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# A General Perspective of Extreme Events in Climate

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Extreme events are by definition scarce, but they can have a significant impact on people and countries in the affected regions. An extreme event is most commonly defined in terms of the non-Gaussian tail (sometimes called a climate regime) of the data's probability density function (PDF). Understanding extremes has become an important objective in weather/climate variability research because climate and weather risk assessment depends on knowing the tails of PDFs.

In recent years, new tools that make use of advanced stochastic theory have evolved to evaluate extreme events and the physics that govern these events. One theory attributes extreme anomalies to stochastically forced dynamics, where, to model nonlinear interactions, the strength of the stochastic forcing depends on the flow itself (multiplicative noise). This closure assumption follows naturally from the general form of the equations of motion. Because stochastic theory makes clear and testable predictions about non-Gaussian variability, the multiplicative noise hypothesis can be verified by analyzing the detailed non-Gaussian statistics of atmospheric and oceanic variability. This presentation discusses the theoretical framework and some recent developments in stochastic modeling of extreme events in climate.