

Understanding Synoptic Weather Yielding Extreme Daily Precipitation

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Climate models with sufficiently high spatial resolution (roughly $\frac{1}{2}^\circ$) can simulate fairly well the frequency versus intensity distribution of daily precipitation, including extremes. Confidence in such simulations and their projected future changes requires that simulations replicate the observed physical behavior underlying the extreme events. Climatological analysis can rely on straightforward compositing of observed or simulated extreme events when examining regions and seasons that have relatively simple precipitation dynamics, such as the central U.S. in winter. The analysis is more complex when multiple circulation patterns can yield extreme events, as occurs in some regions or seasons. We show how using Self-Organizing Maps can help sort different patterns in a systematic manner, yielding insight into the physical behavior and evolution of different types of extreme events in a region.