Moisture Sources of Wet Extremes

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In September 2024, cyclone Boris brought intense precipitation to Central and Eastern Europe, causing severe flooding in Austria, Czech Republic, Poland, and neighboring countries. Understanding the processes that lead to extreme events like this is important for improving the prediction and mitigation of such events in the future. A key question in this context is where the moisture responsible for the precipitation came from. Since no direct observations can answer this question, a variety of moisture tracking methods have been developed to identify moisture sources. In the first part of the talk, I will demonstrate how one of these methods can be used to identify moisture sources for the heavy precipitation in September 2024, and highlight anomalous patterns associated with the event by comparing it to a climatology of moisture sources from 1979 to 2023. In the second part of the talk, I will present results from the moisture tracking intercomparison project INSPIRE (IdentificatioN of Sources of Precipitation through an International Research Effort), where 14 different moisture tracking methods were applied to three extreme precipitation events: a monsoon event in Pakistan, a convective event in Australia, and an atmospheric river event in Scotland. The results highlight the benefits and challenges of moisture tracking, and provide valuable insights into the processes driving extreme precipitation events.