AUTHOR'S RESPONSES TO REFEREES COMMENTS

RE: Analytical Approximation of the Definite Chapman Integral for Arbitrary Zenith Angle by Dongxiao Yue

The author had responded to the referee comments online at (https://egusphere.copernicus.org/preprints/2024/egusphere-2023-3112/#discussion). The responses have been now incorporated into the revised manuscript.

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Anonymous Referee #1

Referee #1 initially objected to the publication of the paper, mostly on the ground that "It does not contribute to the current science of calculating the attenuation of sunlight in atmospheres". Referee #1 later "withdraw [the] objection to publication."

Revisions in response to the comments by Referee #1: The author added citations to four books, namely, Bauer and Lammer, 2004; Brasseur and Solomon, 2005; Schunk and Nagy, 2009; Grieder, 2010; Engel, 2018, where approximate solutions to the Chapman function was discussed. (Revised manuscript ll.7-8). This change should better illustrate the significance of the research on the subject.

Anonymous Referee #2

Referee #2 stated that "the manuscript presents an elegant analytical result that approximates the incomplete Chapman mapping function", and "recommend[ed] the manuscript for publication." Referee #2 made four "minor comments" suggesting changes to make the manuscript clearer, which the author gladly accepted.

Revisions in response to the comments by Referee #2

Comment #1: Line 40. The variable y is not shown in Fig. 1, and its actual introduction does not occur until Eq. (9). The sentence "As illustrated..." is therefore confusing.

Response: The revised manuscript deleted the reference to variable y at Line 41

Comment #2: Line 52. I would move the sentence "Since the thickness..." to line 55. This is logically connected to the next statement "Since λ is large...".

Response: The y variable is now defined at line 53 of the revised manuscript with additional explanations. The “thickness” argument is moved down accordingly in the revised manuscript.

Comments #3: Line 53. One more explanation of why rewriting (9) in the approximate form of (10) is necessary…

Response: The author has added the explanation of the approximation in lines 54-56 of the revised manuscript.

Comment #4: Line 91. In the sentence "At the same time, the exponential factor in the equation..." it is necessary to specify "At the same time, the exponential factor in the second term inside the brackets of Eq. (11)...".

Response: The author has made this suggested change in the revised manuscript to make it clearer.