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Towards a better way of quantifying uncertainty in the E-OBS temperature dataset

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E-OBS is a widely used gridded dataset that provides daily resolution data from 1950 to "present-day" across Europe and is constructed by interpolating station data contained in the ECA&D database. While E-OBS provides several gridded variables, the focus in this study is uncertainty in the gridded temperature data. A measure of error is currently included in the dataset that aims to provide an estimate of the uncertainty of the data at each grid-box for each day. This uncertainty estimate is mainly a function of the density of the input station data and is particularly important as the quantity of these data vary spatially and temporally; this has a large effect on the reliability of the gridded data. However, the uncertainty measure currently provided in E-OBS remains one of the least-used components of the dataset by end-users. This uncertainty calculation is based on a combination of monthly error values, using Bayesian standard error estimates derived from monthly climatology values, and daily error values derived from interpolation variance. In this analysis we present an alternative way of quantifying uncertainty in the E-OBS data for the three temperature variables (maximum, minimum and mean daily temperature) using a multiple realization (ensemble) approach. The established E-OBS gridding method is retained but an ensemble of grids is produced using conditional stochastic simulation. This ensemble approach would seem to be the best way of incorporating uncertainty measures into the existing E-OBS gridding scheme, whilst providing a measure of uncertainty that should be of use to many users of the E-OBS data.