EMS Annual Meeting Abstracts
Vol. 13, EMS2016-690, 2016
16th EMS / 11th ECAC

A simple and cost-effective approach for assessing the uncertainties in gridded data

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Long-term gridded time series of key climate variables are a prerequisite in various environmental research and applications. Such datasets provide regularly spaced and spatially continuous estimates of meteorological variables for regions lacking direct observations. However, like other modelled data, statistically interpolated products contain uncertainties related to e.g. input data and methodology. Inherently, information about the uncertainties and potential caveats of the gridded data is of great value for the end users. Unfortunately, while simulation approaches are favored for quantifying the uncertainty, they are often neglected due to their intensive computer requirements, as such experiments require hundreds or thousands sampling rounds to conduct and thus are not feasible for long-term analysis. Recently, we have developed a new gridded daily climatology for Finland consisting of several climate variables (e.g. daily temperature conditions, precipitation and snow). In the process the previous gridding methodology was refined, and a simple and cost-effective approach for quantifying the spatio-temporal patterns of interpolation accuracy was developed. A permutation-based approach was chosen, were observation data were randomly sampled and multiple daily realizations of the gridded data were produced. After investigating the daily variability across the whole period, the analysis provided a good overall picture of the spatial uncertainties in the data. Moreover, the applied random sampling procedure can potentially provide additional information about the other aspects of the uncertainty. For example, after each random draw of observations, the statistical modelling parameters are likely to change, thus reflecting e.g. the robustness of the gridding methodology. Moreover, the procedure can help to identify stations with a strong influence on the gridded output and thus recognize regions with a suboptimal station density. In this presentation we will provide a brief description of the method, while especially focusing on the various aspects of uncertainties that can be characterized with our approach.