

Mesospheric gravity wave propagation observed by OMTI multi-station network

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Atmospheric gravity waves significantly contribute to the wind/thermal balances in the mesosphere and lower thermosphere (MLT) through their vertical transport of horizontal momentum. It has been reported that the gravity wave momentum flux preferentially associated with the scale of the waves; the momentum fluxes of the waves with a horizontal scale of 10-100 km are particularly significant.

Airglow imaging is a useful technique to observe two-dimensional structure of small-scale (<100 km) gravity waves in the MLT region and has been used to investigate global behavior of the waves. Solar-Terrestrial Environment Laboratory, Nagoya University has made long-term airglow imaging observations in the world using the Optical Mesosphere and Thermosphere Imager (OMTI) system. All-sky airglow imagers of OMTI have interference filters on rotating wheels to observe airglow emissions in the vicinity of the mesopause (OI 557.7-nm, emission height ~96 km; OH Meinel-bands, ~86 km) and the ionosphere (OI 630.0-nm, ~250 km). In the Far East region, four OMTI stations are now up and running: from north to south, Yoyaguni (24.5N, 123.0E), Sata (31.0N, 130.7E), Shigaraki (34.9N, 136.1E), Rikubetsu (43.5N, 143.8E), Japan, and Paratunka (53.0N, 158.2E), Russia. This multi-station network covers an area elongating from southwest to northeast (~25x25 degrees, including almost all part of Japan) and allows us to identify the horizontal extent of gravity wave propagation in much wider range than ever. Based on the long-term measurements of OMTI since 1997, we found some events showing gravity waves widely prevailing over Japan.

In the presentation, we will report observational results of the OMTI multi-station measurements concerning small-scale gravity waves in the MLT heights.

Keywords: atmospheric gravity waves, airglow imaging observation, mesosphere and lower thermosphere, OMTI