

Simultaneous HF and MST radar observations of upper mesosphere summer echoes

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Polar mesosphere summer echoes (PMSE) in Arctic have been well studied using vertical incidence MF-UHF radars. The first, oblique incidence HF radar observations of PMSE-like echoes at Syowa Station, Antarctica, have been reported by Ogawa et al. (GRL, in press): unfortunately, they had no other evidences supporting that the echoes were surely PMSE. In this paper, we report simultaneous observations of PMSE by means of the CUTLASS HF radar in Finland and the ESRANGE MST radar in Sweden. The MST radar detected PMSE over ESRANGE that descended from 90 km to 85 km in altitude between 0950 and 1130 UT on August 8, 1999. On this day the Finland radar were observing meteor winds at four frequencies (9, 11, 13 and 15 MHz) as a special campaign. This radar detected near-range (100 - 200 km) echoes, being very similar to the Syowa PMSE, during the same time period. The interferometer observations of echoes showed that almost echoes returned from the altitudes between 80 and 100 km. These facts clearly indicate the capability of the superDARN radars for studying PMSE and that PMSE may occur simultaneously at two points with a distance of about 500 km. The echo region depend on the radar frequency: that is, the region is more localized at higher frequency. This fact is important to understand the scattering mechanism of HF waves due to upper mesospheric turbulence.

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