

Response to review comment 1 on “Spatial characteristics of the dayside auroral ionosphere observed by Incoherent Scatter Radar”

Frøystein, I., Spicher, A. and Oksavik, K.

We thank the reviewer for reviewing our manuscript and for providing comments and suggestions. The full comment is posted below. Our responses are written in bold blue text in-between the reviewer’s comments.

This paper studies the ionospheric structure, including density and temperature in the vicinity of the cusp region, using the EISCAT Svalbard radar. They show that the ionosphere is structured by its position relative to the open-closed field line boundary, being markedly different equatorwards of it in the closed field line region and polewards of it in the polar cap. The paper is well written, the results are interesting, and the data is presented clearly. Hence, I recommend it for publication. I have only a few minor comments, listed below.

Lines 94-95: “Each experiment ... visual inspection.” It is not clear what is meant by this sentence.

The data from each experiment was inspected visually, and the events with a clear auroral oval at 300 km were included in the data set used for this study. We will add this sentence in the revised text for clarity.

Line 115: Perhaps state that it is IMF B_T that is being referred to.

Agreed. The sentence will be rewritten as such: “Finally, for the statistical analysis, we remove data points for which the IMF $B_T < 9$ nT”.

Lines 204-208: The authors are looking for a relationship between latitudes of regions and PCN or AE. Perhaps it should be stated that it is expected that the OCB should be in a state of flux when AE or PCN are elevated.

We will add the AE expectation to a more detailed introduction to the latitude description, in the first paragraph of the section: “The location and movement of the OCB is linked to the opening of magnetic flux at the dayside magnetopause and to the closing of flux in the magnetotail, and its latitude is therefore expected to relate to both the IMF and geomagnetic indices such as AE (Lockwood et al., 2005, references therein). This is previously shown in studies based on ASI (Johnsen and Lorentzen, 2012b) and satellite (e.g. Newell et al., 1989; Newell et al., 2006).”

In the revised text, we make corrections according to the following four comments:

Line 155: Mis-spelling of “first”.

Line 341: Mis-spelling of “assess”.

Line 382: Is “increases” meant here?

Line 412: Should read “beneficial to include”.