Characteristics and sources of inertia-gravity waves revealed in operational radiosonde at Jang Bogo Station (JBS), Antarctica

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Characteristics and sources of inertia-gravity waves (IGWs) are investigated in the troposphere (z = 2–7 km) and the lower stratosphere (z = 15–22 km), using high-resolution radiosonde data obtained daily at Jang Bogo Station (74˚37’S, 164˚13’E) for 25 months (Dec. 2014–Dec. 2016). In the stratosphere, most of IGWs propagate upward, while down-going IGWs increase with reduction of up-going IGWs from May to October. In the troposphere, 60 (40) % of IGWs propagate upward (downward) without seasonal variations. Most of the observed IGWs in the stratosphere propagate eastward significantly following the prevailing westerly in the stratosphere, while this feature is less evident in the troposphere. The average intrinsic frequency, vertical wavelength, and horizontal wavelength of IGWs in the troposphere (stratosphere) are 3.48f (1.94f) (where f is the Coriolis parameter), 1.48 km (1.48 km), and 67.17 km (222.94 km), respectively. Intrinsic frequency and vertical wavelength in the stratosphere show clear seasonal variations with an increase (decrease) from autumn to winter (spring to summer), resulting in increased (decreased) horizontal wavelength from spring to summer (autumn to winter). Wave energy in the stratosphere has clear seasonal variations with the maximum in August (6.2 J kg^{-1}) and minimum in January (2.5 kg^{-1}), while tropospheric ones have much smaller energy without seasonal variations. The momentum flux (MF) of up-going IGWs in the stratosphere is more negative (positive) in the zonal (meridional) direction, while that of down-going IGWs is mostly positive for both directions. Potential sources (mountains, polar-night jets, and convective clouds) of the observed IGWs are examined using a three-dimensional ray-tracing model of IGWs. The results will be shown in the conference.

Key words: Inertia-gravity waves, radiosonde, Antarctica, wave sources