



## **Climate comparison of reference upper-air measurements: GPS radio occultation and GRUAN radiosondes**

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The confidence in the vertical structure of the rate of temperature change in the upper-air region is still low. To change this, measurements of suitable quality are required. Observations from the GPS radio occultation (GPSRO) satellite technique and from the newly established GCOS Reference Upper Air Network (GRUAN) are both candidates to serve as reference observations. GPSRO is currently the only self-calibrated and SI-traceable satellite measurement system, where the observations can be traced back to precise time measurements. These observations possess the required high quality with global coverage, but common physical parameters such as temperature are only available after a sophisticated retrieval process. GRUAN on the other hand delivers data only from a sparse network of radiosonde stations (16 stations at present), with a more straight-forward measurement principle and careful bias corrections applied. Owing to the strongly differing techniques, GPSRO and GRUAN have their unique strengths and weaknesses. In this study, we compare collocated profiles from these two datasets for the time period 2011 to 2013, with a special focus on day/night biases, and use interpolated ERA-Interim data as an additional source of background information. The GRUAN effort is a vital contribution to the goal of anchoring less accurate upper-air measurements to reference data. GPSRO adds to this global coverage and more stratospheric extend, and, as an observing system independent from radiosondes, serves as another fundamentally needed source of thermodynamic reference data in the free atmosphere.