Identifying Overshooting Tops in Tropical Convection

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Abstract

The GOES-R Tropical Overshooting Top (TOT, Monette et al. 2012) product is an algorithm designed to identify convective updrafts and overshooting tops in tropical environments, specifically tropical cyclones (TCs). The TOT algorithm is a derivative of the GOES-R Overshooting Top (OT) product, and utilizes the 10.9-μm infrared window to identify isolated pixels that are significantly colder than their surroundings (convective overshoots). The detected TOTs can serve as a proxy for "hot towers", which represent intense convection with possible links to TC genesis and rapid intensification (RI), and TOTs have been shown to be skillful as a single predictor at forecasting TC genesis and RI. An objective on this proposal is to test TOTs in multi-predictor genesis and RI models to identify if TOTs add any value to these models. TOTs will also be compared to lightning strikes, a predictor currently utilized by experimental RI models. TOTs have been a part of the National Hurricane Center (NHC) Proving Ground product list since 2012.

Knowing the location and height of TOTs also has useful aviation applications, as overshooting tops have been linked to convectively-induced turbulence events experienced by aircraft (Bedka et al. 2010). TOT heights are estimated using GOES brightness temperatures and NWP model profiles. The TOT product has also been used as a real-time hazard avoidance tool for the Global Hawk pilotless aircraft flown during NASA's Hurricane and Severe Storm Sentinel (HS3) field experiment and NOAA's SHOUT program for the past 3 Atlantic hurricane seasons.