Geophysical Research Abstracts
Vol. 17, EGU2015-8262, 2015
EGU General Assembly 2015

Properties of inertia gravity waves in the lower stratosphere as observed by the PANSY radar over Syowa Station in the Antarctic

Maria Mihalikova (1), Kaoru Sato (1), Masaki Tsutsumi (2), and Toru Sato (3)

(1) Department of Earth and Planetary Science, The University of Tokyo, Tokyo, Japan, (2) National Institute of Polar Research, Tachikawa, Tokyo, Japan, (3) Department of Communications and Computer Engineering, Kyoto University, Kyoto, Japan

The Inertia-gravity waves (IGWs) are an important component for the dynamics of the middle atmosphere. However, observational studies needed to constrain their forcing are still insufficient.
The PANSY radar is a Mesosphere–Stratosphere–Troposphere/Incoherent Scatter (MST/IS) radar installed at Syowa Station (69°00′S, 39°35′E) in the Antarctic region. This type of radar is useful to clarify the role of atmospheric gravity waves at high latitudes in the troposphere, stratosphere and mesosphere because it provides high resolution vertical profiles of wind vectors including their vertical components with high accuracy at time intervals of about one minute. A partial system of the PANSY radar is in operation since May 2012 and thus provides long-term observations to examine IGW characteristics in terms of the seasonal variation in the lower and middle atmosphere.
In the present study, observational data of the horizontal and vertical wind components (vertical resolution of 150m and temporal resolution of 30 minutes) are used to derive statistical analysis of the properties of IGWs with short vertical wavelengths ($\leq$4km) and ground-based periods longer than 4 hours. The study concentrates on the lowermost part of the stratosphere just above the tropopause level (height range 10km to 12km). The properties of IGWs from January 2013 until December 2013 are derived using the hodograph analysis. The annual cycle of the parameters of the observed IGWs (intrinsic frequency, horizontal propagation direction, vertical and horizontal wavelength) are obtained. The annual cycles for the cases of IGWs with upward and downward propagation of the energy are also derived and compared in the individual months. We also investigate the momentum flux for the considered cases of IGWs. Notable property is quite large temporal change of the ratio of downward propagating waves during the year. Their percentage ranges from 9% to 22% in the summer and winter months respectively. This is more than the previously reported in the studies from mid-latitudes and model-based studies. The higher percentage of the downward propagating waves in the winter months agrees with the findings of radiosonde data based studies from the Antarctic region.