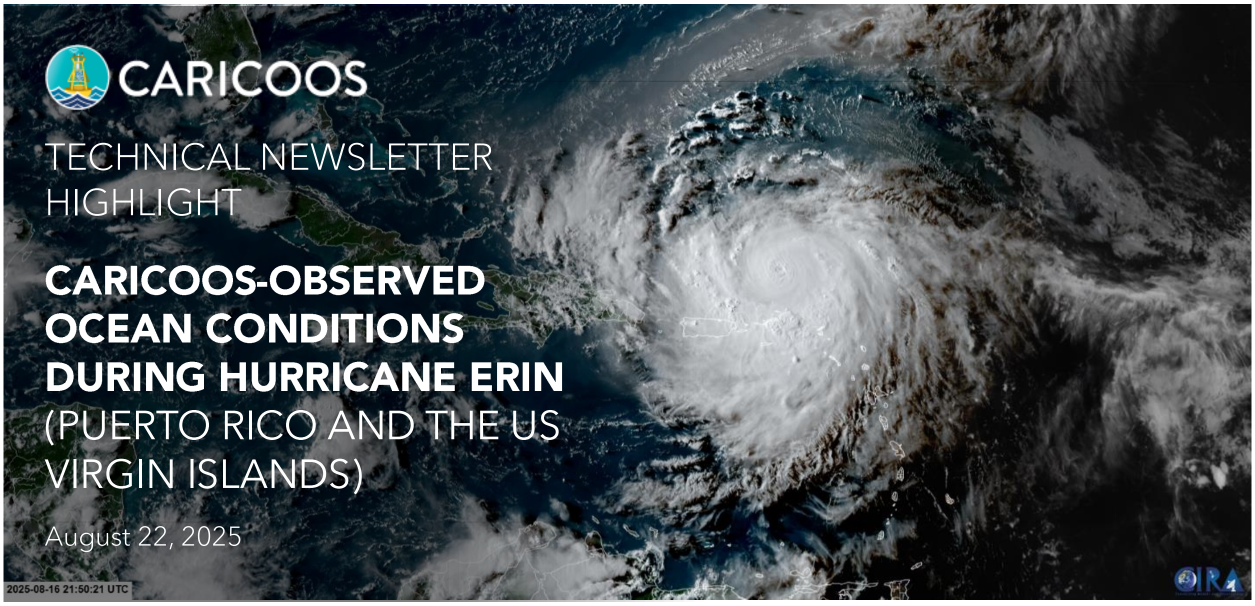

On August 16–18, 2025, during Hurricane Erin's passage north of the US Caribbean region, the Caribbean Integrated Coastal Ocean Observing System (CARICOOS) observing network, which operates a network of ocean buoys, coastal weather stations, underwater gliders, and other instruments across Puerto Rico and the U.S. Virgin Islands, collected critical data to help document storm-generated ocean and atmospheric conditions.

WAVE CONDITIONS

Larger waves were recorded north and west of the region. The CARICOOS San Juan buoy measured a maximum significant wave height of 2.6 meters (8.7 feet) (Figure 1), while the Rincón buoy measured 2.9 meters (9.5 feet), and the St. John buoy measured 2.6 meters (8.4 feet). The San Juan buoy also detected long-period swells with wave periods of up to 15 seconds, while at Rincón and St. John, the wave periods generally remained below 9 seconds, indicating they were primarily wind-driven waves.

Across the waters surrounding Puerto Rico, waves over 1.4 meters (4 feet) were generated by the hurricane's outer bands. These conditions created significant hazards, which led the National Weather Service to issue continuous alerts and advisories.

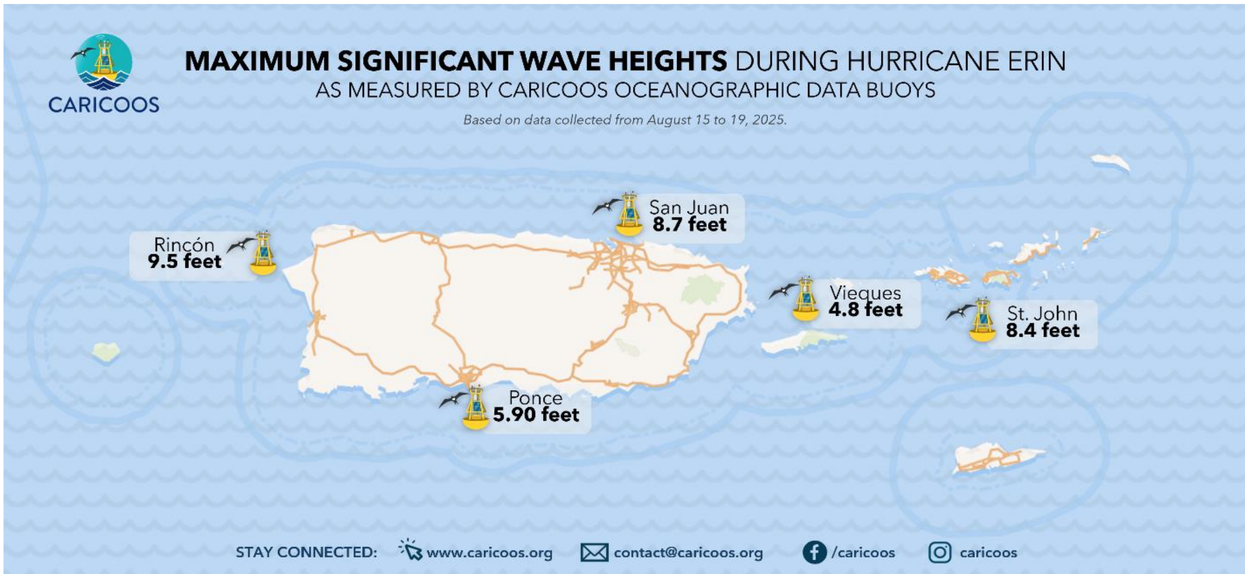

Figure 1 Maximum significant wave heights recorded by CARICOOS oceanographic buoys during Hurricane Erin, in Puerto Rico and the U.S. Virgin Islands (data collected from August 16 to 19).

WIND CONDITIONS

Land-based meteorological stations located near coastal waters recorded strong winds as the storm passed. The highest values were measured at Buck Island, St. Thomas (U.S. Virgin Islands) and Culebrita, Puerto Rico, where winds reached up to 42 knots (48 mph) (Figure 2) with gusts up to 50 knots (58 mph) (Figure 3).

Across the rest of the network, stations measured average wind speeds between 16 and 35 knots (18–40 mph), with gusts ranging from 28 to 46 knots (32–53 mph). These observations confirm that tropical-storm-force winds affected islands across the region.

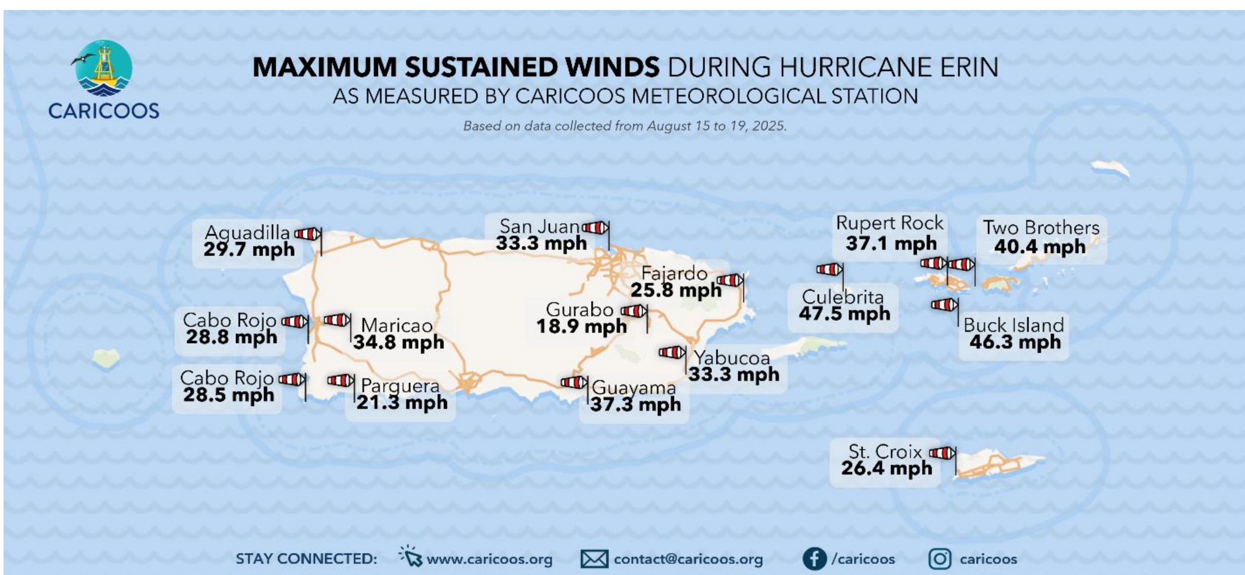

Figure 2 Maximum sustained wind speeds during Hurricane Erin in Puerto Rico and the U.S. Virgin Islands, as measured by CARICOOS meteorological stations (data collected from August 16 to 19).

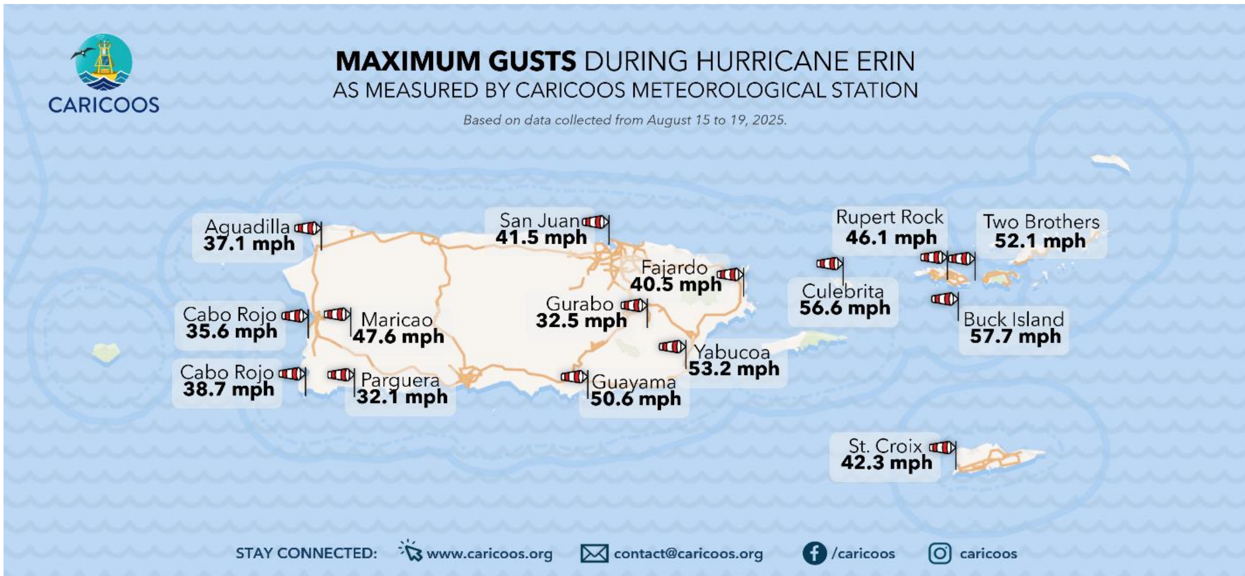

Figure 3 Maximum gusts during Hurricane Erin in Puerto Rico and the U.S. Virgin Islands, as measured by CARICOOS meteorological stations (data collected from August 16 to 19).

OCEAN TEMPERATURE AND SALINITY: HURRICANE GLIDER OBSERVATIONS

In partnership with NOAA's Atlantic Oceanographic and Meteorological Laboratory (AOML) and the U.S. Navy, hurricane gliders were deployed to monitor ocean conditions in the U.S. Caribbean region during the hurricane season.

During Hurricane Erin, August 17 to 19, 2025, the gliders collected valuable data showing that before Erin approached, the upper ocean layer, with a thickness of about 100 meters (over 300 feet), and a temperature of 28 °C (82 °F) (Figure 4). As the storm moved west, its strong winds and pressure caused mixing, pulling colder water up toward the surface (upwelling). This cooling effect, created by the hurricane's rotating motion, lasted for almost 24 hours. Once the storm passed and the ocean began to settle, warmer waters quickly returned to the surface, and by August 21, the ocean temperature in the region had risen to 30 °C (86 °F).

South of the islands (Figure 5), this cooling effect was not as strong. Instead, the gliders detected changes in temperature and salinity linked to heavy rainfall and the widespread cloud cover associated with Erin.

GLIDERS IN THE ATLANTIC OCEAN

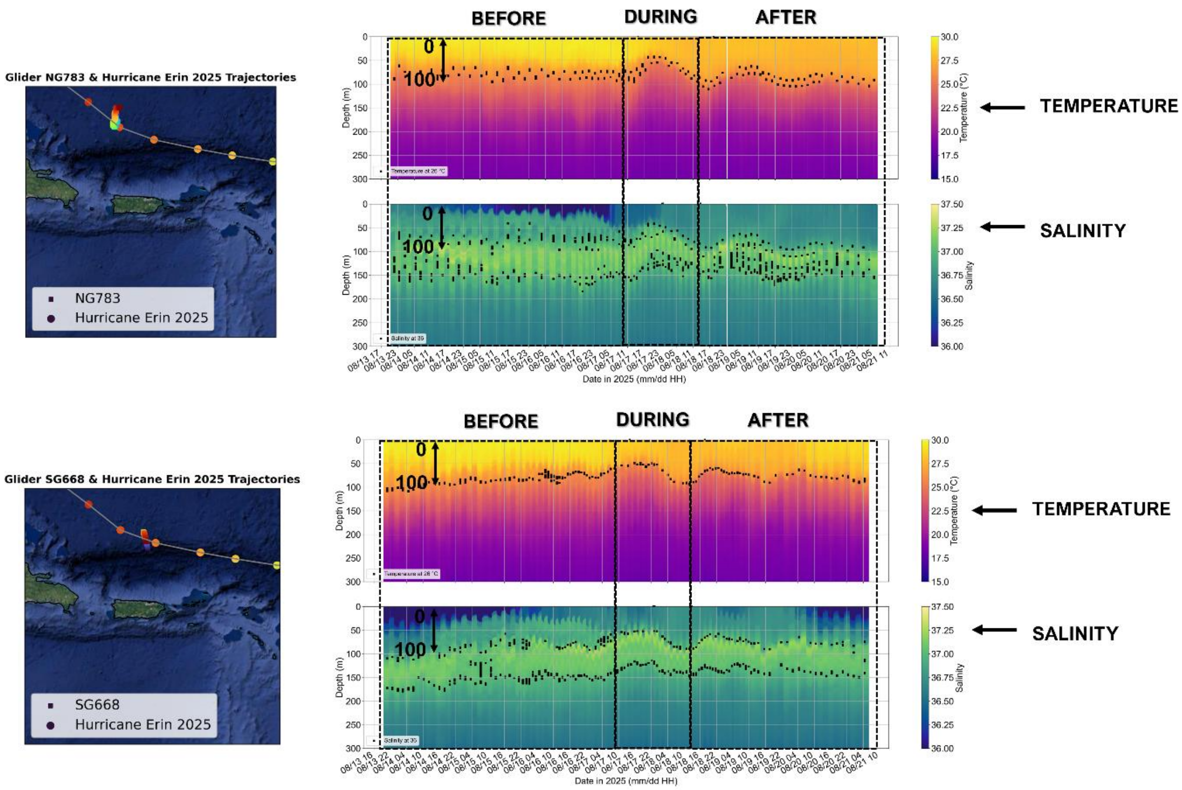

Figure 4 Left column: Locations of underwater glider deployments during Hurricane Erin in the Atlantic Ocean. Right column: Corresponding temperature and salinity data collected by the gliders. The top row shows data from glider NG783 (U.S. Naval Oceanographic Office), and the bottom row shows data from glider SG668 (NOAA Atlantic Oceanographic and Meteorological Laboratory). Dashed squares indicate periods before, during, and after the hurricane. Cooling is observed between 0 and 100 m depth, where slightly darker colors indicate lower temperatures, reflecting vertical mixing induced by hurricane winds.

These near-real-time observations of temperature and salinity north and south of Puerto Rico and the U.S. Virgin Islands are critical because tropical cyclones draw their energy from warm ocean waters. The deeper and warmer the upper layer of water is, the more fuel a storm can access.

By keeping these gliders in operation throughout hurricane season, CARICOOS, NOAA IOOS, and partners provide vital data to support the National Hurricane Center and National Weather Service. This helps improve forecasts of hurricane intensity and contributes to better preparedness for communities in the Caribbean and beyond.

GLIDERS IN THE CARIBBEAN SEA

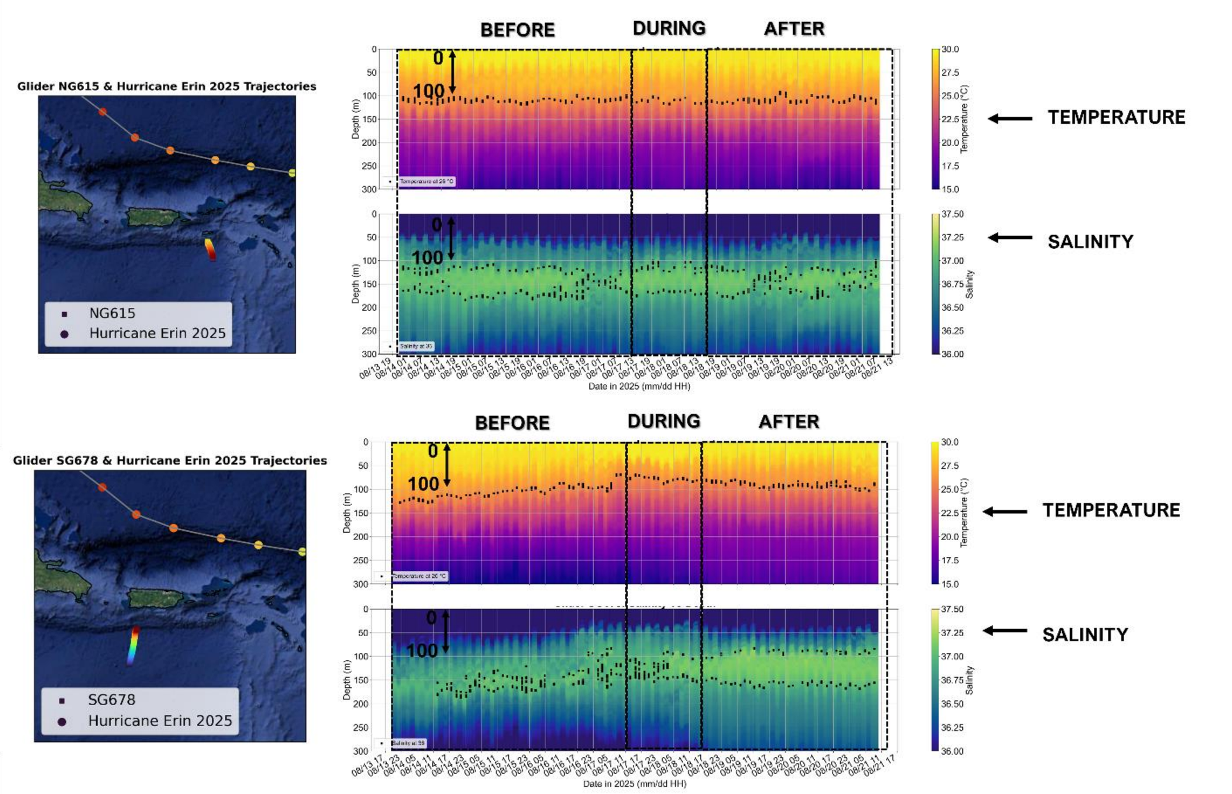

Figure 5 Left column: Locations of underwater glider deployments during Hurricane Erin in the Atlantic Ocean. Right column: Corresponding temperature and salinity data collected by the gliders. The top row shows data from glider NG615 (U.S. Naval Oceanographic Office), and the bottom row shows data from glider SG678 (CARICOOS). Dashed squares indicate periods before, during, and after the hurricane. Cooling is observed between 0 and 100 m depth, where slightly darker colors indicate lower temperatures, reflecting vertical mixing induced by hurricane winds.

SUMMARY

Variable	Summary
Wave Conditions	The US Caribbean experienced a significant impact due to the wave conditions generated by the storm. Peak significant wave heights exceeded 4-8 feet across exposed inner shelf waters, driven by sustained hurricane-force winds and long fetch.
Wind Conditions	High wind speeds were observed, with sustained winds up to 40 knots (46 mph) and gusts up to 50 knots (58 mph), confirming the atmospheric forcing responsible for generating large waves and ocean mixing.
Ocean Temperature and Salinity	Slight SST cooling due to vertical mixing caused by hurricane winds. Rapid sea surface cooling of 1–2 °C was observed along the storm track, indicating strong vertical mixing and upwelling of cooler subsurface waters.