

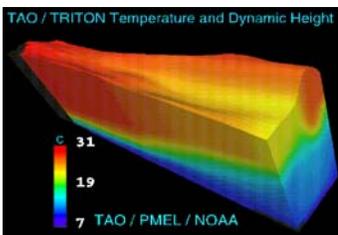


Pacific Marine Environmental Laboratory

A leader in developing ocean observation systems to address NOAA's mission



Moored buoy that measures ocean changes and retransmits data in real time to forecast El Niños



Display of temperature and dynamic height from 70 buoy El Niño monitoring array



Tsunami detection instrumentation

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What does the Pacific Marine Environmental Laboratory do for the nation?

The Pacific Marine Environmental Laboratory (PMEL) conducts interdisciplinary research in oceanography and atmospheric science. Current PMEL programs focus on open ocean observing in support of the long-term monitoring and prediction of the ocean environment on time scales from hours to decades. Studies are conducted to improve our understanding of the complex physical and geochemical processes operating in the world's oceans, to define the forcing functions and the processes driving ocean circulation and the global climate system, and to improve environmental forecasting capabilities and other supporting services for marine commerce and fisheries. Results from PMEL research activities contribute to NOAA's mission goals of protecting, restoring, and managing the use of coastal and ocean resources through ecosystem-based management; of understanding climate variability and change to enhance society's ability to plan and respond; and of serving society's needs for weather and water information. PMEL provides sound, state-of-the-art research that supports NOAA's environmental assessment, prediction, and ecosystem management missions and contributes to the development of an integrated global environmental observation and data management system.

Recent Accomplishments:

- PMEL has been conducting tsunami research since 1973. Following the Indian Ocean tsunami in 2004, NOAA was able to quickly move toward an improved real-time detection strategy and an improved warning capability because of investments that PMEL has made in these areas. PMEL pioneered the development of a deep-ocean, real-time tsunami monitoring network and the methodology for producing improved tsunami forecasts to support NOAA's Tsunami Warning Centers. PMEL's tsunami research also benefits coastal communities in their development and emergency management planning efforts. **Payoffs: Site-specific tsunami forecasts are now being developed for communities along the Pacific, Atlantic and Gulf of Mexico coasts of the U.S. These forecast capabilities will be implemented in the 74 principal population centers by 2009. PMEL will continue to improve real-time tsunami detection buoys and will work with the National Weather Service to improve tsunami warning services to the nation.**
- Observations of oceanic and atmospheric conditions in the tropical oceans are essential for our understanding and prediction of the global impact of climate, such as El Niño and La Niña events. To provide these data, PMEL completed the Pacific Tropical Atmosphere Ocean (TAO) Array, the world's largest number of instrumented buoys comprising a single, ocean climate observing system, and is now expanding the tropical mooring array into the Atlantic and Indian Oceans. **Payoffs: Predictions of El Niño and La Niña are now being made by NOAA, mitigating the impacts of these events.**
- PMEL studies the impact of underwater volcanoes on the ocean's heat content and chemistry. This research led to the real-time detection of underwater volcanic eruptions and the establishment of the nation's first deep seafloor observatory at an active seafloor volcano, and to the subsequent dis-

covery of new, microbial life forms that are being ejected from deep within the earth from seafloor hydrothermal vents. **Payoffs: Several new microbial life forms have incubated that possess biological properties valuable to the biotechnology industry.**

- PMEL, along with the National Marine Fisheries Service (NMFS), studies the impact of climate and ocean conditions on North Pacific ecosystems and commercially-important fish and shellfish species. **Payoffs: This understanding, along with monitoring the environment throughout the life cycle of the fish, will assist decision-makers and improve forecasts of the abundance of these species. Forecasts of pollock abundance in Alaska have improved over the past ten years.**
- PMEL scientists are internationally recognized leaders in the measurement of oceanic carbon inventories and have a major role in the ten-year-long repeat hydrography observation program initiated in 2003 to determine carbon uptake from the atmosphere. **Payoffs: The role of the oceans in the global carbon cycle, though not well-understood, is recognized as a key component in the global carbon balance and climate change. Measurement of carbon in the ocean over long timescales will improve our understanding of the oceans' contribution to the global carbon budget and quantify the oceans' capacity to absorb this important greenhouse gas.**

What's next for PMEL?

PMEL conducts complex oceanographic experiments. Laboratory strength lies in PMEL's experienced and knowledgeable scientists and engineers who are able to obtain, process, analyze, and distribute high-quality oceanographic measurements. Their capabilities require a modern and well-maintained infrastructure of scientific instruments, computing and networking resources, oceanographic research ships, and continuous engineering development potential. For the future, PMEL needs to maintain and enhance its proven observational and analysis capabilities as part of the goals of the Integrated Ocean Observing System. The lab is increasing its emphasis on numerical modeling techniques, information technology, and engineering as tools to aid in observing system design, experiment planning, implementation, data interpretation, and dissemination. PMEL will continue to conduct research that improves the services and products that NOAA provides to the nation.

Research Partnerships:

PMEL has partnerships with the Cooperative Institute for Arctic Research (University of Alaska); the Cooperative Institute for Marine Resources Studies (Oregon State University); the Joint Institute for Marine and Atmospheric Research (University of Hawaii); the Joint Institute for the Study of the Atmosphere and Ocean (University of Washington); and the office of emergency services for Alaska, California, Hawaii, Oregon, and Washington. Federal partners include other NOAA line offices, the National Science Foundation, the U.S. Geological Survey, the Federal Emergency Management Agency, the National Aeronautics and Space Administration, and the Office of Naval Research.

Budget and Staff

The fiscal year 2006 enacted budget for the PMEL budget lines totaled \$15.8M. The fiscal year 2007 President's budget request for PMEL is \$16.4M. PMEL currently has 77 permanent Federal employees.



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