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Investigations of Dusty Plasmas in the Near Earth Space Environment[1]

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Dusty plasmas in the near earth space environment have been argued to have important implications for global change and therefore continue to be a forefront research agenda in the space science community. The natural dust layer results in beautiful visual displays in the form of noctilucent (and polar mesospheric) clouds. Also, radar echoes associated with these clouds, phenomenologically termed Polar Mesospheric Summer Echoes PMSE, have been studied for the past 30 years due to their continued promise for providing remote sensing information on the natural dust layer. Recently, active space experiments have attempted to provide further information on the creation and evolution of the natural dust layer by investigation of an artificial dust layer utilizing sounding rocket experimental techniques. To this end, current research agendas involving dust layers in the near earth space environment will be discussed in this presentation. Emphasis will be placed on 1) utilization of high power radio wave modification experiments of the natural dust layer as a potential diagnostic technique and 2) computational modeling of turbulence in artificially generated dust layers in the space environment. Much of the discussion will summarize the effort at Virginia Tech over the past few years.

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