

Hurricanes Harvey, Irma and Maria Supplemental Priorities for the US Integrated Ocean Observing System

Hurricanes Harvey, Irma and Maria devastated the Caribbean, Southeast Atlantic and the Gulf of Mexico, including critical ocean observing infrastructure.

The regional observing systems under the Integrated Ocean Observing System (IOOS) provide real time information on ocean conditions used for safety at sea and for forecasting storm intensity, storm surge and flooding.

While many assets survived the storms, several were damaged, leaving the region without critical information for maritime safety, emergency management and extreme weather event response.

Summary of Major Damages

Quick repairs to the system are needed to ensure NOAA, the Coast Guard, states, local emergency managers and the public have the information they need to make wise decisions.

Damaged: 9 out of 22 Moored Buoys

Although several buoys survived back-to-back category 5 hurricanes, others did not and sensors for monitoring winds, currents and waves need to be replaced.

Data from these buoys provide real-time information on sea state conditions for fishermen and mariners and are used to validate hurricane and wave models for storm surge and flooding forecasts.



Damaged: 11 out of 20 Weather Stations



The non-federal weather stations are located in areas now covered by the National Weather Service and add value to federally-produced weather forecasts.

These local weather stations provide the information necessary to develop detailed and tailored forecasts for local residents.



The NOAA-led U.S. Integrated Ocean Observing System (IOOS) is essentially the National Weather Service for the coastal oceans and Great Lakes, providing the ability to “see” what is happening both above and below the ocean surface; and making that information readily available. IOOS includes 11 regional associations, which focus on local stakeholder needs, and 17 Federal agencies.

Damaged: 14 out of 20 High Frequency Radars

Electronics, antennae and wiring are needed to bring these radars back into production.

The Coast Guard uses the real-time current data from the HF radars for search and rescue, and NOAA and other emergency managers use the data for event response and forecast models for storm surge.



Priority 1 Request: \$2,002,000

Repair of direct damages to Caribbean, Southeast Atlantic and Gulf of Mexico ocean observing assets

As Congress considers a hurricane supplemental package, we request that it include \$2 million for repairing the following damages:

Region	Request	Notes
Caribbean	\$900,000	Replacement of St Thomas oceanographic buoy, sensors for four oceanographic buoys, and nine meteorological stations. Repair of the mooring for San Juan wave buoy and four HF radars.
Southeast Atlantic	\$1,000,000	Repair of seven oceanographic moorings, ten HF radars and two shore-based meteorological stations in Tampa Bay.
Gulf of Mexico	\$102,000	Relocation of the Imaging FloCytobot instrument for detection of harmful algal blooms (TX), and water level sensors (TX), and repair and replacement of nutrient monitoring sensor (FL).

Priority 2 Request: \$5,244,000

Hardening Assets in the Caribbean, Southeast Atlantic and Gulf of Mexico

Investments are also needed to strengthen assets to better prepare them for when the next storms happen. These investments will ensure uninterrupted access to data and information during future events, reduce overall operational costs and prevent future damages.

Investment	Request	Notes
Site hardening 28 HF radars	\$1,840,000	Hardening will keep these coastal radars running and collecting important data during storm passage, providing insights to hurricane air-sea interaction, hurricane prediction, response and restoration.
Support for 12 glider lines for monitoring ocean heat	\$2,500,000	Storm intensity is driven by the heat content of the ocean. IOOS will work with the National Weather Service on optimal siting of the gliders for improvements to hurricane forecasts.
Hardening existing moorings	\$904,000	The addition of GPS sensors and spares will increase operational readiness and uptime and enable quick replacement and repairs if damage does occur.

Priority 3 Request: \$7,788,000

System-wide Enhancements

Because extreme storms are now impacting the entire nation, system-wide enhancements are needed to improve operations and overall cost-effectiveness and provide information before, during and after storms.

Investment	Request	Notes
Harden 114 HF Radar stations nationally	\$5,700,000	System-wide hardening will improve continuous data transmission and reduce replacement cost due to extreme weather.
Upgrade 19 Moorings	\$588,000	Upgrades to existing moorings with meteorological packages, GPS tracking, and subsurface temperature sensors will allow for increased precision in tracking ocean heat content.
Low cost water levels for remote areas	\$1,500,000	Twenty low-cost water level gauges designed for remote locations in Alaska and the Pacific Islands would fill the huge gaps in NOAA's National Water Level Observing Network and provide critical data for inundation modeling and forecasting.

Please note supplemental funding should be directed to the IOOS Regional Observation budget line under the Navigation, Observations and Positioning program in NOAA's National Ocean Service.



More Information



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