



Confronting reanalysis datasets with independent radiosonde observations

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Reanalysis datasets are used for a broad range of research purposes in the atmospheric sciences, from studying climate change to examining extreme rainfall events. However, it is often difficult to verify the quality of such datasets, because verification requires the reanalysis data to be confronted with high-quality independent (i.e. unassimilated) observations, which are rare.

We have been launching calibrated Vaisala RS92 radiosondes from the University of Reading, UK for the past three years. None of the data from these launches has been assimilated into any forecasts or reanalysis products. The sondes have random ascent trajectories over southern England, making them ideal to cross check the accuracy of the reanalysis data in this region.

In this study, our radiosonde observations of temperature, relative humidity, specific humidity, zonal wind, meridional wind, and pressure surface height are compared with the corresponding data from two widely used reanalysis datasets: ERA-Interim and NCEP. The comparison was done at grid points and pressure levels given by the radiosonde's telemetry data.

The temperatures, horizontal winds, and pressure surface heights from the reanalysis datasets show excellent agreement with the radiosonde observations. Values of the specific humidity show reasonable agreement, but values of the relative humidity show poor agreement. The stated error tolerance of the radiosonde's humidity sensors is too small to account for the poor correlation in these results. We conclude that, although reanalysis estimates of temperature and wind may be taken to be representative of the values locally within the reanalysis grid box, values of relative humidity may not. Therefore, in studies of local hydrology, reanalysis humidity data must be used with caution.