Review on « Width of Plasmaspheric Plumes Related to the Intensity of Geomagnetic Storm » by Yang et al.

In their paper, Yang et al. address the question of the width plasmaspheric plumes and how it correlates with the intensity of the geomagnetic storm. Previous work (Borovski et al, 2008) already showed that there are no correlation (confirmed by this work when looking at the whole event), but this work showed that a negative linear correlation can be found when focusing only on the recovery phase of the storm.
To reach this conclusion, this paper used spacecraft data from the Van Allen mission (ranging from 2012 to 2019), used different definition of the plasmaspheric plume width and excluded extreme events to create a set of events in order to perform statistic analysis. It also use simulation data to explain its results, explaining in particular the inverse correlation by a stronger erosion of the plasmasphere during the initial and mains phase of the geomagnetic storm, resulting in narrower plumes in the recovery phase.

The results of this paper are clear and well explained. The use of simulation offers a nice development of the observation results, offering a new result of use for the community working on plasmaspheric plumes. I would recommend this paper for immediate publication if not for minor comments listed below, my main issue being some lack of clarity when manipulating the statistic tools.

Main comments:

l. 121 —> the set of data used for the Spearman (and Pearson) correlation has a strong constraint: it needs set of data with the same number of data. This first point is already unclear, as you don't say what is N (the number of data point). And then, given the constraint, it is also important that you develop clearly later how you define those set of data so that you can apply these methods.

In Fig 3 (and the text associated), you explain quite clearly how you select your events, and why you make those choices. However, it is interesting to see that purple point events (extreme events) always match quite well with orange points event (not in the recovery phase). A sentence or two about this and the possible explanation of this correlation would be interesting in the discussion.

l.229 —> The F, G and V_S functions are not detailed later. You need more precisions. If this is too long for the core of the paper, maybe in annex.

Minor comments:

l.92: MLT (Magnetic Local Time, I guess) is not defined before use.

l.209: I'd prefer if you give the meaning of PTP, even if this is related to the quoted works.

l.253: typo: EIM —> E_{IM}

l.340: probably a typo (.javascript:void(0))

l.363: I think you can merge the financial support with the acknowledgment

l.490. Maybe detail the different units used in abscissa of the plot.