

## ***Interactive comment on “Revisiting Twomey’s approximation for peak supersaturation” by B. J. Shipway***

**S. Ghan (Referee)**

steve.ghan@pnl.gov

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This is an excellent extension of Twomey’s classical paper on droplet nucleation, providing significantly improved estimates of droplet nucleation and considerable insight into the nucleation process. With one exception the presentation is very clear. The figures are effective in illustrating and demonstrating the methodology. The resulting parameterization appears to be remarkably robust and inexpensive, particularly for models that prescribe the width of log-normal size distribution.

Minor comments

1. Page 25903, lines 17 and 24. Aerosol activation can also arise from diabatic cooling, e.g., radiation fog, so remove “adiabatic”.

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2. Page 25904, line 11. Replace “simple” with “simply”.

3. Page 25904, line 16. Replace “which” with “that”. The text uses “which” often when “that” is more appropriate. “Which” is better in parenthetical situations, while “that” is best when there is no pause.

4. Page 25908, line 6. For clarity define  $x$  and  $y$ .

5. Page 25910, lines 18–22. This is unclear. What is meant by gradient  $\alpha$ ?  $\alpha$  is a supersaturation production rate. It is assumed to be a constant external parameter. How can you replace it with the supersaturation tendency? This is surely a poor approximation near  $S_{max}$ .

6. Page 25913, line 4. Replace “provided” with “providing”.

7. Page 25914, line 8. You can’t cite a manuscript in preparation. Just say that your team is conducting a more comprehensive analysis.

8. Page 25915, lines 11–13. “. . . allows the form. . . of the approximation. . . to be relaxed” doesn’t seem right. You have introduced a more realistic approximation.

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