

## ***Interactive comment on “The Cloud Feedback Model Intercomparison Project (CFMIP) contribution to CMIP6” by Mark J. Webb et al.***

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The authors provide a concise and well-written presentation of the CFMIP experiments proposed for CMIP6, which will continue the successful CFMIP activities over the last 15 years. I enjoyed reading the paper, in particular the historical context given in the introduction, and find that it nicely presents the scientific motivation and chosen simulation strategy at a level amenable to both CFMIP experts and climate scientists with other backgrounds. I recommend publication in GMD after my following minor comments have been addressed.

Line 217, amip-future4K simulations: Why is the CMIP3 SST pattern used and not an updated pattern from CMIP5 AOGCM runs?

Line 227: I am very glad to hear that the CMIP-3 aquaplanet simulations will be ex-

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tended to 10 years. This will be beneficial for studies of extratropical dynamics, for which internal variability is larger than in the tropics.

Line 238, amip-m4k simulations: I am wondering to what extent some models might have problems with SSTs below freezing? Maybe this might require code changes in some models in case they employ a fixed lower threshold for the SST used in the calculation of surface fluxes? Such a problem would, of course, not occur for the p4K simulations?

Lines 279: The authors might consider to also refer to Voigt and Shaw (2015, Nature Geoscience) here for the extratropical circulation. The study showed that cloud-radiative feedbacks contribute substantially to the poleward jet shifts under 4K warming in aquaplanet simulations.

Line 266, lwoff experiments: Just an idea, but I though it's worthwhile bringing it up here: While the surface cloud effect is stronger in the shortwave than the longwave domain, the longwave can still substantial. I am wondering whether an experiment with clear-sky heating in the atmosphere and all-sky heating at the surface would be even better to isolate the effect of atmospheric cloud-radiative heating. I suspect it's too late to change the experimental protocol, and maybe there is a reason why lwoff is still better. If so, it might be worthwhile to briefly discuss this.

Line 342: Non-linearity was also shown in the CMIP5 ensemble by Meraner et al. (2013, GRL, doi:10.1002/2013GL058118). Meraner et al. showed non-linear climate sensitivity across the multi-model CMIP5 ensemble, whereas the other cited work used single models if I am not mistaken. So maybe worthwhile including here?

Line 368: Maybe specify the reason why the CFMIP2/CMIP5 runs did not allow such an estimate. I.e., I assume that one would use SST-driven simulations for this and that the usual amip period is too short to reliably calculate feedbacks?

Sect. 2.7: The time slice experiments ask an interesting question but given that 8

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experiments are demanded, I was wondering how they ought to be combined to answer the questions in mind. Maybe the authors can give an example?

Line 487: I would be curious to know about the reasons to no longer ask for cfSites output in the aquaplanet ensemble and amip-future4K. Is it the lack of observational data to compare to, or a choice to avoid asking for too much data?

Line 685: and → an

Figure 1: Why does the vertical cloud bar on the right side not include the lwoff simulations?

For some of the proposed simulations the link to clouds, which are the prime motivation for CFMIP, is not very evident and maybe could be made clearer? I am thinking of the simulations in Sect. 2.7 (time slice experiments) and Sect. 2.5 (nonLinMIP).

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