ICEBEAR: Recent Results from a Bistatic Coded Continuous-Wave E-region Coherent Scatter Radar

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The Ionospheric Continuous-wave E-region Bistatic Experimental Auroral Radar (ICEBEAR) is located in Canada and has a field of view centered at (58°N, 106°W) overlooking the terrestrial auroral zone. This 49.5 MHz coherent scatter radar measures plasma density irregularities in the E-region ionosphere using a pseudo random noise phase modulated continuous-wave (CW) signal. ICEBEAR uses this coded CW signal to obtain simultaneous high temporal (1 s) and spatial (1.5 km) resolutions of E-region plasma density turbulence over a 600 km x 600 km field of view, providing insights into the Farley-Buneman plasma density instability and wave-like structures evident in the coherent scatter. The initial results from ICEBEAR were obtained with a 1D receiving array, providing azimuthal angle of arrival details of the incoming scattered signal. This azimuthal determination, along with the range determined using the coded signal, allowed the scatter to be mapped in 2D. A recent reconfiguration of the receiving array has allowed the elevation angle of the received signal to be calculated, providing 3D determination of the location of the plasma density irregularities. This presentation will demonstrate the capabilities of ICEBEAR, displaying measurements of highly dynamic plasma density irregularities with wave-like behaviour on 1 second time scales.