Evaluation of a vector autoregressive approach for downscaling

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Statisical downscaling has become a well-established tool in regional and local impact assessments over the last few years. Robust and universal downscaling methods are required to reliably correct the spatial and temporal structures from coarse models. In this study we set up and evaluate the application of VAR-models for automated temperature and precipitation downscaling. VAR-models belong to the vectorial regression-techniques, that include autoregressive effects of the considered time series. They might be seen as an extension of univariate time-series analysis to multivariate perspective. Including autoregressive effects is one of the great advantages of this method, but also includes some pitfalls. Before the model can be applied the structure of the data must be carfully examined and require appropriate data preprocessing. We study in detail different preprocessing techniques and the possibility of the automatization. The proposed method has been applied and evaluated to temperature and precipitation data in the Rhineland region (Germany) and Svalbard. The large-scale atmospheric data are derived from ERA-40 as NCEP/NCAR reanalysis. These datasets offer the possibility to determine the applicability of VAR-models in a downscaling approach, their need for data-preparation techniques and the possibility of an automatization of an approach based on these models.