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Global analysis of gravity wave potential energy in the lower stratosphere derived from GPS radio occultation data

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Global gravity wave (GW) potential energy distributions are retrieved from radio occultation (RO) data from different satellite missions: CHAMP since 2001, GRACE and COSMIC since 2006. The RO technique uses GPS radio signals received aboard low orbiting satellites for atmospheric limb sounding. Atmospheric temperature profiles are derived with high vertical resolution.

The specific potential energy (SPE) as a measure of GW activity is deduced from the temperature profile for each occultation event from the tropopause up to 35 km. The GW analysis is based on the vertical detrending of the measured temperature profiles by using a band-pass filter associated to different vertical wave lengths. We discuss mean SPE distributions with respect to geographical regions/seasons and altitude intervals. At equatorial latitudes, GW activity inter-annual enhancements, related to the QBO, are observed just below zonal wind zero contours corresponding to westerly shears.

Up to now CHAMP presents the first global long-term temperature data set with high vertical resolution. The RO experiment aboard the GRACE mission is online since May 2006. The availability of COSMIC data since April 2006 improves the temporal and spatial resolution of RO measurements significantly. This is the basis for the derivation of horizontal GW parameters. Some first results will be discussed.