

Marston S. Johnston et al. 2014

Authors' response

25 May 2014

Review of article: Diagnosing the average spatio-temporal impact of convective systems

-- Part 2: A model inter-comparison using satellite data

The authors would like to thank the reviewers for their insightful and tremendously helpful comments. We have reviewed all comments from both reviewers, adjusted the text where necessary, and conducted a sensitivity test to examine how the composite results are affected by the use of a single rain rate threshold for all datasets verses the multiple thresholds used in the paper. The comments requiring a sensitivity test was the most involved comment, and the authors's response is concerns mostly these comments.

Specifically, the comments of reviewer 1 have been addressed to the best of our ability. There were, however a few areas where we disagree somewhat.

1. Huffman et al. (2007; doi:10.1175/JHM560.1) does not have a Table 2. We are unaware of the source of the 0.01-0.05 mm/h quoted by the reviewer. The Huffman et al. 2007 article did mention that TMPA (AMSU-B) misses light precipitation over ocean areas, but the article only quantifies this bias for parts of the Pacific only and for another dataset than the one used in our study. We have updated to text to reflect the uncertainty of the TMPA results with regards to "light" precipitation.

2. We have endeavoured to provide enough information on the model configurations that diverges from the AMIP requirements. Information about the aerosols and RCP are not particularly relevant for the results and were not included.

The specific comments of reviewer 2 revealed an error in figure 2, where the TMPA data was used in its native grid instead of a version that has been resampled to a 1x1 degree grid. This error has been corrected and the figure and accompanying text have been updated.

The comment regarding the use of multiple thresholds to filter the deep convection (DC) systems in each dataset is one not unfamiliar to us. In Paper 1 we motivated in detail the choice to use a multiple thresholds. In hindsight, it would have been prudent to expound this more in Paper 2. The models and the TMPA data have very large differences in the RR with the models being systematically and significantly lower. Consequently, it is not possible to match the rates between the dataset. Also, because the satellite data are not contiguous in space and time, we need a large number of DC systems in order to create a statistical mean which covers the entire evolution of DC systems. The methodology calls for the top 9 percentile of all rain rates above 0 (1.5 mm/h).

We have conducted a sensitivity test where the 1.5 mm/h was applied to all the models. We looked at all the composites and found minimal impact on the results, indicating that the methodology is not particularly sensitive to the rain rate threshold (see Figure). We have decided to remain with the current multiple threshold technique.

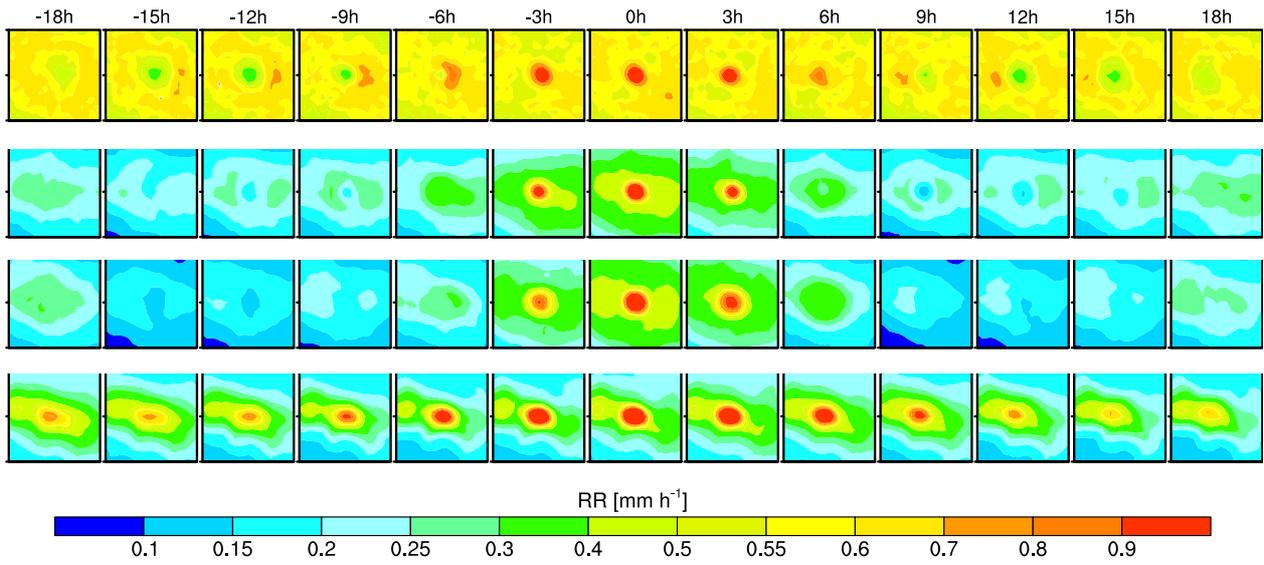


Figure 1: Composite of rain rate maxima using a fixed 1.5 mm/h rain rate threshold. The panels from top to bottom: TMPA, EC-Earth3, ECHAM6, and CAM5.