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Comparisons Between E-region Coherent Scatter and Swarm-E Fast Auroral Imager Measurements

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The Ionospheric Continuous-wave E-region Bistatic Experimental Auroral Radar (ICEBEAR) is a VHF coherent scatter radar that makes measurements of the E-region ionosphere with a field of view centered on ≈ 58°N, 106°W. This overlaps with the Saskatoon SuperDARN radar field of view, providing the opportunity for multi-frequency coherent scatter radar measurements in a similar region. In conjunction with these coherent scatter radar measurements, the Swarm-E, or e-POP, satellite Fast Auroral Imager (FAI) has been used to make measurements of auroral emissions in the 650-1100 nm wavelength band over the same field of view. The primary emission species in this wavelength range are N_2, O_2, and N_2^+, which correspond to energetic charged particle precipitation penetrating into the lower altitudes of the ionosphere. This makes the FAI a great instrument for comparison studies with E-region coherent scatter. In addition to this, the FAI is able to be slewed to a location allowing for extended conjunction windows between the imager and the coherent scatter radars. With recent advances in radar hardware and processing the temporal and spatial resolutions of these different instruments are becoming comparable (~ 1 s, 1.5 km), providing an excellent opportunity to study plasma density irregularities in the E-region ionosphere in great detail. Comparisons between the coherent scatter radar and FAI measurements are presented, providing insights into how E-region plasma density irregularities correspond to the location of auroral emissions at 650-1100 nm wavelengths.