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Statistical analysis of mesospheric echoes observed by the SuperDARN Hokkaido radar

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Near-range (< 1000 km) echoes observed by the SuperDARN Hokkaido HF radar contain not only E-region echoes but also mesospheric / meteor echoes. We detect very near-range echoes observed especially in summer, which is likely to be mesospheric echoes. Mesospheric echoes are much observed at high latitudes and sometimes observed at mid-latitude in recent years. Mesospheric echoes in summer at high latitude are observed because temperature at the mesopause becomes very low (under 150 K) and radio waves are probably backscattered at mesopause by aerosols and cluster ions.

In this study, we determine criteria to select mesospheric echoes by reference to mesospheric echo events (Ogawa et al., Mid-latitude HF-radar Workshop, 2010), and perform statistical analysis of LT and seasonal dependences of mesospheric echoes observed by the SuperDARN Hokkaido radar. The results shows that echoes categorized as mesospheric echoes are observed preferably in summer and in daytime. This is consistent with the mesospheric echoes in high latitude reported by previous studies. More details of the statistical analysis and their physical interpretation will be presented.

Keywords: Hokkaido HF radar, SuperDARN, mesospheric echoes, mesopause temperature decrease, electron density