Propagation mode and scatter type identification of SuperDARN echoes using high Doppler resolution spectral analysis.

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The correct identification of ionospheric echoes and 'ground' or 'sea' echoes is important to a wide variety of studies using SuperDARN radar data. FITACF correctly distinguishes the majority of ionospheric and ground echoes, but it sometimes falsely tags low velocity ionospheric scatter as sea scatter (and vice versa). The former is a particular problem for the TIGER SuperDARN radars because they often observe slowly moving irregularities in the sub-auroral ionosphere. High Doppler resolution spectral analysis using TMS operating system data (Yukimatu and Tsutsumi, GRL 29, doi:10.1029/2002GL015210, 2002) provides an ability to accurately measure the Doppler velocity and spectral width of backscatter signals. The improved Doppler resolution allows for complete resolution of the two Bragg peaks associated with sea scatter. Scatter type identification is therefore much improved and low velocity ionospheric signals (± 110 m/s) are reliably distinguished from sea echoes. Key parameters obtained from this high Doppler resolution spectral analysis are compared in detail against the same parameters produced by two versions of the FITACF algorithm, including the latest version. With “raw dump” as a standard feature of the latest version of the ROS, this type of analysis may be more widely used.