

Response to the Editor for the manuscript

CMIP6 simulations with the compact Earth system model OSCAR v3.1

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We are very grateful to the Editor for allowing these discussions. In the following response, the original answer is in *black italic* while the answer is in **green**. Here is the summary of the modifications brought to the text:

- Improvement in the structure of the manuscript: reorganized the sections on the diagnostic of the model, moved to the appendix the sections on the behavior of the model
- More discussion in the experimental setup:
 - o Description of OSCAR, with more emphasis brought on descriptions existing in the literature
 - o New conceptual figure for description of the model
 - o Post-processing of OSCAR more detailed
 - o New conceptual figure for description of this framework, discussion of its limits
- More discussion in the sections on the diagnostic of the model
- Edit of the abstract
- More active formulations, proofread
- Correction of the figures to integrate the labelling of panels

The manuscript has now been reviewed by two referees. I agree with their view that the paper is of general interest, but presents to large a set of simulations without adequate interpretation and discussion of results.

We acknowledge that this manuscript presents many results, covering numerous aspects of this model and experiments. Because of the amount of results, we did not discuss in details all results.

We consider that some sections require discussion on the results, and they are those that concern the diagnostic of the model. The structure of the manuscript did not allow to identify these sections easily. This is why we have rearranged the main structure of the manuscript into the experimental setup, the diagnosis of the model and the behavior of the model. The sections concerning the diagnosis of the model now present more discussion of the results.

To comply with the recommendations of the reviewers, we moved the sections on the behavior of the model to the appendix. We deem them as useful for many readers, because they describe the response of the model in situations that the sole diagnostic of the model does not allow to imagine. So far, Reduced-Complexity Earth System Models have shown their outputs only for usual experiments,

but did not show their behaviors in all these situations. That is why we consider that it would still be a valuable input to the literature.

Of course, if you consider that this section on the behavior of the model would not be of interest to the readers, we would agree on deleting it. However, we highlight that we would not be able to invest the time to transform these deleted results into future studies, hence they would be lost.

Is OSCAR 3.1 already fully documented from Gasser et al. (2017) and Gasser et al. (2020), including calibration? If not, more emphasis needs be spent on the model description part.

The description of the model OSCAR v3.1 and its calibration are fully documented from these 2 papers. Although it was written in the section on the description of the model, it was not clear enough. That is why we have brought more details on several aspects of the experimental setup:

- New conceptual figure, describing OSCAR v3.1. We tried to keep it as conceptual as possible, but still ended up with +60 boxes.
- More emphasis brought on the description
- New conceptual figure for the post-processing of OSCAR
- Post-processing of OSCAR more detailed, acknowledging its limits as suggested by Reviewer 2.

Please prepare a revised manuscript of the paper addressing this main concern and the other reviewer comments, as well as a point-by-point response.

All comments have been answered in the other files. We will send you soon the revised manuscript.