

Ann. Geophys. Discuss., referee comment RC1  
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## **Comment on angeo-2021-15**

Anonymous Referee #1

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Referee comment on "Validation of SSUSI-derived auroral electron densities: comparisons to EISCAT data" by Stefan Bender et al., Ann. Geophys. Discuss.,  
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The study describes a validation of SSUSI derived electron density profiles using ground-based electron density measurements by Eiscat incoherent scatter radar in Tromsø, Norway. The data were collected over 2 years and analyzed in 2 magnetic local time sectors separately: 03–11 & 15–23 MLT. Despite all averaging the agreement of the two data products is good within the analyzed height range of 90–150km. Thus, the results provide a promising outlook for spatially extending Eiscat electron density measurements with the help of SSUSI data.

The only bigger concern I have is the lack of description of the magnetic activity during the analyzed time periods. A brief look into a magnetic index data, as an additional parameter for Table 1, would provide some background on Eiscat location with respect to the auroral oval, i.e. what kind of precipitation the Eiscat radar was pointing to.

Minor commentary:

- line 9: "derive" instead of "drive"?

- line 25: more sporadic compared to what?

- lines 27–30: so far only particle precipitation and their energies have been talked about. Should this have an introductory sentences to say something about where NO<sub>x</sub> comes from?

- lines 32-47: These few paragraphs are very detailed to be in the introduction. It would be more important to describe the Aksnes et al. results in more detail here and move some data and instrument details to the next section.

- line 34: not sure if there is a point in giving time spans in both 0–12 and 0–24 time ranges..

- line 69: "at" seems misleading here

- line 70: I would not call experiments the same as pulse codes, as the latter is just one part of the experiment setup

- line 72: what is the reasoning behind the analysis time window?

- line 74: were scanning experiments also included in this study?

- footnote 1: the latter sentence could well be in the actual text

- section 3.1: The beginning of this section reads a little backwards. Following the data processing logic until the Fang et al. parametrization would probably be more logical..

- line 120: what was the desire to be consistent with Aksnes et al. in the first place?

- Figure 1: a legend to describe the experiments in the panels c & f would be helpful.

- line 186: "is" instead of "are"

- line 194: "study" instead of "studies"

- line 200: "blindness of SSUSI" for the sake of completeness

- line 239: "short temporal and spatial scales" with respect to what? Although Eiscat provides data in high resolution it does not allow a high resolution extrapolation, so this is a confusing statement.