

# ***Interactive comment on* “Estimation of westward auroral electrojet current with magnetometer chain data” by Marina A. Evdokimova and Anatoli A. Petrukovich**

## **Anonymous Referee #2**

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The study describes new alternatives to dealing with modeling issues related to the limited coverage of data-points and false minima of the optimized functions. Even though the manuscript addresses models of the westward auroral electrojet, their claims are useful for the study of electric currents at other magnetic latitudes.

In general, the manuscript is well structured, has an adequate length, a good mathematical description, and a fluent language, though it has some typos and grammatical issues. The title is okay, although it could be more precise. Perhaps the authors want to strength the fact that the study focuses on a comparison between two models and a description of new assumptions to get better results.

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At first glance, it appears that this study should be published in *Annales Geophysicae*. However, there are some minor points that the authors must address before publication, which might help to illustrate better their results to the readers, including a proper conclusion section. Comments are as follows,

- It is a bit disappointing to find a three-line conclusion section after going through such an interesting paper. Please, profit from this section to make your claims and findings clear and concise.

- Although in general, the authors give credits to related works, the readers might profit from the references of the following statements:

Page 1, line 21. "In the course of a substorm, the activity zone first shifts equatorwards during growth phase, then, after an onset, it retreats polewards. For stronger substorms auroral zone shifts equatorwards."

Page 9, line 32. "Current density and width of the electrojet are strongly anticorrelated"

- It could be more comfortable to picture the magnetometer arrangement by showing a map of the stations rather than a table with the coordinates.

- For all the figures, a more detailed description in the caption is very much appreciated.

- Figure 5 is not described throughout the manuscript. Please delete it or use it.

- In the caption of Figure 5, the authors mention Figure 5 instead of Figure 4. It is difficult to distinguish among the circles and dots (black circle together with a black dot make a bigger black dot). Please use different forms (e.g., +, \*).

- The combination of lines in red and magenta in figures 3 and 6 are hard to follow. Maybe the authors want to use contrasting colors.

- In Figure 6, please do not use dashed-lines. When the time series is highly variable, it generates noise. Please use solid lines with different colors.

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- Finally, I encourage the authors to have a closer look at the language. As mentioned before, there are several typos and some grammatical issues.

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