



Longitudinal differences of the PMSE strength at high Arctic latitudes

Ralph Latteck (1), Werner Singer (1), Nimalan Swarnalingam (2), Jan Maik Wissing (3), Chris Meek (4), Allan H. Manson (4), James Drummond (5), and Wayne K. Hocking (2)

(1) Leibniz-Institute of Atmospheric Physics, Radar sounding and sounding rockets, Kühlungsborn, Germany (latteck@iap-kborn.de), (2) Dept. of Physics and Astronomy, University of Western Ontario, London, Ontario, Canada, N6A 3K7, (3) Dept. of Physics, University of Osnabrueck, 49076 Osnabrueck, Germany, (4) Institute of Space and Atmospheric Studies, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, S7N 5E2, (5) Dalhousie University, Halifax, Nova Scotia, Canada, B3H 4J1

Observations of Polar Mesosphere Summer Echoes (PMSE) obtained by the ALWIN VHF radar, located in Andenes, Norway (69°N, 16°E) and by the Resolute Bay VHF radar, located in Nunavut, Canada (75°N, 95°W), are characterized by differences in occurrence rate and PMSE strengths, with generally lower levels at Resolute Bay. Even though both radars are well calibrated, the effect of the different radar hardware, especially the antenna systems, on the observations still causes concerns if comparisons of results from both sites are presented.

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 located in the same longitudinal sector as Resolute Bay, but 5 degrees north of the site, the Andenes SKiYMET radar is co-located with the ALWIN VHF radar. Both SKiYMET radars are calibrated using cosmic sky noise variations.

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. Lower levels of PMSE strength were found at Eureka, confirming the earlier observations at Resolute Bay obtained by VHF radar. 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.