

## ***Interactive comment on “A relation between the locations of the polar boundary of outer electron radiation belt and the equatorial boundary of the auroral oval” by Maria O. Riazantseva et al.***

### **Anonymous Referee #2**

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This paper presents potentially interesting results and interpretations. With a little more detail within the manuscript, and slightly more interaction between the introduction and the conclusions sections it will provide a useful scientific step forward.

Some comments regarding the text and figures are presented below:

1) In the paragraph starting page 2, Line 19 two mechanisms are put forward for the relative locations of the equatorial boundary of the auroral oval and the outer radiation belt trapping boundary. The rest of the paper is about determining which mechanism is supported by the analysis of satellite data as presented. However, the opening sentence of page 8, line 18 indicates that the results agree with Anotonova et al. 2017.

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This work was not mentioned in the Introduction section and therefore is not expected. The new work should be discussed in section 1 to give the reader the background to the research mentioned in that paper.

2) The first paragraph of section 1 discusses the L-shell variations of the boundaries, particularly the outer radiation belt trapping boundary. Given the use of 100 keV in this study to determine the boundary location rather than 40 keV or 35 keV as previously used, it would be beneficial to the paper if the distributions in L-shell of the boundaries were plotted for the whole dataset - similar to Figures 4 and 5. These new figure(s) would provide clarity for the reader and confirm that the algorithm is producing results that are consistent with the previous work cited in paragraph 1&2, section 1.

3) Figures 4 and 5 show the distributions of the boundaries for northern and southern hemispheres. However, no obvious follow-up of this separation is undertaken, and it is unclear why it is done. It is reasonable to use the PCS index for the southern hemisphere analysis, but it is unclear why the data continue to be separated hemispherically after that. Just having one plot for each activity index would clarify the presentation and aid the discussion of the main result, i.e., that there is a latitudinal difference in the distributions for quiet and active conditions.

Some small points:

4) 'to the equator of' should be replaced by 'equatorward of'. 'to the pole of' should be replaced by 'poleward of'.

5) Page 2, line 4-5. The sentence is unclear. I think it says that the outer radiation belt trapping boundary is clearly identifiable in low orbiting satellite data.

6) It would be useful to the reader to state whether the electron detector was measuring spin averaged electrons or was omni-directional etc.

7) Page 4, line 7-8. What energy did you use to calculate the average value and std of the electron fluxes? Same question for the total energy electron flux. If all of the

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auroral electron energy data in the range from 0.032-16.64 keV was used, how was it combined?

8) Figure 1. The caption should describe the lines added to the plot. What does the red vertical dashed line represent. The caption should say - the text doesn't. Why are there two green vertical lines at  $\sim 14:06$  UT. Why is there a red vertical line in Figure 1 and a blue vertical line in Figure 2?

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Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2018-6>, 2018.