



Reconstruction of global monthly upper-level fields back to 1900

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The study of upper-level fields is an important tool in climate research and is particularly important for understanding the mechanisms leading to long-range teleconnections. However, global 3-dimensional datasets are only available for the second half of the 20th century. For the investigation of teleconnections, especially with respect to interannual-to-decadal oscillations, it is of interest to have upper-level fields prior to 1948.

Upper-air data prior to 1948 can still be found on paper in various archives. After digitizing the data will become available within this year. After an extensive quality control the data can be used for statistical reconstructions of upper-level fields.

In this paper we present statistical reconstructions of global monthly mean fields of temperature and geopotential height back to 1900 for the 850 to 100 hPa levels used for the validation of the digitized upper-air data. The reconstructions are based on surface data including several hundred predictor variables composed of temperature series from meteorological stations and fields of sea level pressure. The principal component regression model is fitted in a recent calibration period (1948-2004) using the NCEP/NCAR reanalysis as predictand and applied in the reconstruction period (1900-1947). In a first step the reconstructed upper-level fields based on surface data are used for the assessment of the historical upper-air data and for the development of a validation strategy. In a future second step the validated upper-air data will be included for the reconstruction and climate models are used for the final validation. The reconstructed fields based on surface data are presented for selected months and are analyzed with a main focus on circulation variability.