



## **Adjusted radiosonde temperatures back to 1950 for ERA5 and research**

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Comprehensive adjustments for the global radiosonde data set exist only back to 1958 and many of them have not been updated to present.

Within the EU project ERA-CLIM2 and in preparation for the new Copernicus reanalysis ERA5, which will be extended back to 1950, many new radiosonde and PILOT records have been digitized and have been made ready for assimilation.

The RAOBCORE (Haimberger et al. 2012, *J. Climate*) adjustment system, which analyzes time series of differences between radiosonde observations and existing reanalyses to detect and adjust the radiosonde temperature time series has been updated to include these data. Finding suitable reanalyses as a reference for break detection has proved difficult in the pre-satellite era, since the reanalyses are more strongly dependent on the radiosonde measurements to be adjusted. Using surface data only reanalyses, which are entirely independent of radiosondes, also poses challenges particularly in the stratosphere, since features such as sudden stratospheric warming and temperature perturbations due to volcanic eruptions are not well represented.

While the biases in the pre-satellite era could be significantly reduced, the differences between adjustments depending due to differences in the reference can reach 0.5-1K in the stratosphere in the early 1960s.

An ensemble of realizations for adjustments is provided and it is recommended to use different realizations if an ensemble of reanalyses with realistic representation of uncertainty at higher altitudes is to be created.