



NOAA'S ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABORATORY

Hurricane, Climate, Coastal, and Ocean Research



An ocean glider is deployed off the coast of Puerto Rico.

Photo Credit: NOAA AOML

Underwater Robots Explore the Ocean Depths to Help Fine-tune Hurricane Forecasts

NOAA's Atlantic Oceanographic and Meteorological Laboratory (AOML) is deploying ocean gliders to gather data to increase the accuracy of hurricane forecast models. The autonomous, unmanned gliders are equipped with sensors to measure salinity and temperature as they move through the ocean at different depths. For the 2019 hurricane season, NOAA scientists are launching these underwater research vehicles from ships off the coast of Puerto Rico, Dominican Republic, US Virgin Islands, and the Bahamas. With more gliders set to be launched later in the summer in other parts of the Atlantic Ocean and Caribbean Sea. The gliders are battery powered and are typically deployed for six months. They can operate in hurricane conditions and collect data down to a half mile below the sea surface. Upon reaching the ocean surface, the data are transmitted to satellites.

Ocean Properties can Influence Hurricane Strength

Warmer waters and salinity provide important clues to how strong a hurricane can become. Warmer surface waters can lead to more heat energy that can fuel stronger hurricanes. Normally, this warmer water is mixed with cooler water below the surface, reducing energy for the passing storm. However, if there is a layer of fresher, warmer water at the surface, it can serve as a cap that prevents mixing of ocean waters and keeps heat energy at the ocean surface, continuing to fuel the passing storm.

NOAA Research Improves Models and Forecasts

Improving forecasts of hurricane intensity is important because coastal communities make decisions about whether to evacuate based in part on the predicted strength of an approaching hurricane. Representing the ocean accurately in hurricane forecast models is an emerging priority to improve hurricane intensity forecasts. The gliders provide high-volume, high-resolution data in areas where storms frequently pass but where there may be a scarcity of ocean observations.

Glider use at NOAA

NOAA scientists have been deploying gliders to monitor ocean conditions each hurricane season since 2014 and have worked with partners that include the US Navy, the Dominican Republic, IOOS, CARICOOS, the National Maritime Affairs Authority (ANAMAR), Rutgers University, the University of Miami, and the University of Puerto Rico-Mayaguez to launch the unmanned vehicles in areas that frequently experience hurricanes.



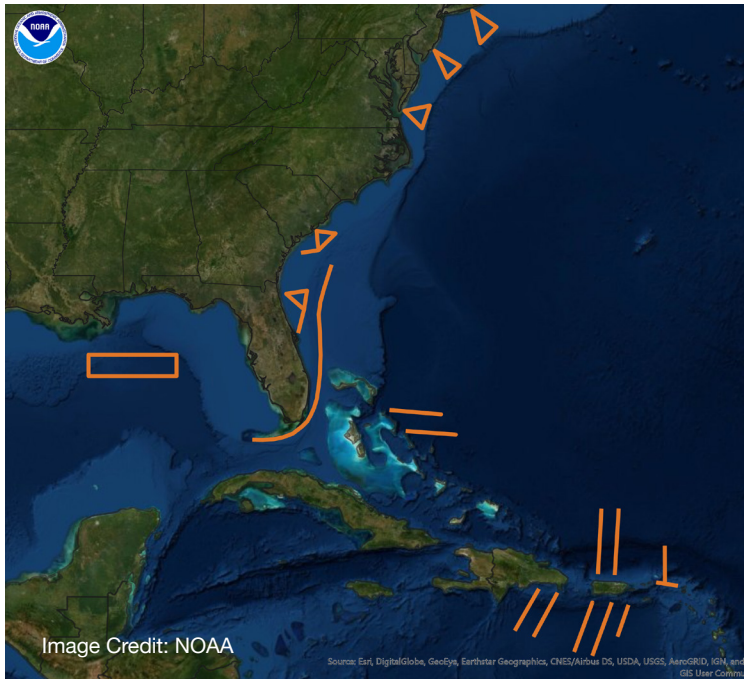
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Glider Deployments will form a “Picket Fence”

Orange lines show the proposed paths for gliders to travel in the summer of 2019, where they will record temperature and salinity data from the surface to a half mile below. Once launched, the gliders will make regular dives along a set course, surfacing several times a day to send their data to an available satellite.

The deployment patterns expand coverage in regions where hurricanes might intensify and where ocean data can provide the most value to hurricane models.

Warm water has the potential to strengthen storms, while cool waters can weaken them. Knowing if a storm will pass over predominantly warm water or areas where cold water may be stirred up from below helps scientists and forecasters predict whether a storm will intensify or weaken as it travels.

AOML will deploy approximately 8 gliders in 2019 to transmit ocean profile data in real-time for assimilation into numerical ocean and ocean-atmosphere forecast models. During these operations, students and technical support personnel from each of the local institutions partnering with AOML will receive training on several aspects of our glider operations.

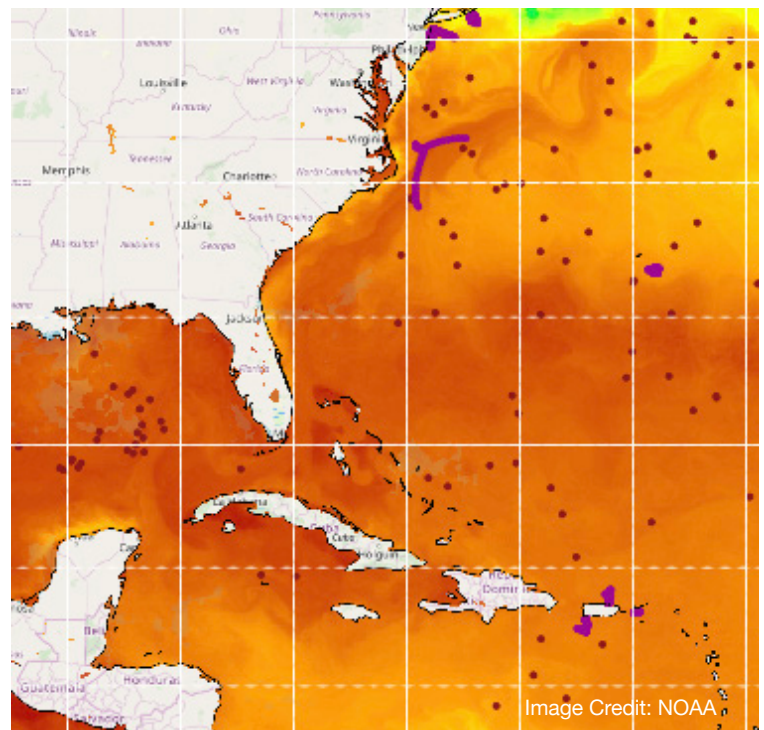
AOML is partnering with the National Weather Service to study the impact of glider and other ocean data on NOAA's next generation hurricane models.

OceanViewer Displays Recent Ocean Conditions

AOML, NESDIS/CoastWatch, and OceanWatch recently released a new version of the OceanViewer interface in support of tropical cyclone research. The web page is hosted by AOML, and an example is shown below.

This interface provides easy access to ocean and atmospheric observations during hurricane season. The page allows users to display a suite of ocean and atmospheric observations, both in situ and satellite, and some derived products, which are all useful for assessing ocean and atmospheric conditions prior to, during, and after the passage of a tropical cyclone.

The large set of targeted ocean observations featured in this product, including ocean gliders and floats, was selected for their contribution to monitoring ocean conditions in support of hurricane forecasts. As deployments are made throughout the 2019 season, data will be available for viewing on this site.



Hurricane OceanViewer

For a quick view of ocean conditions that can inform hurricane forecasts, visit:
https://cwcgom.aoml.noaa.gov/cgom/OceanViewer/index_hrd.html

Glider tracks are in purple. Image date 7/22/2019

