



GPS radio occultation: Operational sounding of the atmosphere with GRACE

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GPS Radio Occultation (RO) measurements aboard the GRACE-A satellite are continuously activated since May 22, 2006. The data are automatically analyzed by the GFZ orbit and occultation processing systems. About 150 globally distributed vertical profiles of refractivity, temperature and water vapour are derived per day. A substantial number of these data are provided with an average latency between measurements and availability of corresponding analysis results of less than 5 hours. Bending angle (ECMWF) and refractivity (Met Office) data are already operationally used since 2006 to improve global weather forecasts.

The history of GPS radio occultation on GRACE from its initial short activation mid 2004 and the corresponding data analysis at GFZ is reviewed. Results from GRACE-A and -B orbit and occultation analyses are presented and atmospheric profiles are validated with independent meteorological data from analyses and radiosondes. Instrument specifics compared to the German CHAMP satellite are characterized, and the zero-differencing technique for the GRACE occultation data analysis is introduced. We also review the use of the GRACE data by various weather centres and present results of an assimilation study to improve global weather forecasts by using a combined set of CHAMP and GRACE data at ECMWF.

Finally we give examples for applications of the GRACE data in atmospheric research.

The data will be used together with those from the other current RO missions CHAMP, COSMIC and METOP.