

# Author Response

December 20, 2022

## 1 RC1

*Specific comments on the revised manuscript:*

*P1 L15: The phrase of “While there have been previous studies commenting on PMAF morphology” can be removed.*

Thank you for your comments, and you are right, this has been removed.

*P2 L23: “commented on their morphological evolution.” can be removed. An important issue is not whether they commented on the morphology or not, but what they show the morphology.*

You are right, this has been removed.

*P3 L1: What does MSP stand for?*

The acronym MSP stands for Meridian scanning photometer, which we have added to the manuscript.

*P3 L41: be commented on in the discussion. ---> be discussed later.*

*P3 P41: “It is also one of two reasons we analyze the two event lists separately in the quantitative part of this study.” I do not understand what this sentence means. What is the first reason?*

The two reasons are: 1) The unusually high PMAF occurrence rate 2) Different camera setups during the two event lists. We have adjusted the manuscript to make this clear.

*P4 L30: “The first complete description of the morphological evolution. . .” can be removed. If it was the complete description, no need to be investigated in detail anymore.*

We think you mean P2 L30 instead of P4 L30. And we agree with your assessment, the phrase has been removed.

## 2 RC2

*I. Page 3, the paragraph starting with “For each PMAF event. . .”: the authors should re-organize this paragraph so that the two reasons to perform the analyses separately based on two event lists in this study can “parallel” and “clearly” be described. The first reason should be “Although the 1 st database contains 23 PMAFs that occurred between 2003 and 2008, PMAF took place on 10 different days, hence, some of those days had only 1 PMAF event, while on other days multiple PMAFs occurred. The second event list contains 18 PMAFs that all occurred on the same. This is unusual and thus we separate the two databases and analyze them separately.” The second reason is “the camera setups,*

*including different cameras and present/absent narrow-band filter, used in this study, are different in the two databases". Above information should be included in this paragraph and re-organized.*

Thank you for your comment. This paragraph has been reworked following this and the other reviewer's comment.

*II. On the definition of "re-brightening events"; this referee can understand what "re-brightening events" are with the authors' explanations. However, I cannot understand where this detail was described. In your reply, "This is mentioned in the manuscript on page 8 line6..." but, I cannot find these sentences there. Please re-check this.*

We apologize for the confusion, the actual location of this sentence is page 6 line 2-3 (revised manuscript).

*III. Page 6, L.8: At least, this reviewer has never heard the terminology of "equatorward boundary intensification (EBI)" (but, instead, poleward boundary intensification (PBI) is frequently used and widely known). Although the authors say, "This phenomenon is commonly referred to as an EBI in the literature...", which literature(s) is (are) EBI shown and discussed? Please show the citations.*

EBIs have been commonly reported to be observed during the onset of a PMAF event. We have added multiple citations to this claim.

*IV. Page 7: "...the authors believe..." "...we believe that it is..." "the authors" should not be used in the manuscript but should be replaced with "we". Please check whether or not you are making this usage elsewhere in the manuscript.*

We accept your suggestion and have changed our use of the phrase "authors" with "we" in all instances.

*V. Location of quotation: "While there have been recent advancements in the automation of detection... of auroral forms (Nanjo et al., 2022; Guo et al., 2022), there is currently no automated..."*

We accept your suggestion and have moved the location of the citation.