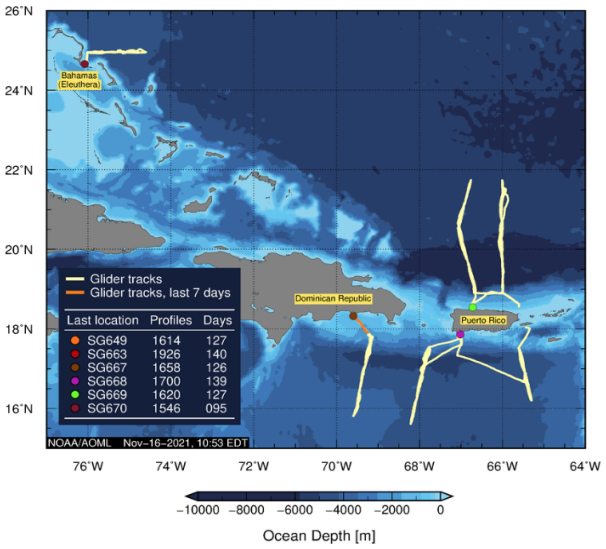
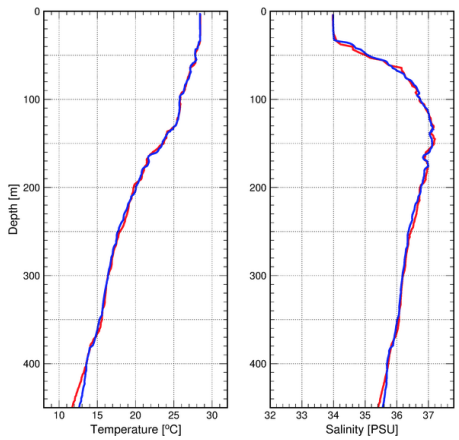
NOAA Atlantic Oceanographic and Meteorological Laboratory (AOML), Miami, FL
Underwater Gliders

Underwater gliders are autonomous vehicles approximately 6 feet long and 200 lbs. of weight that measure a suite of ocean parameters (temperature, salinity, currents, dissolved oxygen, etc.) several times (4-20) per day from the sea surface to depths up to 1000m several. Gliders travel approximately 24 km/day, or can be stationed at a fixed location, and are fully piloted from land by pilots on the ground able to change glider trajectories and sampling strategies. While sampling the ocean gliders transmit data in real-time even under strong hurricane wind conditions.

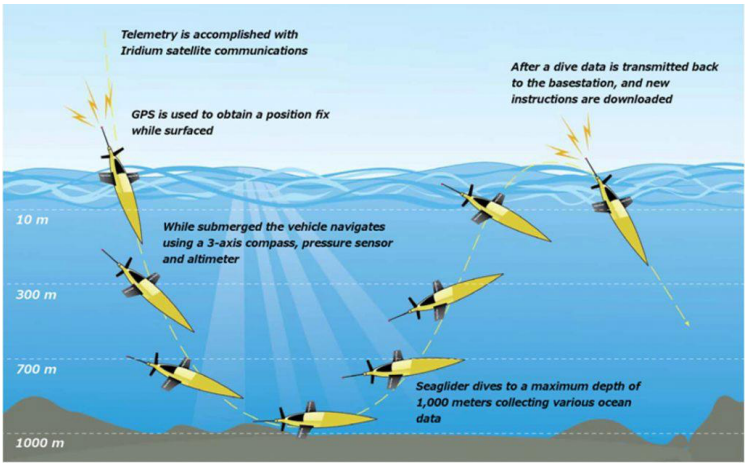
Gliders were developed and improved over the last two decades and are now operated by the oceanographic community to the point that much of the observations they conduct can be called routine while collecting observations in areas that are challenging or not accessible to more traditional observing platforms. Gliders can be deployed and recovered a few miles from the coast utilizing small boats, are remotely piloted from the ground, and remain in the water for up to nine months. Gliders are recovered and redeployed, not providing a source of pollution in the ocean and, given their short stay (<10 mins/day) at the surface, they represent a very minor risk for navigation. NOAA/AOML currently has a fleet of approximately 10 gliders to monitor the Atlantic Ocean for hurricane and environmental research and forecasts.



Location of NOAA/AOML underwater glider observations during the 2021 Atlantic Hurricane Season



Example of temperature and salinity profiles collected by NOAA/AOML glider SG635 in the Caribbean Sea during the 2022 Atlantic Hurricane Season



Typical sampling strategy of a glider using changes in buoyancy to move through the water column in a saw-tooth pattern while collecting high-resolution temporal and spatial data. Figure courtesy of Huntington Ingalls Industries.

Current research emphasizes the value of glider observations for monitoring ocean conditions that have been linked to hurricane intensity changes. Due to their highly dynamic nature, some ocean features responsible for hurricane intensification, such as warm surface currents, ocean eddies, and large lenses of fresh waters, often prove challenging to be continuously observed by typical observation platforms. On the other hand, underwater gliders allow for the collection of critically needed surface and subsurface observations of these features, which are then incorporated into ocean models for improved hurricane intensity forecasts.

Since 2014, NOAA/AOML together with partners have operated underwater gliders in 50 missions, obtaining over 60,000 temperature and salinity profiles while traveling more than 40,000 miles over more than 5,000 days, in an effort to improve our understanding of the ocean's role on hurricane intensity changes. Data obtained by these gliders are used in real-time analysis and hurricane intensity forecast models during the Atlantic hurricane seasons.

NOAA/AOML glider SG610 deployed in the tropical Atlantic during the 2020 Atlantic Hurricane Season

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For More Information about NOAA AOML gliders please vsit our Webpage at:
https://www.aoml.noaa.gov/hurricane-glider-project/

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