



Temperature trends in Europe: Comparison of different data sources

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Temperature trends differ markedly not only region-to-region and between seasons but also depending on the selected datasets. Only a few studies attempted to compare temperature trends between data sources of different types. Here, one station-based (ECA&D), two gridded (E-OBS; CRUTEM) and two reanalysis (ERA-40; NCEP/NCAR) datasets are used for long-term temperature change detection. The period from 1957 to 2002 when all datasets overlap is examined and the linear regression method is utilized to calculate temperature trends in each season separately for 92 ECA&D stations, 325, 60, 323 and 212 grid points of E-OBS, CRUTEM, ERA-40 and NCEP/NCAR, respectively. Raster maps illustrating the differences in trends between datasets across European domain are accompanied by mean temperature series showing the causes of these discrepancies. We demonstrate that trends in reanalyses deviate considerably from the other datasets mainly because the type and amount of data assimilated into them change in time. Interestingly, whilst the ERA-40 shows lower trends due to an overestimation of the mean temperature prior 1967, the NCEP/NCAR reveal lower trends compared to other datasets owing to mean temperature underestimation at the end of the examined period. A noticeable anomaly in NCEP/NCAR data was detected in Eastern Europe in summer with temperature trends nearly twice as steep compared to other data sources. The study also reveals the weaknesses of the observation-based data sources, such as the unstable number of stations entering the interpolation over time in the case of gridded data or the lack of representativeness of selected ECA&D climate stations.