

Interactive comment on “Influence of cloud microphysical processes on black carbon wet removal, global distributions, and radiative forcing” by Jiayu Xu et al.

Anonymous Referee #1

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General comments

The authors developed a wet removal scheme that explicitly describes the influence of cloud processes on BC in CESM. Compared to the original scheme in CESM (i.e., MAM7), the improved wet scavenging scheme greatly reduces bias against HIPPO 1-4 aircraft observations. Finally, the authors calculated global total annual mean BC conversion rates among different phases, quantified the contributions of different cloud processes to the conversion rates, and evaluated the influences of these processes on BC distribution and direct radiative forcing. Generally speaking, the paper is well written and documented, explanatory sections are interesting, and tables and graphics

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are well constructed. As a result, I am recommending the paper be accepted with minor revisions. The few questions and comments I have are listed below in the specific comments to the authors.

Specific Comments

1. In the section 2.1, the parameterizations used in this study may be summarized in a table in order to make the paper more clear. In addition, the related information about the HIPPO campaigns (e.g., location, flight samples, time) is welcome.

2. One suggestion: Different cloud processes may affect the vertical profile of BC. Besides direct radiative forcing, I wonder that corresponding radiative heating rate profiles of BC caused by different cloud processes how to change??? I encourage the authors to perform related simulation in the current or further study.

Please also note the supplement to this comment:

<https://www.atmos-chem-phys-discuss.net/acp-2018-900/acp-2018-900-RC1-supplement.pdf>

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-900>, 2018.

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