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GPS radio occultation with CHAMP: Comparison of vertical refractivity and temperature profiles with radiosonde data

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Atmospheric profiling with the German CHAMP (CHAllenging Minisatellite Payload) satellite was activated in February 2001. The unique long term set of GPS radio occultation data comprises now more than 300,000 measurements. The experiment brought significant progress for the innovative GPS occultation technique in relation to the proof-of concept GPS/MET. CHAMP data are used for several applications in atmospheric/ionospheric research and for the preparation of upcoming GPS occultation missions, as e.g. COSMIC, Metop, EQUARS or TerraSAR-X. The status of the experiment is briefly reviewed and recent validation results are presented.

Our special focus is on a comparison of CHAMP data with measurements from the global network of radiosondes. A set of \sim 160,000 profiles, derived from CHAMP measurements, was used. Several aspects are investigated, as, e.g., the dependence of the comparison results on the geographical region (i.e. on the type of the used radiosonde) and on the maximum distance and time difference between the CHAMP and the corresponding radiosonde measurements. It is shown, that the observed differences in the comparisons over various geographical regions are caused by different types of radiosondes and that the CHAMP data can be used to reveal weaknesses of the radiosonde measurements.