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CITATION

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Something to Celebrate

This issue of *Oceanography* celebrates 50 years of Intergovernmental Oceanographic Commission (IOC) operation under the UNESCO umbrella. One can only wonder if those involved in laying the groundwork for this international entity could ever have anticipated how critically important it would be 50 years in the future, as modern civilization faces unprecedented global change. Never has there been a time when an organization dedicated to "promoting international cooperation and coordinating programs in marine research, services, observation systems, hazard mitigation, and capacity development in order to learn more and better manage the resources of the ocean and coastal areas" has been more needed.

During IOC's first half-century, ocean sciences research has grown ever more responsive to societal needs, as a host of discoveries and milestones have occurred. For example, on January 23, 1960, the bathyscaphe *Trieste,* a manned deep-sea vehicle, dove 10,915 meters to what was believed to be the deepest point in the Mariana Trench and the deepest location on Earth. Onboard were US Navy Lieutenant Don Walsh and Swiss oceanic engineer Jacques Piccard; the dive took almost five hours, with *Trieste* spending 30 minutes on the bottom, where the hull withstood pressures of 17,000 pounds per square inch (1172 bars, or 117 Megapascals). The 1960s also brought us Harry Hess's seafloor spreading theories, which were then confirmed through use of, among other tools, a scientific ocean drillship that supplied rock and sediment samples from deep below the seafloor. Deep-ocean exploration in the seventies resulted in the major discovery of hydrothermal vents—an ecosystem that thrives without the sun's energy. The adaptational prowess of marine organisms became evident as biologists determined that the biota use the energy released by inorganic chemical reactions of venting materials to produce food (so-called chemosynthesis). At the base of food chain of this unimagined ecosystem are chemosynthetic archaea, supporting many diverse organisms like giant tubeworms, crabs, and shrimp. It was also during this 50-year period that oceanographers began clearly to link ocean phenomena with changes in Earth's climate, including description of El Niño–Southern Oscillation (ENSO), a climate pattern that develops in the tropical Pacific. The major El Niño event of 1982 resulted in the installation of a Pacific equatorial oceanographic buoy array that has since predicted the onset of El Niño and La Niña events and ultimately has led to a better understanding of the coupling of oceanic and atmospheric systems.

This period of major breakthroughs was facilitated by new and improved technologies—the tools ocean scientists have at their disposal to address high-priority research questions. These tools came not only from the traditional oceanographic community but also from outside it. Satellites, computers, microelectronics, nanotechnology, biotechnology, imaging, and robotics all became part of ocean scientists' toolboxes. I have every expectation that in the future new and improved tools will expand our ability to explore the ocean and, more importantly, to understand the dynamics of ocean processes as they change over days, weeks, seasons, and decades.

The ocean science community now stands at the threshold of a new era in oceanographic research—one facilitated by long-term, continuous ocean observations and measurements, made possible by a wide range of innovative technologies to "see" ocean processes from a perspective within the ocean. These new tools will address one of the chronic problems in ocean sciences research—that of undersampling. Ocean scientists have long struggled with trying to understand the inherent complexities of the ocean through extrapolation of too few data points. Ocean modeling efforts also have been compromised because of inadequate ocean data sets, and thus useful predictive models of real ocean behavior are limited.

The ocean connects us all through its circulation, and it contributes to the life support of all humankind. There are some who suggest that Earth has entered into a new geological age—the Anthropocene—from "anthro" meaning human and "cene" meaning new [geological age]. It is suggested that human influence is of such global scale that a new period in geological time has commenced. Many would debate this idea. However, all would agree that we are indeed fortunate to have major advances in our ocean science research capability converge with the time when understanding global climate change is critical. And we are also fortunate to have organizations like IOC to connect these research findings with strategies to promote wise use and management of ocean and coastal resources.

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