A NOAA plan to enhance underwater glider observations during the 2019 Atlantic hurricane season

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Abstract (Oral Presentation)

Factors contributing to rapid intensity changes in hurricanes include upper level wind shear, interactions with topography, and the fluxes of heat and momentum across the air-sea interface. The upper ocean thermal structure has been linked to hurricane intensification, and their intensification or weakening due to the air-sea fluxes depend on the temperature difference between the air and the sea surface water at the ocean-atmosphere interface. Hurricane wind forcing can produce rapid changes in the upper ocean thermal structure, which then feeds back on the heat fluxes into or out of the hurricane. Ocean models that do not accurately forecast the rapid evolution of the ocean surface temperature during a hurricane event will improperly represent the air-sea fluxes and, in turn, will improperly forecast the impact of the ocean on intensity change. In recent years, the National Oceanic and Atmospheric Administration (NOAA), the Integrated Ocean Observing System (IOOS) Regional Associations, universities, and the US Navy have deployed gliders in areas where Atlantic hurricanes rapidly intensify and weaken, gaining significant individual experience in glider operations and data analysis focused on hurricane intensity studies. Initial outcomes from this effort include a substantial improvement of spatial coverage in poorly sampled regions, and an assessment of the impact of subsurface ocean observations on hurricane intensity forecasts When fully implemented, this effort, in addition to other efforts led by other research institutions and federal agencies, will support a dedicated pilot plan for ocean monitoring with the goal of improving hurricane forecasts. This will be the next step in the transition of ocean monitoring from research to operations by supporting and combining resources, expertise, and regional and local knowledge. This particular plan intends to support several components of the operation of approximately 15 gliders to be deployed in the Caribbean Sea, tropical North Atlantic Ocean, and Mid and South Atlantic Bights. The sampling strategy of observations will be determined based on historic hurricane trajectories and areas of rapid intensification/weakening. Glider data will be distributed in real-time through IOOS and inserted into the GTS for assimilation into forecast models. We present here analyses and results obtained with glider observations, which were the basis for the justification of this effort.