



Comparison of present global reanalysis datasets in the context of a statistical downscaling method for precipitation prediction

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The analogue method is a statistical downscaling method for precipitation prediction. It uses similarity in terms of synoptic-scale predictors with situations in the past in order to provide a probabilistic prediction for the day of interest. It has been used for decades in a context of weather or flood forecasting, and is more recently also applied to climate studies, whether for reconstruction of past weather conditions or future climate impact studies. In order to evaluate the relationship between synoptic scale predictors and the local weather variable of interest, e.g. precipitation, reanalysis datasets are necessary. Nowadays, the number of available reanalysis datasets increases. These are generated by different atmospheric models with different assimilation techniques and offer various spatial and temporal resolutions. A major difference between these datasets is also the length of the archive they provide. While some datasets start at the beginning of the satellite era (1980) and assimilate these data, others aim at homogeneity on a longer period (e.g. 20th century) and only assimilate conventional observations.

The context of the application of analogue methods might drive the choice of an appropriate dataset, for example when the archive length is a leading criterion. However, in many studies, a reanalysis dataset is subjectively chosen, according to the user's preferences or the ease of access. The impact of this choice on the results of the downscaling procedure is rarely considered and no comprehensive comparison has been undertaken so far.

In order to fill this gap and to advise on the choice of appropriate datasets, nine different global reanalysis datasets were compared in seven distinct versions of analogue methods, over 300 precipitation stations in Switzerland. Significant differences in terms of prediction performance were identified. Although the impact of the reanalysis dataset on the skill score varies according to the chosen predictor, be it atmospheric circulation or thermodynamic variables, some hierarchy between the datasets is often preserved. This work can thus help choosing an appropriate dataset for the analogue method, or raise awareness of the consequences of using a certain dataset.