

LONGITUDINAL DIFFERENCES OF THE PMSE STRENGTH AT HIGH ARCTIC LATITUDES

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Observations of Polar Mesosphere Summer Echoes (PMSE) by the Resolute Bay VHF radar, located in Nunavut, Canada (75°N, 95°W), and by the ALWIN VHF radar, located in Andenes, Norway (69°N, 16°E) are characterized by differences of occurrence rate and PMSE strengths, with generally lower levels at Resolute Bay. Even though both radars are using calibrated observations, the role of the different radar hardware and antenna systems operated at both sites still represents a cause for concern in comparisons.

Now, PMSE observations with identical radar hardware and identical analysis software are possible using the recently installed SKiYMET meteor radar at Eureka (80°N, 86°W) and the SKiYMET meteor radar at Andenes. Eureka is in the same longitudinal sector as Resolute Bay, but 5 degrees in latitude to the north. A 4-week measurement campaign was performed during July in 2008, with both the Andenes and Eureka meteor radars running in a special mode designed for PMSE studies. Both radars are calibrated using cosmic sky noise variations. In addition, the Andenes SKiYMET radar is also co-located with the ALWIN VHF radar in Andenes and may be used for the verification of results. Lower levels of PMSE strength were found at Eureka, confirming the earlier observations at Resolute Bay.

The observations are discussed in relation to dynamics, thermal conditions, and ionization. Strong indications exist that the observed differences of PMSE strength are related to the different levels of ionisation due to precipitating particles in the auroral oval and inside the polar cap. Global maps of precipitating energetic electrons (energy band: 6.5 keV – 9.46 keV) and energetic protons (energy band 80 keV – 240 keV) derived from POES satellites clearly indicate that Eureka and Resolute Bay are always inside the polar cap where, under geomagnetically quiet conditions, ionisation due to particle precipitation is missing.

PMSE, radar

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