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Interactive comment on "Estimating the fate of oxygen ion outflow from the high altitude cusp" *by* Patrik Krcelic et al.

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Patrik Krcelic, Stein Haaland, Lukas Maes, Rikard Slapak, and Audrey Schillings Ann. Geophys. Discuss., https://doi.org/10.5194/angeo-2019-125, 2019 "Estimating the fate of oxygen ion outflow from the high altitude cusp"

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I think, this is an interesting statistical study, that makes use of Cluster EDI and CODIF data to investigate the fate of escaping oxygen ions under various conditions. It should be published in any case.

I have, however, some remarks and found a few misprints (see below).

In section 2.2, related to Fig. 1, I'm missing a statement about the IMF (orientation,

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Discussion paper

strength) assumed. The IMF orientation is also important for the precise position of the cusp; the symmetric position about noon suggests, that you assumed By=0. The exact cusp positioning would be better described (I suppose) by the newer Tsyganenko models. But I agree, that for a first, simpler estimation the older T96 (with no IMF-dependence?) is sufficient.

Fig. 2: "...projected into the Northern Hemisphere..." - how this projection is done? The majority of data ($\sim$2/3) are projected ones. Maybe, one should rather generally speak about projected data, because they are shown in a x-R plane, where "R" is by definition always positive, independently of Northern or Southern provenience.

Fig. 6, right panel: the convection should actually be perpendicular to B; this is quite strongly disturbed close to the Shue-et-al model magnetopause, but also somehow in other regions. This is clearly due to the averaging within the pixels and an indication for the variability of the convection data in this region. The later estimates probably take only ratios between parallel and perpendicular velocity components, not the (slightly "chaotic" or "random") data?

Page 9, paragraph below Fig. 5, V_i perp: "...the scaling of cusp convection ...illustrated in Fig. 5." Why only "illustrated"? One can quantify it by the (inverse) ratio of |B| strength between ionosphere and magnetosphere, unless I'm mistaken. Why not specify this here?

Minors:

Caption of Fig. 1, 3rd sentence: some small words are missing - I'd write: "The right panel depicts the schematic (symmetric) area that the cusp and plasma mantle occupy in the polar cap."

"magnetosheath" with end-"h" in captions to Fig. 3, in the labels of Figs. 9 and 11, and on line 5 on page 17.

Page 6, line 6: "...has a wider temperature range."

Page 6, line 27: "In the present paper..."

Page 7, line 17: "considered" (with "ed")

Page 9, line 9: I would write in plural: "...length of the arrows indicates the magnitude of the vectors.." And: the scale in Fig. 6 is NOT in the upper right corner, but below the binned area.

Page 11, line 10: instead of "an" -> "the" ...measurements...

Page 15, line 1: include "the" in "... of the fate..."

Page 15, line 5: order of words: "...from the high latitude..."

Page 16, line 8: include "ions" in "...oxygen ion escape."

Page 17, line 15: "...ends up..." Page 17, line 19: "...analyzed the capture..." line 21: "...fate of energy oxygen ions..." (or energetic?)

Conclusions, first item: order of words: "...the distant X-line..." 72,1 Bo

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