

## Gravity wave activity in a wide height range of 65-110km over Syowa st. (69S), Antarctica

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There are very small number of ground-based observation techniques in the lower thermosphere, especially above around 100 km, although the region is a pronounced transition region in terms of the thermal structure, chemistry and dynamics. Radio meteor echo measurement in a low radio frequency such as MF is a possibility of atmosphere observation above 100 km. We have applied a meteor wind measurement technique, which is widely used in VHF, to MF radar systems, and have successfully obtained meteor winds up to 120 km altitude [Tsutsumi et al, 1999; Tsutsumi and Aso, 2005]. The technique was applied to the MF radar at Syowa station, Antarctica and meteor winds have been continuously obtained since May 1999, simultaneously with conventional correlation based wind measurements in the mesosphere.

In this study we try to estimate seasonal behavior of gravity wave activity over Syowa in a wide height range from 65 to 110km using the accumulated 16 years of data. Gravity wave activity is estimated in two ways. One is a commonly used wave variance estimation technique based on time series of wind velocities [e.g., Vincent, 1994]. Hourly mean winds are used for the purpose in the present study. The other is a recently developed technique by Mitchel and Beldon [2009], where residuals after the hourly mean wind estimation are used as a proxy of short period wave activity. The former and the latter correspond to wave periods longer and shorter than about two hours, respectively. Obtained wave activities show a broad winter time maximum and summer time minimum in both wave periods, which is consistent with previous results in the mesosphere over Antarctica [Dowdy et al.,2007]. We further found that wave activities above 100 km are enhanced in late summer to early winter in both wave periods, which has not been known so far. Details of these features are discussed in the presentation.

Keywords: atmospheric gravity waves, mesosphere and lower thermosphere, Antarctica, MF radar, Syowa station