

Evaluating the utility of atmospheric river detection in forecasting heavy rainfall events in the southeastern U.S.

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ABSTRACT

Past studies led by the NOAA Hydrometeorology Testbed (HMT) have documented the important contribution of atmospheric rivers (ARs) in driving extreme precipitation and flooding events in the western U.S., and these research findings have resulted in forecast tools that have provided significant operational benefit. However, little research has been conducted on this topic in other regions of the U.S., particularly in the southeastern U.S. Evidence suggests that events such as the severe flooding that occurred in Tennessee in May 2010 may have been partially driven by the presence of an AR, but a robust study of the linkage between AR conditions and eastern U.S. precipitation remains elusive. An extreme precipitation climatology produced as part of the NOAA HMT's most recent pilot project in the Southeast U.S. (HMT-SE) has identified a collection of heavy precipitation cases so that the correlation between extreme rainfall and AR conditions can be quantified. A newly-developed AR detection tool (ARDT) based on integrated vapor transport (IVT) is being tested for the Southeast U.S. region, and the results of which are being compared to a subset of heavy precipitation cases. ARDT performance is also being compared to that of the western United States in order to determine the tool's utility for pinpointing precipitation in the eastern U.S.'s environment of generally higher background moisture and more diverse array of precipitation generation mechanisms (as opposed to generally drier background states and more orographically-focused precipitation in western U.S. AR environments.)

This presentation will describe the linkage between identified ARs and known heavy precipitation events in the southeastern U.S., as well as compare the types and frequencies of heavy precipitation events that are not linked to AR conditions in this region. A primary objective of this investigation is to determine whether defining synoptic-scale moisture transport features as ARs in the southeastern U.S. can provide potential operational or applied forecast benefit. To evaluate potential operational benefit, it is planned that the ARDT tool will be tested and evaluated in the upcoming NOAA/NCEP/NWS HMT 2015 Flash Flood and Intense Rainfall (FFaIR) operational forecasting experiment.