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Recent Incoherent Scatter Radar Results with Artificial Ionospheric Heating at EISCAT

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During the last few years the solar minimum has made many HF heater-induced phenomena difficult to excite, particularly those where the heater frequency needs to be near or below the O-mode penetration frequency. This condition is even more difficult to meet at night.

Consequently the types of experiments performed have been more mesospheric or D region heating experiments, more daytime F region experiments and X-mode heating of the F region. Experiments where electron temperature modulation of the D region affects mesospheric dust charging and thereby the backscatter cross-section of irregularities in the neutral gas, have been particularly fruitful in unraveling the physical processes involved. Four radars covering HF (8 MHz) to UHF (933 MHz) have been used to measure the effects at the various scales.

X-mode transmission has also produced, at times, surprisingly strong heating in the F region. This allows us to extend some experiments to lower density conditions, as well as giving us more input to models of the ionospheric energy balance. Some highlights from these and other experiments will be shown.