

# Ocean Observation Based on Networked Sensor Systems

The Ocean Observatories Initiative (OOI, USA) will construct a networked infrastructure of science-driven sensor systems to measure the physical, chemical, geological and biological variables in the ocean and seafloor. Greater knowledge of these variables is vital for improved detection and forecasting of environmental changes and their effects on biodiversity, coastal ecosystems and climate.

Building on last century's era of ship-based expeditions, recent technological leaps have brought a transformation in the approach to ocean research – the focus on expeditionary science is shifting to a permanent presence in the ocean. The ocean itself presents major obstacles to oceanographic exploration. We cannot live in it or even visit for long. We cannot see through it, nor probe effectively with satellites. But new tools permanently installed in our oceans can communicate instantly with scientists on land. They require less power and can carry out user commands or complex pre-programmed instructions; the tools can provide long-term, continuous and real-time understanding of critical ocean phenomena.

Advanced ocean research and sensor tools represent a significant improvement over past techniques. Remotely operated and autonomous vehicles go deeper and perform longer than submarines. Underwater samplers do in minutes what used to take hours in a lab. Telecommunications cables link experiments directly to office computers and supply unparalleled power. Farther asea, satellite uplinks shuttle buoy data at increasing rates.

The ocean is the planet's largest ecosystem. It drives an incredible range of natural phenomena, including our climate, and thus directly impacts human society. New approaches are crucial to improving scientific understanding of episodic and long-term changes at work in the oceans. Resolving pressing issues related to climate variability, severe weather, ocean turbulent mixing, changes in ocean ecosystems, plate tectonics and sub-seafloor chemistry and biology depend upon these new approaches. The [OOI](#)'s goal is to install transformational technology in ocean observatories where it can serve researchers, policymakers and the public.

With these advances the OOI will improve the rate and scale of ocean data collection, and its networked observatories will focus on global, regional and coastal science questions. It will also provide platforms to support new kinds of instruments and autonomous vehicles.

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