

ARTIFICIALLY INDUCED MODULATION OF PMSE USING THE EISCAT HEATING FACILITY

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Polar mesosphere summer echoes (PMSE) are abnormally strong radar returns that occur during summer months near the mesopause at high latitudes. Joint PMSE - ionosphere heating experiments using the EISCAT VHF radar and the Heating facility were conducted at the EISCAT site near Tromsø during the period July 9-14, 1999. An analysis of radar back-scattered power showed that PMSE were indeed affected by artificial ionospheric heating. The echo power fell during heating in less than 2 seconds. Height profiles of back-scattered power for four different combinations of heating parameters and ionospheric conditions are presented and analysed with the help of an ionospheric heating model. The decrease of PMSE power during heating is height dependent and varies from one case to another. This variability of the heating effect on PMSE power may be related to height-dependence and case-to-case variation of the electron temperature enhancements due to ionosphere heating as well as to differing undisturbed levels of PMSE power. The possible relation of electron recombination, diffusion, and aerosol charging to the observed reduction of PMSE power during heating will be discussed. An increase of electron diffusivity due to the temperature enhancement seems to be the most likely factor affecting PMSE during the experiments. The results of experiments for different heating modulation frequencies and radiated powers will be also presented. Proposals for the next joint PMSE/Heating experiment will be discussed.