The Hurricane Engine: Identifying the Correlation Between Ocean Eddies and the Development and Intensification of Hurricanes

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Upper ocean heat content (OHC) in advance of a hurricane is generally superior to pre-storm sea surface temperature (SST) for indicating favorable regions for hurricane intensification and maintenance. Eddies are the swirling motion of currents that have a deep vertical vortex. Rapid intensification is a catastrophic occurrence to community as it does not allow a population to properly prepare. The purpose of this research-based project was to analyze 15 years of historical atmospheric and oceanic data in search of possible correlating factors in hurricane development. Rapid intensification was recorded by calculating the increase in wind speed of 30 it or more and ocean eddies were detected from observing ocean current satellite imagery and visually inspecting an anti-cyclonic direction breaking off from a current. A conditional probability table was created to calculate percentages of the occurrence of ocean eddies and rapid intensification. 60% of hurricanes studies had a rapid intensification and an ocean eddy; 25% had no rapid intensification and no ocean eddy. 15% had rapid intensification, however, no ocean eddy. A linear regression analysis was conducted on change in SST of before and after a hurricane and rapid intensification. The correlation had an r-value of 0.79, indicative of a strong correlation. A small change in SST indicates an ocean eddy is present because an eddy's great depth does not allow the hurricane's wind to stir up cold water. An eddy's great vertical depth increases the circulation of warm water, therefore, the winds stir up warm waters, which continue to fuel a hurricane.

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