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Spatial and temporal coherency of European drought

B. Lloyd-Hughes
University of Reading, Walker Institute, Meteorology, United Kingdom (b.lloydhughes@reading.ac.uk)

The majority of notable high precipitation events are characterised by highly localised, short lived, heavy downbursts. The same is not true of the most notable drought events. These typically last for several months or even years and span thousands of square kilometres. Previous attempts to classify the spatio-temporal structure of drought have tended to impose unrealistic constraints (e.g. orthogonality with respect to contributions to the covariance) or arbitrary area averaging (e.g. within national boundaries). To avoid these pitfalls, a novel 'volumetric' approach to classification is proposed through the application of three dimensional aggregation methods to time series of regular grids of standardized precipitation data. A drought event can then be defined naturally by the outer shell of any spatially and temporarily coherent set of points displaying rainfall below a given threshold.

Initial results are presented for Europe for the period 1901-2007. These reveal a surprising degree of variability in the shape, volume, and location of the aggregated drought events. It is hoped that a better understanding of these structures will lead to improved methods for diagnosing and validating drought within climate models.