

## **Determination of atmospheric wave parameters from individual radio occultation retrievals of vertical temperature profiles**

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A new method for the determination of internal gravity wave (IGW) parameters from a single vertical temperature profile measurement in the Earth's atmosphere has been developed (Gubenko et al., 2008). This method does not require any additional information not contained in the profile and may be used for the analysis of profiles measured by various techniques. The method is based on the analysis of relative amplitude thresholds of the wave field and on the linear IGW saturation theory in which these amplitude thresholds are restricted by dynamical (shear) instability processes in the atmosphere. When the amplitude of an internal gravity wave reaches the shear instability limit, energy is assumed to be dissipated in such a way that the IGW amplitude is maintained at the instability limit as the wave propagates upwards. We have extended the analysis technique of Gubenko et al. (2008) in order to reconstruct the complete set of IGW characteristics (including such important parameters as the kinetic and potential wave energy and IGW fluxes of the energy and horizontal momentum) from temperature perturbations in a single vertical profile (Gubenko et al., 2011). Analysis of individual IGW events, identified in the radio occultation (RO) retrievals of vertical temperature profiles, and estimates of wave characteristics can be used for parameterization of internal gravity waves in general circulation models. It is shown that the inspection of the simultaneous wind velocity and temperature data may provide useful information for the examination and validation of an IGW saturation approach that is the important point for the correct application of our IGW reconstruction method to the RO temperature data. We propose also an alternative analysis method to estimate the relative amplitude threshold (and to extract IGW parameters) from perturbations of the Brunt-Vaisala frequency squared in a single vertical profile (Gubenko et al., 2011). An application of the developed method to the RO temperature data has given the possibility to identify the IGWs in the Earth's stratosphere and to determine the magnitudes of key wave parameters such as the intrinsic frequency, amplitudes of vertical and horizontal perturbations of the wind velocity, vertical and horizontal wavelengths, intrinsic vertical and horizontal phase (and group) speeds, kinetic and potential energy, vertical fluxes of the wave energy and horizontal momentum. The obtained results of internal wave studies in the Earth's stratosphere found from the COSMIC and CHAMP GPS RO temperature profiles are presented.

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