

D- and E-region ISR spectra measured with the EISCAT radars

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The energy from the solar wind is mainly transported to the polar upper atmosphere and causes various phenomena such as auroras characterized by their rapid variability in time and space. Incoherent scatter radar (ISR) located in high latitude is one of the most powerful tools to investigate generation mechanisms of such phenomena and their effects on the atmosphere. The ISR basically gives information of plasma parameters between the bottom-side and topside ionospheres. However, the ISR has several unavoidable limitations to derive ionospheric parameters in the E- and D-region ionospheres, due to limited information of the ISR spectra.

We have investigated ISR spectra in the D- and E-region using the latest techniques of the EISCAT UHF and VHF radars located in Tromsø. Previous studies indicate that the EISCAT UHF and VHF radars have limitations of plasma parameter derivation below 90 and 100 km altitudes, respectively. We show lower limits of reliable plasma parameter derivation using the latest pulse coding techniques of the EISCAT radars. Based on the knowledge and experience of the current EISCAT radar observations, we will discuss possibility and limitation of future E- and D-region observations of the EISCAT\_3D radar.

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