



EGUsphere, referee comment RC1
<https://doi.org/10.5194/egusphere-2022-296-RC1>, 2022
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Comment on egusphere-2022-296

Anonymous Referee #1

Referee comment on "Morphological evolution and spatial profile changes of poleward moving auroral forms" by Anton Goertz et al., EGU sphere,
<https://doi.org/10.5194/egusphere-2022-296-RC1>, 2022

Reviewer report of "The Morphology of Poleward Moving Auroral Forms" by Goertz et al.

Summary:

This paper describes the morphology of poleward moving auroral forms (PMAFs) based on the image data from all-sky cameras and tests the possibility of use of the arcness index for PMAF event identification. As for the morphology of PMAFs, they showed mostly known typical features but found a new feature, merging of auroral patches/arcs into larger scale PMAFs. They suggest that it might be explained by the localized dayside magnetopause reconnection. As for the arcness index, they concluded that the automation of PMAF detection using arcness index is difficult.

Although this paper may potentially include some new points, it is not suitable for publication for this journal unless substantial reorganization for the reason described in the below major comments.

Major comments:

1. One of the major concerns is that the purpose/motivation and new aspects of this paper are unclear. The manuscript does not explain why they examined the morphology PMAFs and why they could examine the morphology "in detail" (e.g., due to new data/method). The term "in detail" is very ambiguous, and the critical point is what those details are. As the authors say in the abstract, previous studies have examined PMAF morphology. The authors should focus more on what is different data/methods and new finding compared with those previous studies.
2. The title "Morphology of Poleward Moving Auroral Forms" is too general, and such a title is suitable for a review paper or the first report on morphology. They argued that they found a new feature, merging auroral patches/arcs into larger-scale PMAFs. If it is a really new finding, this paper should focus on it, and the title should be, for example, "Merging of auroral patches/arcs into large-scale PMAFs". More analysis and discussion of the generation mechanism of this phenomenon are needed. Also, I wonder whether this feature is a new typical feature or a particular case of PMAFs?

3. The analysis of the arcness index is not needed for this paper since it looks like a different topic. Also, it did not help find a new morphology of PMAFs.

4. Some of their arguments are not supported by data. See the below specific comments.

Specific comments:

P5 section 4.1: The authors abruptly summarize the general morphological evolution without showing any data supporting it. Multiple examples, at least 3-4 cases, showing the general morphological evolution should be displayed before the summary. Also, what is new points that previous works have not been reported?

Fig3: I cannot see the arc moved poleward. Is this really PMAF event? The author should quantify the velocity of the move of aurora. Also, latitude-longitude grids are needed to identify right direction.

p9 L2: Where are data supporting "no relationship between PMAF occurrence time and class."?

Fig6: Why the author uses several events not all the events?

Fig7: Why values of arcness are not shown in the figure?

P12 L14: Where are data supporting "the general evolution of arciness relating to PMAF occurrence."?