# One night variation of horizontal phase velocity distribution of mesospheric gravity waves at Syowa

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Gravity waves, generated in the lower atmosphere, can propagate to the mesosphere and the lower thermosphere, and transport great amount of energy and momentum, and release them at various altitude regions. Among many parameters to characterize gravity waves, horizontal phase velocity is very important to discuss vertical propagation and where the momentum is released. Near the mesopause region, OH and other airglow imaging has been used for investigating the horizontal structures of gravity waves for more than two decades. Although the huge amount of the image data has been observed at various observation sites all over the world, a time consuming manual procedure has been used for extracting horizontal propagation characteristics from airglow data. This causes difficulty in obtaining a global map of gravity wave characteristics in the mesopause region. Another important fact on the mesospheric gravity wave studies is that observations over the Antarctic region were quite rare despites a significant amount of gravity waves generated in this region.
Matsuda et al., 2014 developed new statistical analysis method for deriving horizontal phase velocity spectrum of gravity waves derived from airglow imaging data. It is suitable to not only deal with a large amount of data, but also reveal temporal variation of phase velocity spectrum. In this study, we obtained 9 horizontal phase velocity spectra every an hour at 1501-0000 on May 11 2013 at Syowa (69S, 40E). We compared these spectra with background wind using re-analysis data (MERRA) and MF radar data, and found that effect of wind filtering by critical level could not explain the temporal variation.

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