Characteristics and Sources of Inertia-Gravity Waves Observed by Radiosonde in Korea

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Characteristics and sources of inertia-gravity waves in the lower stratosphere are investigated using radiosonde data observed at ten stations in Korea during 15 June to 15 July 2007. The average potential, kinetic, and total energies of the observed waves are 2.40 J kg^{-1}, 4.49 J kg^{-1}, and 6.89 J kg^{-1}, respectively. The average intrinsic frequency, vertical wavelength, and horizontal wavelength for the observed waves are 2.77f (where f is the Coriolis parameter), 2.58 km, and 620.11 km, respectively. To examine the propagation and the sources of the observed gravity waves, a three-dimensional ray-tracing model is used. The observed gravity waves are classified into two groups based on the existence of convections when and where the rays reach altitudes of z = 6-13 km. Sources mostly locate in the northeast and southeast of the observation stations below z = 5 km for the convection-related cases (CONV), and above z = 20 km for the other cases (NCONV). The amplitude of waves in 2007 is found to be much larger than that in 2005, and it is likely due to the interannual variation in the convective activity that appears in outgoing longwave radiation (OLR) data in the East Asia where waves are originated.

Keywords: Inertia-gravity wave; radiosonde; wave source; ray tracing