

## Multi-Point Observation of Short-Period Mesospheric Gravity Waves Over Japan During the FRONT Campaign

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Simultaneous observations of short-period gravity waves were carried out using three all-sky cooled-CCD imagers of OH airglow at Moshiri (northern edge of Japan) and at Shigaraki and Bisei (middle part of Japan) on May 1998. These stations were separated with horizontal distances of 250-1,300 km. On the basis of these data, we suggest that the low-altitude source of the observed short-period gravity waves has a spatial extent of more than 1,000 km and the upward propagation of the waves are controlled by the background wind profiles. Using the observed wave parameters, Doppler ducting of the waves is also discussed.

Simultaneous observations of short-period gravity waves were carried out using three all-sky cooled-CCD imagers of OH airglow at Moshiri (northern edge of Japan) and at Shigaraki and Bisei (middle part of Japan) during the F-region Radio and Optical measurement of Nighttime TIDs (FRONT) Campaign on May 1998. These stations were separated with horizontal distances of 250-1,300 km. Wind profiles in the mesosphere were obtained simultaneously by two middle frequency (MF) radars located at Wakkanai and Yamagawa (northern and southern edges of Japan, respectively). The imagers at Shigaraki and Bisei observed east-west gravity wave structures with a horizontal wavelength of 20-40 km on May 19, 21 and 22. They moved northward with a horizontal phase velocity of 20-40 m/s. At Moshiri (about 1,200 km northeast from Shigaraki and Bisei), similar east-west structures moving northward were observed on May 19 and 21, indicating a large horizontal extent of the observed gravity waves. On the other hand, wave structures at Moshiri were not evident on May 22. The horizontal wind data at Wakkanai show similar profiles to those at Yamagawa on May 19 and 21, while they show opposite directions between Wakkanai and Yamagawa on May 22. On the basis of these data, we suggest that the low-altitude source of the observed short-period gravity waves has a spatial extent of more than 1,000 km and the upward propagation of the waves are controlled by the background wind profiles. Using the observed wave parameters, Doppler ducting of the waves is also discussed.