

## **Atmospheric rivers and heavy precipitation events in the southeastern U.S.**

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This presentation summarizes the current understanding regarding the climatology, dynamics, and hydrometeorological impacts of atmospheric rivers (ARs) in the southeastern U.S. (SEUS). Drawing upon results of recent studies, it is shown that ARs can affect the SEUS in all months of the year, but peak in frequency in the winter and the transitions seasons, consistent with the climatology of midlatitude cyclones in the region. Moreover, ARs are shown to be frequently associated with heavy [ $>100$  mm ( $24$  h $^{-1}$ )] precipitation events (match rate of  $\sim 41\%$ ), most conspicuously for those heavy precipitation events classified as widespread (match rate of  $\sim 52\%$ ). Notably, ARs matched to widespread heavy precipitation events are shown to exhibit a strong tendency to form in connection with the recurvature and/or extratropical transition of a tropical cyclone. This linkage to TCs is posited to be a unique aspect of the phenomenology of ARs in the SEUS

The dynamics and hydrometeorological impacts of ARs in the SEUS are discussed in the context of case studies of two AR-induced heavy precipitation events that occurred in May 2010 in the vicinity of Nashville, Tennessee, and in September 2010 across North Carolina, respectively. Both events featured widespread extreme precipitation totals and resulted in high-impact flooding. The May 2010 case highlights the important role of Rossby wave amplification and breaking over western and central North America in the formation of a strong quasi-stationary AR linked to transports of moist air from the tropics. The September 2010 case provides an example of AR formation in connection with the interaction of a TC with a slow-moving midlatitude trough. The presentation is concluded with a discussion of future research directions regarding ARs in the SEUS.