

# Longitudinal differences of the PMSE strength at high Arctic latitudes

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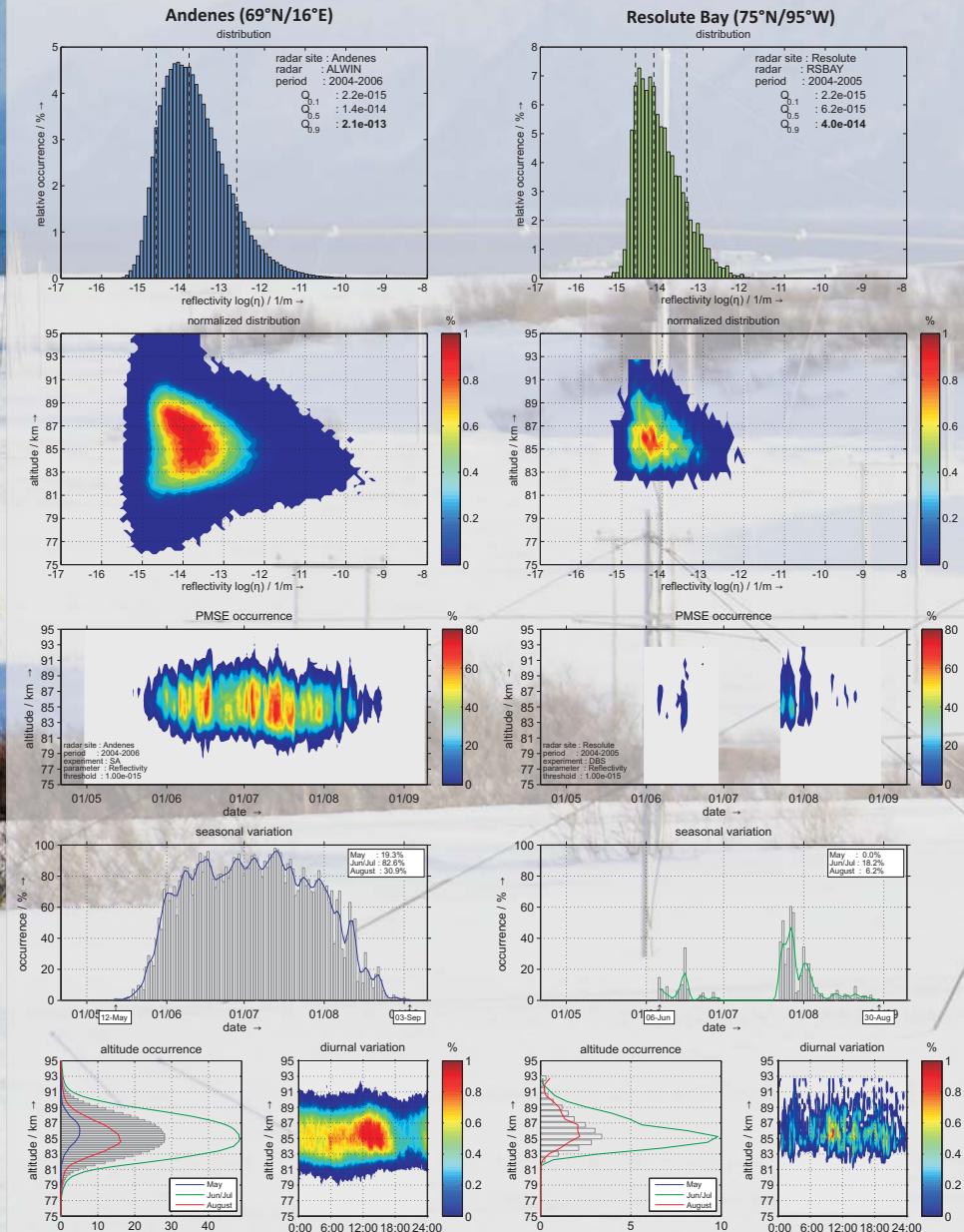
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## Motivation

Strong differences of PMSE occurrence and strength have been observed with calibrated VHF radars at Andenes (69°N/16°E, polar oval) and Resolute Bay (75°N/95°W, polar cap)

→ Instrumental differences or differences in background ionization?

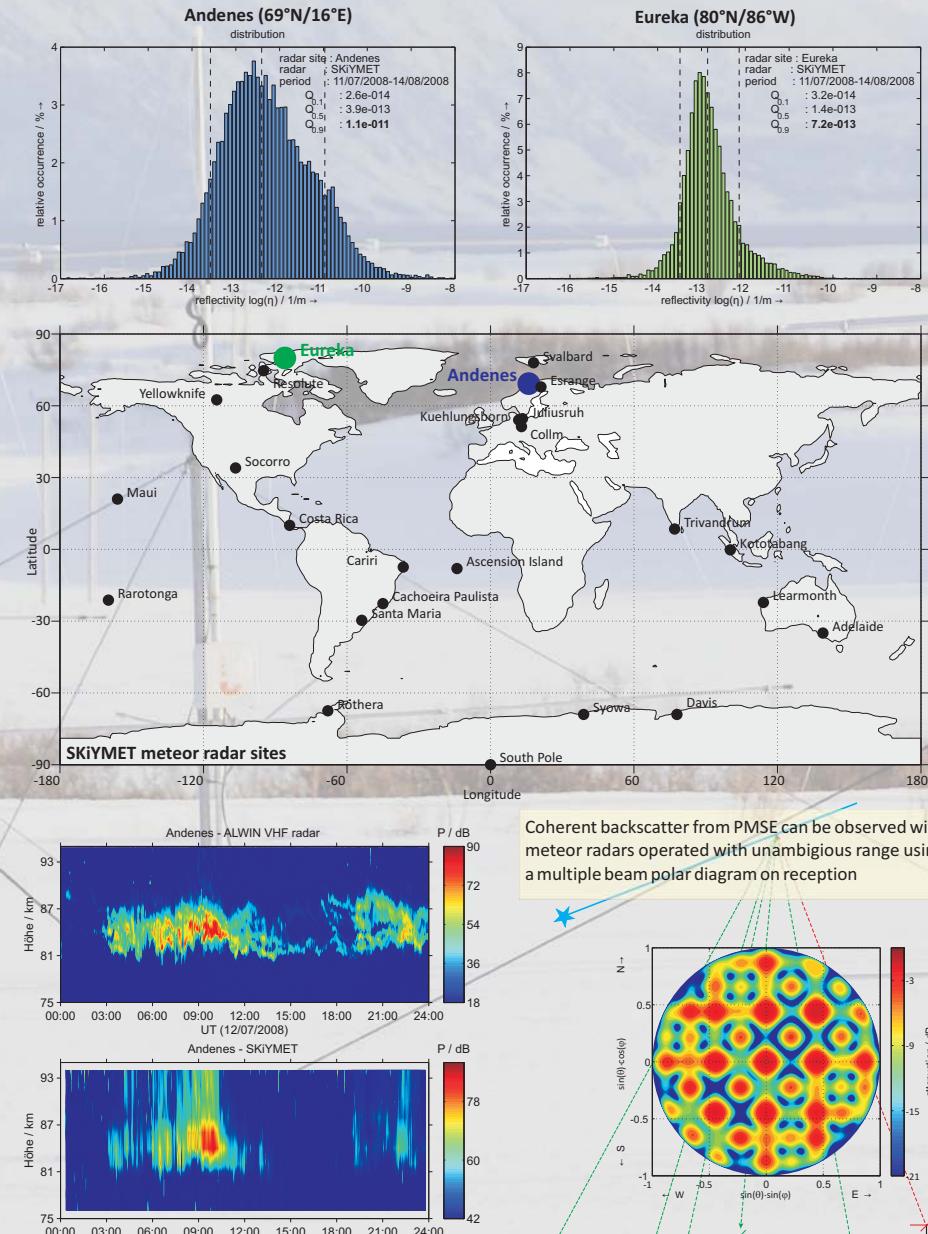


The volume reflectivity distribution of PMSE observed at Resolute Bay has a lower maximum ( $6 \times 10^{-12} \text{ m}^{-1}$ ) than the distribution of PMSE observed at Andenes ( $2 \times 10^{-9} \text{ m}^{-1}$ ). The PMSE occurrence is much lower at Resolute Bay than at Andenes. The decrease of the PMSE season at Resolute Bay starts earlier than at Andenes but the end of the PMSE season is very close at both sites. The PMSE height distribution at Resolute Bay has a maximum at 85 km but with only a few contributions below 83 km (Latteck et al., 2008).

## PMSE observations with meteor radars

at Andenes (32.55 MHz, 69°N/16°E) and Eureka (33.4 MHz, 80°N/86°W, polar cap)

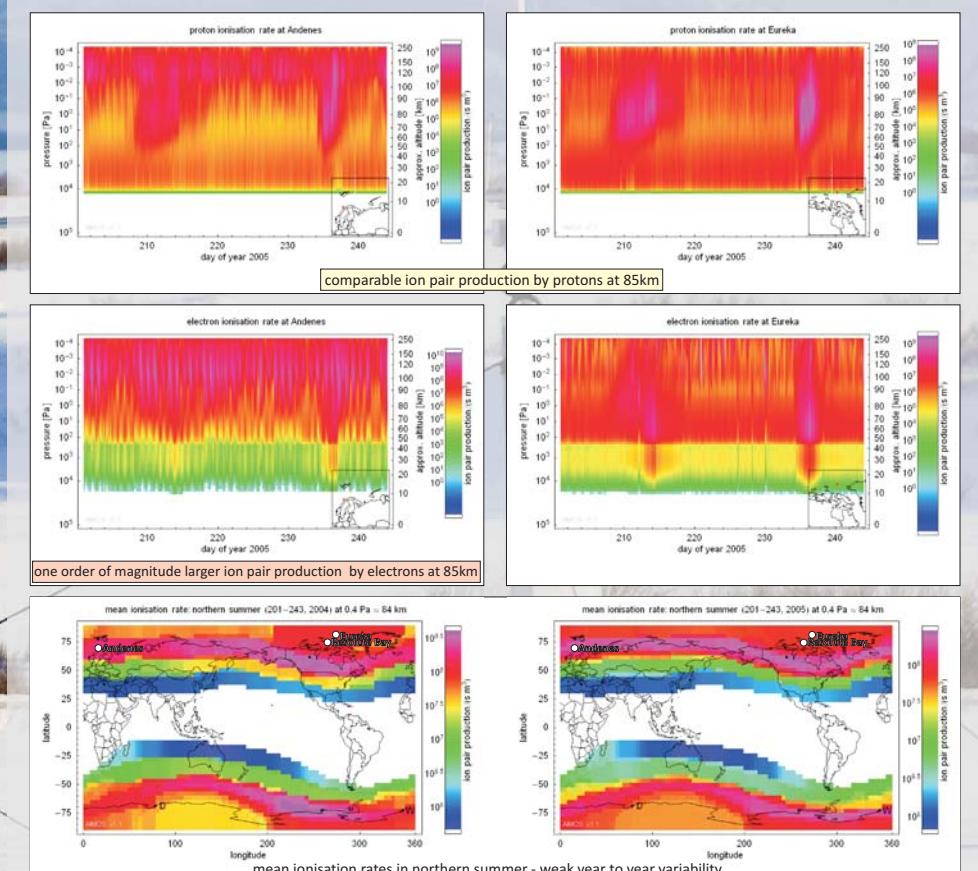
→ PMSE observed within the polar cap are weaker and have a lower occurrence rate



Simultaneous observation of PMSE using the ALWIN VHF radar and the Andenes SKYMET radar. The structures are much better resolved by the MST radar (300m) compared to the meteor radar (2000m), the evolution with time of the PMSE layer is also well reproduced by the meteor radar.

## Atmospheric Ionization Module OSnabrück (AIMOS)

- a 3D empirical model of atmospheric ionization due to precipitating particles with high spatial resolution basing on the background atmosphere of the HAMMONIA model,
- observations from two polar orbiting satellites are assigned to horizontal precipitation cells in dependence on geomagnetic activity (GOES 10/11, NOAA 15/16; time period 2002-2005)



## Summary

- During quiet times, the major contribution to ionospheric ionization is from electrons in both the polar cap (electrons of solar origin) as well as in the auroral oval (electrons of magnetospheric origin) whereas the ionization in the auroral oval exceeds that in the polar cap significantly.
- Whereas Andenes is located in the Aurora oval Eureka and Resolute Bay are located inside the polar cap with a much lower ionization rate.
- The differences in PMSE strength and occurrence rates as observed in Andenes, Resolute Bay and Eureka are most likely caused by differences in background ionisation.