review, advisory panel meeting logistics, and other integrative activities for scientists participating in IODP activities (e.g., websites), the University of California, San Diego was selected, through a competitive merit-review process, to host the the IODP Science Support Office through award of a five-year (FY 2014—FY 2018) cooperative agreement. In January 2018, following external merit-review of a renewal proposal, NSF awarded a 5-year cooperative agreement for continued support of this Office through FY 2023.

In FY 2014, through a competitive process, Texas A&M University was selected to be the *JOIDES Resolution* Science Operator (JRSO) under a five-year (FY 2015—FY 2019) cooperative agreement which may be renewed for a second five-year period subject to successful performance. This cooperative agreement contains language encouraging the awardee to facilitate novel partnerships involving support of *JOIDES Resolution* operations between the U.S. scientific drilling community and commercial industry, thereby providing new intellectual opportunities and potential reduction in overall facility cost. The National Science Board in February 2019 authorized the NSF Director, at her discretion, to enter into a new cooperative agreement from October 1, 2019 through September 30, 2023.

In FY 2015, to facilitate support for U.S. scientists participating on IODP platforms (i.e., salary and travel support) and for U.S. IODP education and outreach efforts, a new cooperative agreement was awarded, after external merit-review, to the Lamont-Doherty Earth Observatory (LDEO) of Columbia University for operation of the U.S. Science Support Program for a five-year period (FY 2015—FY 2019). NSF has initiated the external merit-review process for considering a five-year renewal of the award.



*JOIDES Resolution* underway for science expedition 369, October 2017. Credit: Gabriel Tagliard