Return periods of droughts and related damages

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The socio-economic costs caused by drought have increased in recent years and necessitate a quantitative assessment of the return periods for this hazard. Since damage reports generally cover a relatively short time period, the extreme value distribution has to be estimated. Here, we evaluate a principle component analysis resampling technique to expand time series of limited length and estimate their probability distribution. The evaluation is based on data from a multi-century Community Climate System Model (CCSM3) climate control run for present climate conditions. The method is applied to various parameters, including temperature, precipitation and soil moisture deficit. We discuss the performance of our method for different parameters, domains and lengths of the sampling time series. We apply the method to derive a probabilistic dataset of the observed recent drought damages in France. The analysis reveals links to changes in the climate of that region. We discuss the implications for future drought damages in a regional climate impact assessment.