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Interactive comment on "Development of high-resolution Thermosphere–Ionosphere Electrodynamics General Circulation Model (TIE-GCM) using Ring Average technique" *by* Tong Dang et al.

Tong Dang et al.

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General Comments: The manuscript does a commendable job in presenting the new Ring Average method. The need for remedying the resolution problem in GCMs at the polar regions is sufficiently laid out with proper referencing to the literature. The derivation and the implementation of the technique are intuitive and coherent. The results from the introduced model are evaluated in two different examples and clearly demonstrated an advancement in performance with a strong potential to further the science. In addition, the code repositories are provided in the "Code Availability" section and the

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codes are presented in a user-friendly and self-explanatory manner. Overall, the paper is exceptionally well-written and organized.

Response: Thanks very much for your thoughtful and positive comments.

Specific Comments:

1. Please consider revising Key Point 2 to clarify what is meant by "more complicated geoscientific models". The paper only discusses the application to TIE-GCM and WACCM-X models and it is not immediately clear how these models compare geoscientifically.

Response: Thanks for your comments. We have revised Key Point 2 as “The Ring Average technique is applied to develop a 0.625×0.625 high-resolution TIE-GCM and more complicated geoscientific models with polar/spherical coordinates and finite difference numerical schemes”.

2. Please consider adding "forward" to Line 134 to read as "a central difference forward Euler".

Response: Added as suggested.

Technical Comments:

1. Please consider replacing "On the other hand" with "In addition" or "Furthermore" on Line 171.

Response: Corrected as suggested.

2. Please extend Figure 1 caption to include how the information in Lines 123-124 about the number of "chunks".

Response: We added “For example, the 144 azimuthal cells in the most inside (highest latitude) grid (Figure 1a) have been grouped to 9 effective cells (chunks), with 16 original cells in each chunk. In the effective grid, the numbers of chunks from inside to

outside are 9, 9, 18, 18, 36, 36, 72, 72, 72, and 72, respectively."

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