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Gravity wave absolute momentum flux from GPS radio occultation data

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Global gravity wave (GW) parameters (potential energy and vertical flux of absolute horizontal momentum) are retrieved from GPS radio occultation (RO) data. The RO technique uses GPS signals received aboard low Earth orbiting satellites for atmospheric limb sounding. Atmospheric temperature profiles are derived with high vertical resolution and the GPS RO technique is sensitive to GWs with small ratios of vertical to horizontal wavelengths. Since 2006 the six-satellite U.S./Taiwan FORMOSAT-3/COSMIC mission delivers about 2000 global distributed radio occultations daily. This gives the possibility for the determination of absolute Momentum Flux (MF) as the most important parameter for the quantification of GW activity. In this presentation we discuss MF distributions in the lower stratosphere (20-35 km) derived from closely spatio-temporal RO temperature fluctuation profiles. The results are compared with other MF climatologies and limitations of the method will be addressed.
Another crucial issue discussed in this presentation is the influence of different background separation methods to the final momentum fluxes. For gravity wave analysis a measured temperature profile is divided into a fluctuation and a background and it is assumed that the fluctuation is caused by gravity waves only. For the background separation, i.e. the detrending of large-scale processes from the measured temperature profile, several methods exist. In this study we compare horizontal and vertical detrending approaches and demonstrate that the horizontal detrending based on radio occultation data and ERA-Interim gives more consistent results compared with a vertical detrending.