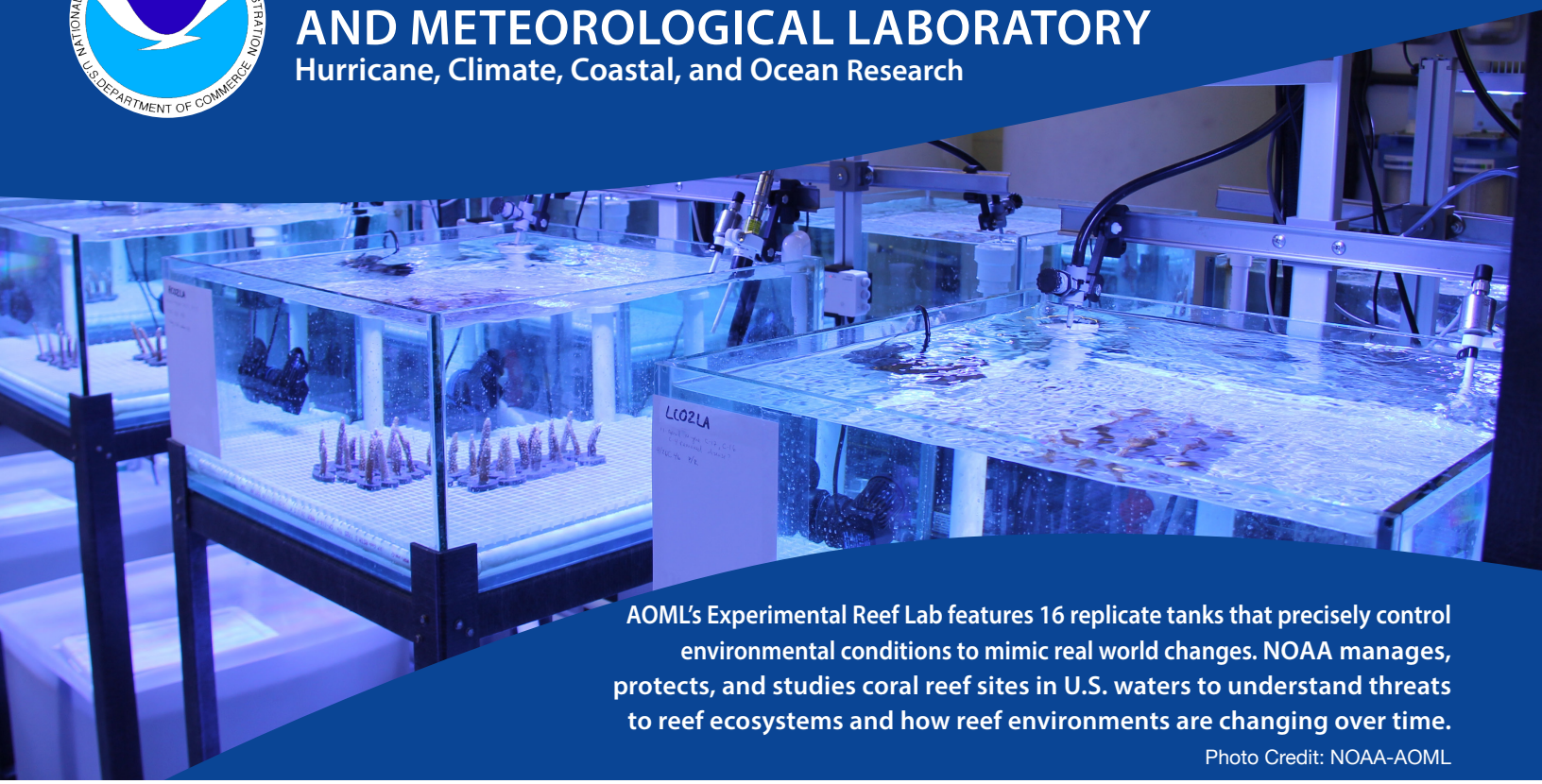
NOAA'S ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABORATORY

Hurricane, Climate, Coastal, and Ocean Research



AOML's Experimental Reef Lab features 16 replicate tanks that precisely control environmental conditions to mimic real world changes. NOAA manages, protects, and studies coral reef sites in U.S. waters to understand threats to reef ecosystems and how reef environments are changing over time.

Photo Credit: NOAA-AOML

Ocean Chemistry and Ocean Acidification in the Gulf of Mexico and U.S. Coral Reef Sites

A changing climate is impacting the nation's coral reef ecosystems. Increases in ocean temperature are causing widespread coral bleaching and more frequent disease, while changes to ocean chemistry are reducing coral growth rates and accelerating reef bioerosion. NOAA monitors key indicators to identify and monitor the following climate-driven trends:

- Thermal stress – changes in sea temperature.
- Ocean acidification – changes in carbonate chemistry.
- Ecological impacts – changes in coral growth rates, bioerosion, and community structure.

AOML uses environmental buoys, high-resolution photomaps, bioerosion monitoring sensors, and regular sampling to assess sea temperatures and the progression of ocean acidification, as well as the ecological impacts of these stressors.

Coral Reefs are among the most valuable ecosystems on Earth, providing people with myriad benefits that include storm protection, food, recreation, and carbon storage among other things. Together these ecosystem services make up the Blue Economy.

AOML and its NOAA partners, including NOAA's Coral Reef Conservation Program and researchers with NOAA's Ocean Acidification Program, monitor these valuable services by collaborating across ocean basins to collect and maintain high-quality, sustained observations through a network of monitoring sites. AOML has sentinel sites in La Parguera, Puerto Rico, at Cheeca Rocks in the Florida Keys National Marine Sanctuary, at the Pacific site at Fagatele Bay in American Samoa, and planned for the Flower Garden Banks National Marine Sanctuary in the northern Gulf of Mexico. By establishing these sites, AOML provides tools for ecosystem monitoring and management, provides context for local changes, and analyzes trends in the nation's valuable coral reef ecosystems.

For additional information, please contact:
Erica Rule
NOAA's Atlantic Oceanographic and Meteorological Laboratory
(305) 361-4541
erica.rule@noaa.gov

Each sentinel site has a moored autonomous buoy that measures temperature, salinity, carbon dioxide in seawater, and pH every three hours and relays these data in near-real-time to where they are publicly available online.

Photo Credit: NOAA

AOML Monitors and Reports on Changes in Regional Ocean Chemistry and Ocean Acidification

What is Ocean Acidification?

The ocean absorbs carbon dioxide emitted though regular respiration by living organisms, as well as carbon dioxide that is produced when we burn fossil fuels for energy. Excess carbon dioxide increases the acidity of the ocean and can impact marine organisms from plankton to economically important fisheries. AOML tracks ocean conditions around the southeast U.S. and Gulf of Mexico and uses this information to create models that predict future ocean conditions and potential ecological impacts. AOML uses state-of-the art technology to capture changes in ocean chemistry and impacts to marine organisms.

Gulf of Mexico Ecosystem Carbon Cruise

Every five years, AOML conducts a research cruise in the Gulf of Mexico to collect samples from different depths of offshore waters. The samples are processed while at sea in a unique portable lab that analyzes them for water quality and a host of chemical parameters that determine patterns and trends in key indicators of ocean acidification.

Ocean Acidification Buoys and Photomosaics

The Florida Keys National Marine Sanctuary is home to a special buoy that measures concentrations of carbon dioxide in the air and water. Water samples validate the buoy data, and high-resolution photomosaic maps help track changes in coral cover at these monitoring sites. AOML is also an active partner with the Northern Gulf Institute, which maintains an ocean acidification monitoring buoy off the Louisiana coast.

Experimental Reef Laboratory

The Experimental Reef Laboratory features a series of 16 tanks that can run replicate experiments that precisely simulate real-world changes occurring in the shallow water environments of coral ecosystems. This ability to mimic real-world conditions, as well as predicted future conditions, provides NOAA with a versatile tool for observing how corals respond to an array of environmental stressors. AOML also partners with university researchers to explore how some coral species can develop greater resilience to environmental change and disease.

NOAA's Atlantic Oceanographic and Meteorological Laboratory
4301 Rickenbacker Causeway, Miami, Florida 33149
www.aoml.noaa.gov

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