



Systematic pressure and temperature differences between Vaisala RS80 and RS92 radiosondes

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In the fall of 2004, the German Weather Service started changing the routine radiosonde from Vaisala RS80 to RS92. This was accompanied by ≈ 100 twin flights with both sonde types in Lindenberg (spring 2004) and Hohenpeissenberg (year 2005). Here we focus on temperature and pressure in the stratosphere. The large improvements brought by the RS92 humidity sensor in the troposphere are the topic of separate investigations. For simultaneous pressure and temperature, the twin flights indicate systematic differences. These are generally small for pressures larger than 100 hPa, but increase substantially with decreasing pressures. At 10 hPa, during daylight, the RS92 reports higher temperatures by about 1 K, whereas nearly the same temperature is reported by both types during night. The pressure measured by the RS80 is often lower by 5% (0.5 hPa) or more, at about 10 hPa. Correspondingly, RS80 derived geopotential heights are often larger, by 300 m or more, at 10 hPa. In general, the RS92 pressure measurement is more consistent and less noisy. Pressure and height differences depend on production charges. For RS92 produced between November 2003 and May 2004, the on-sonde Global Positioning System reports about 120 m higher altitude for the 10 hPa surface, than derived from the same sonde's pressure and temperature data. For later RS92 production charges, this altitude difference seems to have disappeared, and agreement between pT_U-heights and GPS-heights is very good. However, the significant pressure and temperature differences in the stratosphere make it necessary to correct stratospheric long-term records for the break caused by the switchover from Vaisala RS80 to RS92.