

## Characteristics of winter time mesosphere echoes over Syowa and Davis in the Antarctic obtained using PANSY and MF radars

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Characteristics of winter time mesosphere echoes have been investigated over Antarctic stations of Syowa (69.0S, 39.6E) and Davis (68.6S, 78.0E) using PANSY radar at Syowa (47 MHz) and MF radars at Syowa (2.4 MHz) and Davis (1.94 MHz). At Syowa low altitude MF radar echoes below about 70 km showed a similar seasonal, day-to-day and local time variations with those of the PANSY radar. Polar mesosphere winter echoes (PMWEs) by the PANSY radar and the low altitude MF echoes mostly coexisted appearing during day time and also for a few hours after sunset, while summer echoes in the lower height region were absent in both radar observations suggesting a close relationship in the generation mechanisms of 47 MHz and 2.4 MHz echoes. In other words winter time low altitude MF echoes can be used as a proxy of PMWEs in VHF. A preliminary comparison between Syowa and Davis MF radar winter echoes showed clearly different day-to-day variations suggesting that PMWEs have a longitudinal structure.

Angles of arrival of Syowa MF echoes were estimated using the interferometry capability of Syowa radar and showed a more isotropic nature in winter. Because gravity wave activity is much higher in winter than in summer over Syowa [Yasui et al., 2015] and also over Davis [Dowdy et al., 2007], higher turbulence energy in winter caused by gravity wave breaking may be responsible for the generation of the winter echoes and their isotropic behaviour. Comparison of gravity wave activity and MF echo power will further be conducted.