Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

PEM27-08 会場:A01 時間:5 月 26 日 10:00-10:15

Comparison of horizontal phase velocity distributions of gravity waves observed by ANGWIN, using a 3D spectral technique

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Atmospheric gravity waves (AGWs), which are generated in the lower atmosphere, transport significant amount of energy and momentum into the mesosphere and lower thermosphere and cause the mean wind accelerations in the mesosphere. This momentum deposit drives the general circulation and affects the temperature structure. Among many parameters to characterize AGWs, horizontal phase velocity is very important to discuss their vertical propagation. Airglow imaging is a useful technique for investigating the horizontal structures of AGWs around mesopause. An international airglow imager (and other instruments) network in the Antarctic, named ANGWIN (Antarctic Gravity Wave Imaging/Instrument Network) was started in 2011. Its purpose is to understand characteristics of mesospheric gravity waves and their impacts on the Mesosphere and Lower Thermosphere (MLT) environment over Antarctica.

In this study, we compared distributions of horizontal phase velocities of gravity waves at around 90 km altitude over different locations using our new statistical analysis method based on 3-D Fourier transform, developed by Matsuda et al. (2014). The comparison has been carried out for airglow imagers at four stations, that are, Syowa (69S, 40E), Halley (76S, 27W), Davis (69S, 78E) and McMurdo (78S, 156E), out of the ANGWIN imagers, for the observation period between April 6 and May 21 in 2013. Not only horizontal propagation characteristics, gravity wave energies can also be quantitatively compared, indicating a smaller GW activity in higher latitudes. The presentation will be focused on showing the performance of the new statistical technique for studying gravity waves.

キーワード: 大気重力波, 大気光イメージング
Keywords: atmospheric gravity wave, airglow imaging