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Observations of Ocean surface response to Hurricane Igor: A Salty Tropical Cyclone Wake observed from Space

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The upper ocean response to a moving hurricane is studied using satellite and in situ observations. Sea surface salinity response is emphasized using Soil Moisture and Ocean Salinity Sensor data acquired before and after the passing of Igor, a category 5 hurricane that attained wind speeds of 136 knots in September 2010. Post minus pre-hurricane satellite estimates of sea surface salinity reveal a strong surface salinity enhancement of $\sim$1 practical salinity unit over a $\sim$89000 km2 ocean surface area located on the right-hand side quadrant of the storm as it passed over the Amazon and Orinoco freshwater plume. The presence of this salty wake is associated with the erosion of the freshwater plume by the hurricane-induced mixing. The strong surface layer erosion as detected from space on the right-hand side storm quadrant is confirmed by in situ observation from Argo float profilers. The thermal, density and ocean color wakes are also evaluated and exhibit very consistent patterns with the sea surface salinity wake. As Igor over passed the plume on its left-hand side quadrants, the presence of a thick barrier layer below the plume inhibited mixing and significantly reduced the surface cooling in the wake of the storm, which limited the surface cooling negative feedback on Igor intensification. With this demonstrative example, we show that the new sea surface salinity measurements from space can be very useful as a complementary dataset to help predicting Tropical cyclone intensification in thick barrier layer area, such as the western tropical Atlantic.