How can significant tornado events in low-CAPE and high-shear environments be predicted, detected, and acted upon with more accuracy and effectiveness using GOES ABI Band 11 (8.5 μm) satellite data?

**Methods and Data Part 2: March 3, 2020 Cookeville, TN Tornado**

This research may be used as a catalyst for other research into predicting HSLC tornado events as early as time. This research will be beneficial for meteorologists in identifying and acting on HSLC tornadic events as early as possible, which will undoubtedly save lives in the future.


Tornadoes are among the deadliest atmospheric phenomenon observed on earth, capable of flattening and changing towns, structures, and lives forever. Recent trends have indicated that notable fatal tornado cases are both shifting to the southeastern United States, a region that is consideredoby more populated than the Great Plains, and are occurring in high-shear low-CAPE (HSLC) environments, which cause many forecasting and prediction issues. Since the atmospheric conditions that need to come together for HSLC tornado setups are rarely obvious beforehand, forecasters are seldom confident in HSLC tornado events until it is too late. As a result, public awareness for HSLC tornado events is very low and often non-existent until the tornado strikes, causing HSLC tornadoes to be deadlier than other tornado setups when they occur. These issues proved to be catastrophic during two tornadoes, the March 3rd, 2019 Beauregard, Alabama EF4 Tornado and March 3rd, 2020 Cookeville, Tennessee EF4 Tornado, which were the two deadliest tornadoes in the United States between June 2013 and December 2021. Therefore, it is critical that research is conducted to find a way to predict HSLC tornadoes far in advance of time. The Beauregard and Cookeville tornado supercells were closely analyzed using GOES-16 ABI Band 11 (8.5 μm) data. The research revealed specific trends in both of the parent tornadic supercells on satellite prior and during the tornadoes, which may be identified and used by meteorologists to predict HSLC tornado events with more accuracy and lead time. This research will be beneficial for meteorologists in identifying and acting on HSLC tornado events as early as possible, which will undoubtedly save lives in the future.