New capability at Sondrestrom radar: sub-second auroral electron density measurements

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Abstract: During auroral substorm events, various large and fine-scale auroral structures evolve rapidly in high-latitude ionosphere. The electron density associated with fine-scale structures often changes on a millisecond time-scale and attain high values. The evolution of density structures can point to the source mechanism responsible. At the Sondrestrom radar in Greenland, a new hardward and software installation has made it possible to measure wide-bandwidth incoherent scatter plasma line, and consequently, the electron density with a 200ms time resolution. Combining these measurements with high-speed optical images gives an unprecedented look into auroral processes. We will discuss the technique, the measurements and the application of this technique in our paper.