Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06232, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06232
EGU General Assembly 2008

Application of the GPS radio occultation technology for studying of the internal waves in the atmosphere

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We show in this contribution that the high-precision and stable signals emitted by Global Positioning navigational System (GPS) satellites create favourable conditions both for radio holographic monitoring of the atmosphere, ionosphere and terrestrial surface and for investigation of the radio wave propagation effects in the trans-ionospheric satellite – to – satellite links. Comparative analysis of the phase and amplitude variations of the GPS radio-holograms allows one to separate the influence of the layered and irregular structures. The altitude profile of the vertical gradient of refractivity of the layered structures can be used to find the main characteristics of the internal wave activity with a global coverage. In general case, when the type of internal waves are not known, the height dependence of the vertical gradient of refractivity can be applied for monitoring the seasonal and geographical distributions of wave activity at different levels in the atmosphere. By use of the vertical profile of the refractivity one can measure important parameters of the internal gravity waves (GW): the in-

trinsic phase speed, the horizontal wind perturbations and, under some assumptions, the intrinsic frequency as functions of height in the atmosphere. A new technique has been applied to measurements provided during CHAllenging Minisatellite Payload (CHAMP) and the Formosa Satellite-3 and Constellation Observing System for Meteorology, Ionosphere, and Climate (FORMOSAT-3/COSMIC) radio occultation (RO) missions. As an example of this approach, we establish the atmospheric origin of the amplitude and phase variations in RO signal at the altitudes 10 – 26 km. We observed in the first time in the RO practice examples of the internal wave breaking at the altitudes between 38 and 50 km. By use of analysis of RO data the geographical distribution of the potential and kinetic energy of GW has been obtained with a global coverage.