



A study of tri-static PMSE observations with EISCAT at 224 MHz

Ingrid Mann (1,2), Ingemar Häggström (2), Anders Tjulin (2), and Sina Rostami (3)

(1) Physics Department, Umeå University, Umeå, Sweden, (2) EISCAT Scientific Association, Kiruna, Sweden, (3) Space Technology Division, Luleå University of Technology, Luleå, Sweden

Polar mesospheric summer echoes (PMSE) are assumed to form as a consequence of mesospheric neutral air turbulence in the presence of massive charged ice particles. They offer an opportunity to study the thermal and dynamical structure of the mesopause region and its coupling to other altitude regions. In the summer of 2013 the EISCAT radars, located in Northern Scandinavia, could for the first time be used for tri-static observations in the VHF band (224 MHz). This is a frequency range where PMSE are often observed. We report observations carried out in June 2013. The radar signal was transmitted in zenith direction with the EISCAT VHF antenna near Tromsø (69.59 deg N, 19.23 deg E) and the scattered signal was measured from Tromsø, Kiruna (67.86 deg N, 20.44 deg E) and Sodankylä (67.36 deg N, 26.63 deg E). PMSE were observed in the 80 to 90 km altitude range from all three receivers for a large fraction of the observation time. Zenith observations simultaneously carried out with the Tromsø UHF radar (933 MHz) displayed predominantly incoherent scatter and an electron density typical for the altitude. Our observations suggest that the scattering process underlying the PMSE occurs over a broad range of scattering angles and that the atmospheric layers generating the PMSE move with a speed in the order of up to a few 10 m/s.