AOGS 2005

Characteristics of Inertio-Gravity waves observed by Rawinsondes in Korea during the Passage of Typhoon Rusa

HYE-YEONG CHUN[1], JUNG-SUK GOH[1] and IN-SUN SONG[1]
[1]*Department of Atmospheric Sciences, Yonsei University, Seoul, South Korea*

This study analyzes properties of disturbances observed by operational rawinsonde launched from six observatories in South Korea from 20 August to 5 September in 2002. From the analysis of the phase relationship, hodograph, and polarization of the wind disturbances, it is found that the disturbances observed in the stratosphere (17.5–30.5 km) are due to inertia-gravity waves. Mean values of estimated intrinsic frequency and vertical and horizontal wavelengths are 2.7 f (f is the Coriolis parameter), 5.71 km, and 906 km, respectively. The intrinsic phase velocities are generally isotropic, while ground-relative phase velocities and group velocities direct to mostly westward because of the easterly flow in the stratosphere.

To estimate sources of the observed wave disturbances, backward ray paths are calculated. Initial spectral characteristics of each ray are determined from the analysis of the rawinsonde data. When backward rays of observed waves propagate downward passing through deep convection region, identified based on brightness temperature, the waves are considered to be due to deep convective systems (WET case). Otherwise, waves are regarded as being induced by sources other than convection (DRY case). In WET (DRY) case, most observed waves are generated in the east (west) of each observatory. In WET case, waves have relatively large intrinsic frequencies (3.55 f) and small horizontal wavelengths (551 km). In DRY case, waves have relatively small intrinsic frequencies (1.43 f) and large horizontal wavelengths (1241 km). Based on the calculation of backward ray paths, the waves in DRY case are likely due to the jet stream located in the north of the Korean peninsula.