

The nature of large off-vertical MF radar echoes over Syowa station, Antarctica

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MF (Middle Frequency) radars have been used to measure wind velocity in mesosphere and lower thermosphere. The radars need ionization and refractive index fluctuations to receive echoes from the region. The nature of the echoes has been studied to better understand that of the ionized media and also to better estimate wind velocity.

Tsutsumi et al. [2017] compared mesosphere echoes of PANSY radar (47 MHz) and MF radar (2.4 MHz) collocated at Syowa station (69S), and showed lots of similarity in these two radar echoes suggesting a common generation mechanism of the echoes despite a large difference in the radar operating frequency. Summer time echoes are almost always aspect sensitive while winter time echoes are less aspect sensitive.

Winter time MF radar echoes is highly variable in strength and angle-of-arrival. These echoes are quite often very low aspect sensitive coming back from off-vertical zenith angles as large as some tens of degrees. Meteor echoes are partly responsible for this low aspect sensitivity [Tsutsumi and Aso, 2005]. The nature of these off-vertical echoes is discussed in details, and the horizontal structure information of wind velocity is tried to be deduced from these widely distributed targets.

References

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