A Stochastic Weather Generator Based on Precipitation Events

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Stochastic weather generators are commonly used to generate time series of meteorological variables that reproduce specific statistical properties of observed data. These artificial time series of arbitrary length are, for instance, useful in agricultural and hydrological impact studies where observed time series are often not long enough to drive corresponding models. They can also be employed as a statistical null model for similarity studies of observational data. However, most weather generators have certain disadvantages, such as the inability to represent the seasonality and interannual variability of the climate system. Here, we present a novel event-based approach to this problem and apply it to precipitation events. Precipitation is usually the most difficult variable to model and, in addition, has the largest variability. Most of the difficulty lies in the correct modeling of the timing of precipitation occurrences. Our event-based approach models such timings for seasonal precipitation events with the advantage of being able to focus also on extreme events that have high socio-economical impacts and are therefore of great interest.