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Representation of Climate in Europe: An Intercomparison of Global and Regional Reanalyses

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The assessment of climate and its variability are a key issue in the development of adaption strategies to encounter the effects of climate change. It is therefore important to provide comprehensive data sets which allow for monitoring regional climate also in areas where no in situ measurements are available. Such measurements are becoming especially sparse when assessing climate at smaller scales. Gridded data sets originating from mere interpolation are prone to errors and up to now do not use multivariate approaches to cover several parameters at once. In this regard, reanalysis data sets constitute a valuable source of information on past weather and climate. The gridded retrospective data have become an integral part of the data sets used by scientists in various disciplines.

In order to assess the value of reanalyses with respect to representing climate, we compare several global and regional reanalysis data sets such as ERA-Interim, MERRA2, COSMO-REA6 over the European continent. Our approach focuses on different impacts of climate such as dry spells, draughts and growing degree days for agriculture, heat and cold waves as public safety risks as well as parameters regarding energy consumption such as heating and cooling degree days. We calculate climate indices separately from each reanalysis as well as from observations for a period covering the last 20 years. The reanalysis based indices are then evaluated against the observation based indices to identify the potential in representing climate as well as to identify similarities and differences among the various reanalyses on different spatial resolutions.