Hurricane Impacts on the Florida Current

WILLIAM BAXLEY[1], NATHANIEL SMALL[2], JAMES VANZWEITEN[3*], AND GABRIEL ALSENAS[4]

[1] *Southeast National Marine Renewable Energy Center, Florida Atlantic University, 5600 N US Highway 1, Fort Pierce, FL 34946, wbaxley1@fau.edu*
[2] *Department of Civil Engineering, California Baptist University, 8432 Magnolia Ave, Riverside, CA 92504, nathaniel.small@calbaptist.edu*
[3] *Department of Civil, Environmental and Geomatics Engineering, Florida Atlantic University, 777 Glades Road, Boca Raton, FL 33431, jvanzwi@fau.edu*
[4] *Southeast National Marine Renewable Energy Center, Florida Atlantic University, 777 Glades Road, Boca Raton, FL 33431, galsenas@fau.edu*

This poster illustrates the impacts of hurricanes Sandy and Irma on a potential Ocean Current Energy production site within the Florida Current. The path and intensities of these hurricanes are compared with resulting flow profiles to help quantify hurricane impacts on flow magnitude and direction throughout the water column. These hurricane induced flow conditions are important to Ocean Current Turbine placement and design. These storm paths had diametric relationships with respect to the potential Ocean Current Turbine deployment site. Hurricane Sandy traveled approximately 250 miles off the eastern seaboard, impeding near surface currents in the study area while passing Florida. Conversely, Irma crossed through the Florida Keys, Southwest Florida, and then Central Florida as it progressed northward and eventually dissipated, increasing near surface currents as it passed. Both of these storms created mixed layers with relatively homogeneous mean (averaged over several minutes) flow speeds and directions over the top approximately 75-150 m of the water column. Below this mixed layer relatively abrupt changes in mean flow speed and direction were observed. Hurricane Sandy created a vertical speed change of 0.67 m/s over a 10 m change in depth, occurring at a depth of 150 m. At this same point a directional shear also developed, with a 60° change in flow direction occurring over the same 10 m depth window. For a two-day period during Sandy the upper layers slow down while a deeper enduring layer maintains almost constant velocity. Irma's passage appears to generate a strong increase in the current layers above 125 m depth, up to 2.5 m/s for three hours. This water velocity is much greater than the typical mean velocity for this area of 1.5 m/s and has only been exceeded once during non-storm conditions over our multi-year ADCP measurement campaign.

FIGURE 1: RENDERING OF HURRICANE PASSAGE OVER THE FLORIDA CURRENT.

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