

Polar Mesospheric Winter Echoes (PMWE) observed with EISCAT VHF

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Polar Mesospheric Winter Echoes (PMWE) are radar echoes from 50 to 80 km altitude that are observed during the winter months, at high latitude. PMWE bear little similarity to the PMSE (Polar Mesospheric Summer Echoes) which are observed during summer at high latitudes and that form in the presence of ice particles. While PMWE are observed when temperatures are too high for existence of ice particles, charged particles play a likely role in their formation. The formation mechanism for the PMWE is still under debate. A correlation between PMWE occurrence and high amount of ionization in the mesosphere is questionable. Wind shears and/or steep temperature gradients can cause PMWE through the generation of neutral air turbulence. In view of so many possible explanations and unanswered questions, further investigation is needed to better understand PMWE formation and evolution in time. If neutral air turbulence plays a role, a frequency dependence of the PMWE power would be likely. A two-year data set (2012 -2013) of PMWE observations with MAARSY 53,5 MHz radar has been published by Latteck and Strelnikova (2015). We have searched for PMWE observations with EISCAT VHF (224 MHz) in the same time period. During 2012 and 2013, PMWE were observed with MAARSY from September to November and then again from February to April. During this same period of time, EISCAT VHF observations in Tromsø (69°35'N 19°14'E) revealed fewer observed events than MAARSY. Out of 268 days of observations listed in the EISCAT archive, we could identify PMWE only on 7 days. We suggest that the smaller number of PMWE observations is due to frequency dependence of the generating mechanism. We will present the PMWE spectra and ionospheric conditions during their occurrence.

Latteck, R., and I. Strelnikova (2015), Extended observations of polar mesosphere winter echoes over Andøya (69°N) using MAARSY, *J. Geophys. Res. Atmos.*, 120, 8216–8226, doi:10.1002/2015JD023291.