

## ***Interactive comment on “Evaluation and climate sensitivity of the PlaSim v.17 Earth System Model coupled with ocean model components of different complexity” by Michela Angeloni et al.***

### **Anonymous Referee #2**

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This manuscript presents a study where a simplified atmospheric model, PlaSim, well referenced and already tuned, is coupled with two different simplified ocean models in order to develop a new EMIC. A few parameters of the ocean models are adjusted so that the EMIC correctly simulates the current climate. CO<sub>2</sub> increase experiments are then performed and the ECS values are discussed, as well as the difference obtained with the two ocean models. The influence of ocean heat transport on sea ice feedback is shown.

I had a hard time finding interest in this manuscript primarily because I don't see its purpose. Is it an evaluation of an EMIC? Is it to isolate some fundamental processes

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to study them in detail? Is it to present a tuning of the model? All these objectives are more or less present, but no question is really addressed, no subject is really deepened, and the bibliographical work is almost absent.

Finally, analysing the ECS as an emergent property for this kind of model no longer seems very relevant given that we know that some approximations that are made have a strong influence on climate sensitivity. It would seem to me more relevant to adjust the parameters of EMIC both on the current climate and on climate sensitivity. And this adjustment could not only concern the ocean but also the atmosphere and sea ice given the importance of atmosphere-ocean-sea ice interactions, an importance confirmed by the authors.

This manuscript looks more like the presentation of a work in progress than a mature work, and I consider that it needs to be extensively modified before it can be published in GMD.

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Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2020-245>, 2020.

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