Evaluation of a downscaling algorithm based on analogues for application at seasonal model outputs

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Quality seasonal forecasts properly downscaled to the resolution needed by users is a key issue for planning, among others, of energy, water resources, agriculture and forestry sectors. Together with a better understanding of the mechanisms driving climate variability at this timescale, a collection of post-processing tools –including bias correction, calibration, space and time downscaling, combination of different forecasting systems, etc.- for improving the usage of seasonal forecasting systems is still needed. This important issue, focused on the Mediterranean region, is approached in the form of a tool-box by the ERA4CS MEDSCOPE project. This work describes in detail the evaluation of a downscaling algorithm based on analogues contributing to the mentioned tool-box. The algorithm makes successive use of an analogue technique -based on a Euclidean distance- and regression to downscale maximum and minimum temperature and precipitation. One important ingredient of this algorithm is the usage of a new observational gridded dataset with 5 km of horizontal resolution covering the whole Iberian Peninsula. This observational grid has been used both to calibrate the method (1981-1996) and to validate the results (1997-2016). The domain where analogues are computed is centered over Iberian Peninsula. Although the main application of this algorithm will be downscaling of seasonal forecasts, the low resolution ERA Interim reanalysis is used for this preliminary evaluation. Results of the validation show small seasonal bias, low values of RMSE and good matching of percentiles, allowing to conclude that at least over the Iberian Peninsula –where the high resolution observational grid is available- the here described downscaling algorithm performs satisfactory.