

Investigating the dusty plasma conditions in the Earth's middle atmosphere by application of artificial electron heating.

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The radar scattering efficiency of the PMSE and PMWE (Polar Mesospheric Summer/Winter Echoes) layers in the Earth's middle atmosphere, can be strongly affected by artificial electron heating. We show examples of how this can lead to cyclic changes in the radar scattering efficiency of the PMSE. The PMSE, as observed by radars, can be brought to nearly disappear by application of the heating and to flash up (overshoot) when the heater is switched off. Model calculations, based on that dust effectively controls the distribution of plasma in the PMSE can reproduce the shape of most of the observed PMSE intensity variations, but an unambiguous interpretation is made difficult due to the many parameters which can influence on the plasma distribution and its variations. We discuss recent progress on using model calculations together with observations to analyze the dusty plasma conditions in the PMSE layers.