

RECENT RESEARCH ACTIVITIES

Global distribution of short vertical scale gravity waves potential energy observed from COSMIC GPS radio occultation**(Laboratory of Atmospheric Sensing and Diagnosis, RISH, Kyoto University)****Noersomadi, Toshitaka Tsuda, and Hiroyuki Hashiguchi**

We retrieved temperature profile with a high vertical resolution using the full spectrum inversion or Wave Optics (WO) method from Constellation Observing System for Meteorology Ionosphere and Climate (COSMIC) Global Positioning System (GPS) Radio Occultation (RO) measurement. We analyzed the vertical wavenumber spectra of gravity waves (GWs) from the normalized temperature perturbations in the 20-27 km height range considering reasonably stable layer regardless of season and latitude. We integrated the wavenumber spectra at range 0.5 km to 1.75 km of vertical wavelength (λ_z) to obtain the gravity waves potential energy (E_p), which was not studied using conventional COSMIC GPS-RO data retrieved by Geometrical Optics (GO). Figure 1 shows the ratio E_p to the model value by saturated GW theory during November-December-January (NDJ) and June-July-August (JJA). The ratio of E_p with the saturated GW model spectrum was relatively stable in the Southern Hemisphere, ranging from 0.4 to 0.6, but in the Northern Hemisphere it showed large variations from 0.3 to 1.2, depending on topography (i.e. Tibetan Plateau in 90°-150°, 30°-60°N, mountainous region in 170°-230°, 70°N) and showed a clear contrast between winter and summer. In particular, the ratio exceeded 1.0 in winter at middle latitudes in the Northern Hemisphere in region 90°-150°, indicating an important effect of topography. It is also noteworthy that the ratio of E_p in the tropics was steadily large at 1.0-1.2 regardless of season and longitude. In particular, over the Equator the ratio was 1.2-1.3 throughout a year.

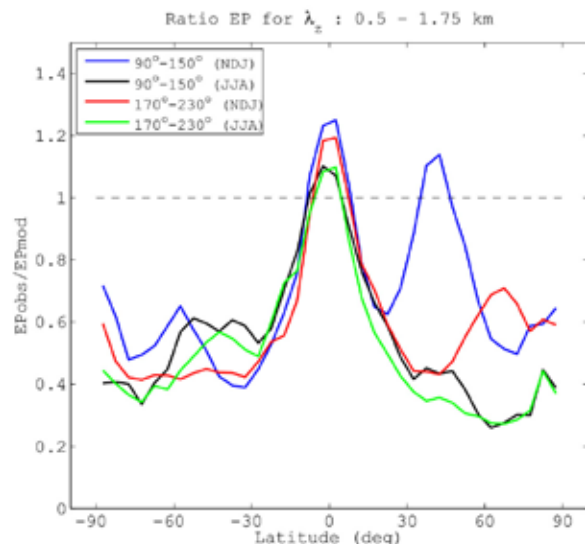


Figure 1. Ratio of the observed E_p to the model value by saturated gravity wave theory.

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References

Noersomadi and T. Tsuda, "Global distribution of vertical wavenumber spectra in the lower stratosphere observed using high-vertical-resolution temperature profiles from COSMIC GPS radio occultation", *Ann. Geophys.*, vol. 34, pp. 203-213, doi:10.5194/angeo-34-203-2016, 2016.