

Interactive comment on “Evaluation of cloud fraction and its radiative effect simulated by IPCC AR4 global models against ARM surface observations” by Y. Qian et al.

B. Stevens (Editor)  
bjorn.stevens@zmaw.de

Dear Authors,

Although all of the reviews are generally supportive of the ambitions of the manuscript, reviewer reports 1 and 3 raise serious issues regarding the extent to which the manuscripts ambitions have been achieved, and as to whether the manuscript makes a contribution that warrants publication in ACP. Please pay special attention to the referee’s concerns regarding the identification, organization and presentation of the manuscript’s key findings. Please keep these important points in mind when revising the manuscript as a revised manuscript that does not substantially address these points will not be considered further.

Y. Qian (Corresponding Author)  
[Yun.qian@pnnl.gov](mailto:Yun.qian@pnnl.gov)

Dear Dr. Stevens,

Thank you for being the editor of this manuscript and for the comments above. We have seriously addressed all comments from the three referees, and accordingly we revised the manuscript substantially. Our detailed responses are documented in the supplement zip file we uploaded, in which four responses to three reviewers and editor are included. Here we would like to bring to your attention the major points we addressed and changes made in the manuscript.

- (1) We have clarified how we map the cloud fraction from model and observation into same vertical grids (see the response to General Comment 1 of Referee # 1 and Specific Comment 5 of Referee # 3) and added a few sentences describing this in Section 2.2.d.
- (2) We have added new analysis for inter-comparison of the three cloud fraction datasets at SGP and NSA. Three new figures are added (Figures 2, 4, and 5). See the response to General Comment 2 of Reviewer # 1.
- (3) We have moved most of the scattered motivations to the introduction and observational data section (Sections 3.1, 3.2, and 3.3). We have reorganized Section 2.2 into four subsections, two of which are new subsections introducing the TSI data (2.2.b) and explaining why only a certain measurement is used to evaluate the models and how the vertical profiles of cloud fraction are constructed (2.2.d).
- (4) We have reorganized Section 3 into three subsections presenting the results for Manus, SGP and NSA, respectively. We have moved some discussions on the uncertainty of measurements into the ARM data section (2.2).

- (5) We have revised the Abstract and Conclusion/Discussion to more clearly highlight the unique aspects and key findings of this study (See response to Specific Comment 1 of Referee # 1).
- (6) We have added a few paragraphs in Section 6 discussing the future work plan as the referees suggested.
- (7) We also removed many sentences/phrases that seemed repetitive or caused confusion in the original manuscript.

Please see the response to each referee for more details. For your convenience, we uploaded a pdf file for the revised manuscript in which all changes we made to the original version of manuscript are tracked where you may also see how much substantially we have revised it (Note this file is generated by Word by comparing the original and revised versions of manuscript so may not accurately reflect all changes we made in some cases). We believe that those changes have made the manuscript more concise, much clearer and much improved. Please let us know if you have further questions or comments.

Thank you for the consideration, and we look forward to your decision.

Sincerely,  
Yun Qian (on behalf of all authors)