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Interactive comment on "Observations of precipitation energies during different types of pulsating aurora" *by* Fasil Tesema et al.

Anonymous Referee #1

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The authors investigate precipitating electron energies during different types of pulsating aurora (PsA). Via statistically analyses of data measured with all-sky image cameras, EISCAT radars and KAIRA, they report that altitude profiles of electron density and cosmic noise absorption values vary depending on types of pulsating aurora: amorphous pulsating aurora (APA), patchy pulsating aurora (PPA), and patch aurora (PA). These results are important and deserve publication for improving understanding of what mechanisms create differences in the shape of pulsating aurora. However, I have a few comments for the authors to consider a minor revision before the publication.

Specific comments

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Discussion paper

1. The difference between PPA and PA

    - In lines 132-133, it is described that PPA has a pulsation nature and PA does not. It seems inconsistent with the description that both PA and PPA have steady emission structures with pulsations in lines 81-83.

2. The division of PsAs into the three sub-categories

    - PA, PPA and APA are often alternately observed in the EISCAT FOV during a short period. How fine are you classifying them? Is the categorization process quantitative to eliminate arbitrariness?
    - The auroras classified into PA in Figure 2 have an arc-like shape not patch shape. I checked 557.7-nm all-sky images installed in Tromsø. Especially, the aurora indicated by the blue arrow in Figure 2 has vorticities. Isn't there a possibility that they are discrete auroras or arc-type diffuse aurora not patchy auroras?

3. The definition of PsA thickness

    - In line 197, the thickness of PsA is mentioned. What is the definition of thickness? Is it the full width at half maximum or anything else?

4. The meridional angle in the riogram

    - I suggest that the vertical axis of the bottom panel in Figure 4 should be converted to the geographic latitude from the meridional angle to make it easier to compare with top two keograms.

5. The KAIRA cosmic noise absorption

    - In lines 228-229, it is described that "The maximum CNA is observed in the late MLT period (after 5MLT)", but the maximum CNA during APA is observed in before 2 MLT and that during PPA is observed before 4 MLT.

6. The MLT distribution of electron densities during different types of PsA

    - In lines 265-266, it is described that “In the late MLT sector (after 5MLT), PPA tends to be most common with higher electron density at a lower altitude (see Figure 6).”, but it seems that PA is also common until 7 MLT in Figure 6.

Technical corrections

1. line 2, “few” should be “a few”
2. line 23, “the” should be “a”
3. liens 27-28, the sentence starting with “In general ...” needs a reference.
4. line 29, the sentence starting with “The auroras are ...” is incomplete and needs to be revised.
5. lien 30: “PsA” should be “PsAs”
6. line 73: “region” should be “regions”
7. line 106: “ASC” should be “ASCs”
8. line 119: “region” should be “regions”
9. line 212: “Ne” should be “log10(Ne)”
10. lines 221, 233: The unit symbols should be in roman type
11. line 260: “D3” should be “D”?
12. Figure 4: The date should be specified.

13. Figure 5: The color bar should be shown.

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