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A stochastic model for daily air temperature reliably reproducing extreme values

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Adaptation to climate change generally necessitates information at the very local scale of an installation and concerning extreme values rather than average conditions. These types of results are hardly obtained from climate model simulations and different downscaling or reconstruction techniques are needed to get reliable estimations of such quantities. The paper aims at presenting the derivation and application of a stochastic model for daily (minimum, maximum or mean) air temperature able to reasonably reproduce cold and hot extremes. Starting from observation series, the trends and seasonal components are first removed by both nonparametric and parametric methods in order to make the reduced series as stationary as possible. Then the reduced series with mean 0 and variance 1 is modelled by some kind of seasonal functional heteroscedastic autoregressive model (SFHAR) and the constraints from the extreme theory for bounded diffusions corresponding to the Weibull case are imposed on the conditional variance in order to take the boundedness of temperature distribution into account.
The different steps of model set up, validation and examples of application will be presented.