

Dear Reviewer #2,

We sincerely appreciate your thorough review and constructive feedback on our manuscript. You have highlighted important areas for improvement and clarification. We have carefully considered each of your points and have made substantial revisions to address them. We appreciate you indicating these areas for improvement, many of which have been addressed in response to Reviewer 1's comments. However, we have provided a detailed response below in response to your comments:

1. Characterization of GLEs:

We have added a new subsection (1.1) that provides a comprehensive analysis of rise and decay times for impulsive and gradual GLEs. This includes a new figure illustrating the distribution of these times for a sample of 35 GLEs, contextualizing GLE 72 within this framework. As a result of this addition, your concern regarding the lack of characteristic values for different types of GLEs is addressed directly.

2. Model description:

We have significantly expanded our model description in Section 3.1, including a complete representation of the focused transport equation and detailed explanations of its terms. To maintain conciseness, we did not reproduce the entire stochastic differential equation formalism; however, we have provided a more comprehensive overview.

3. SIR representation in the model:

The purpose of using the OMNI data to identify and characterize the SIR has been clarified in Section 2.2. Although these data were not directly incorporated into our transport model, they were used to inform our parameterization of the SIR effects. A note has been added to explain this connection in greater detail.

4. Figure issues:

- Figure 3 has been updated to clearly show the comparison between the modeled profile and neutron monitor observations.
- Figure 4 now includes the percentile bounds and shows both the rise and decay phases.
- Figure 7 has been revised to more clearly illustrate the sharp increase in the pitch angle diffusion coefficient across the stream interface, including a logarithmic scale and quantification of the change.

5. Inconsistency in mean free path changes:

We have added a new paragraph in Section 3.3 and a new figure (Figure 10) to clarify the apparent discrepancy between the 35% decline during the SI crossing and the 60% increase across the SI. This explanation provides a more nuanced understanding of the particle transport dynamics throughout the event.

6. Technical comments:

We have corrected the figure reference error, added subsection 3.2, and improved the labeling in Figure 2.

Once again, we would like to thank you for your feedback, which has helped us improve the clarity and rigor of our manuscript.

We have made every effort to address your concerns, but some of the suggested additions (such as an exhaustive discussion of stochastic differential equations) may be beyond the scope of this paper. Our primary focus remains on demonstrating how SIR effects can modulate GLE profiles, potentially obscuring their classification based solely on temporal characteristics.

We believe that the core scientific contribution of our work - highlighting the significant impact of interplanetary structures on SEP transport during GLEs - remains valid and important. In our revisions, we have improved the presentation and interpretation of this key finding without altering its fundamental significance.

We hope that these revisions will satisfactorily address your concerns and that the improved manuscript will be suitable for publication. Your assistance in refining and strengthening our work is greatly appreciated.

Sincerely,

Olakunle Ogunjobi

Corresponding Author