

Interactive comment on “The Monash Simple Climate Model Experiments (MSCM-DB v1.0): An interactive database of mean climate, climate change and scenario simulations” by Dietmar Dommenget et al.

Anonymous Referee #2

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1) I think the major focus of this paper is more about to provide a simple GCM model output dataset for outreach purpose and less about model development and researches issue. I strongly suggest that this paper should be submitted to other journals or reports more focusing on dataset sharing or downstream applications. It also looks to me that present version of this paper is more like a report style for documenting purpose of the simple model experiments and datasets. It seems not a research article suitable for GMD. 2) Surface air temperature turns out to be the only climate variable in the model experiment dataset and the model tool and interactive webpage

C1

seems more useful for other application fields such as policy making, heat-wave, and agriculture as well as social-economical impacts resulted from air temperature change under different warming scenarios (using different CO₂ concentration in the simulations of this dataset). Therefore, it looks to me that the dataset is more suitable published in other more relevant journals. 3) Abstract could be more specific in delivering the advantages and limitations of the experimental datasets. Moreover, the authors could elaborate more on their major findings from the thousand runs via using the simple model to draw the attention of readers for understanding how it can help with their studies. 4) (Section 2) It seems strange that GREB actually did flux corrections to constrain the model results close to observed mean climate while the focus of the model design and dataset is put on comparing mean climate. Moreover several parameters are input from climatological values e.g. cloud cover. Such strong constraints from climatological inputs will render the applications of the simple model for future prediction under global warming even the authors just care about air temperature. 5) The lack of considering circulation and cloud feedback in the GREB model is a big concern for climate model prediction. This limitation seems render the applications of the GREB for (2) the response of the climate to a doubling of the CO₂ concentration, and (3) scenarios of external CO₂ concentration and solar radiation forcings as discussed in the manuscript. 6) (Mean climate) Clouds and hydrological cycle turn out to be the two most important factors as shown in controlling the annual mean as shown in Figure 7. However, these two major factors are highly related to cloud and precipitation processes which are not explicitly simulated in the atmospheric layer of present model. Also, I am wondering how the GREB model deals with precipitation. I guess it is also from reanalysis model output. I think these missing processes will significantly affect the estimation of air temperature under global warming via setting different CO₂ concentrations. 7) More relevant references from comprehensive GCMs to backup the findings of figure 7 or discussions regarding to mean climate can increase the scientific merit of the present version as the authors did for double CO₂ and scenarios simulation part. Also, the comparisons to previous literatures mentioned in the double CO₂

C2

and scenarios part could be more detailed e.g. more discussions on sources of uncertainties from the usage of the simple model versus the comprehensive GCMs. 8) I agree that such simple model for air temperature simulation can be useful for rough estimation purpose or primary understanding of the role of possible processes but not so applicable for the future climate projections. Similar to my concern 1), I also suggest that probably more high horizontal resolution version of the GREB experimental simulations can be more useful for other communities interest about effects associated with increase of temperature.

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