

***Interactive comment on* “Efficient ensemble data assimilation for coupled models with the Parallel Data Assimilation Framework: Example of AWI-CM” by Lars Nerger et al.**

Anonymous Referee #1

Received and published: 16 October 2019

The paper describes the implementation of the software tool PDAF to a coupled ocean-atmosphere model. It discusses essentially the general structure of the PDAF software and how the coupling can be realized on a distributed computing architecture with MPI. While this is interesting, my main issues with this manuscript are the following 4 points:

1. No actual results of the assimilation system are presented. Only the execution time for different settings. It is unclear to me what the role of a reviewer can be in this case. I rather think that the paper should also include the results of such model (see also the following point).
2. The manuscript mentions different approaches to implement the assimilation in

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a coupled system: in a combined state vector spanning the atmospheric and ocean model or separately. The question about which approach is better is still open and it should not be too difficult to the authors to check both approaches. This would help also to address the previous point and add substantially to the scientific value of this paper.

3. The different time scales of ocean and atmosphere are not discussed and the assimilation is done only in the ocean. To really appreciate the effectiveness of the coupling, data should be assimilated in both the atmosphere and the ocean and the question regarding the assimilation frequency should be addressed. As usual, the models should be validated against independent observations.

4. There is too much overlap between this manuscript and previous manuscripts by the same author concerning the description of PDAF (in particular the memory coupling, general API structure). I think the author should focus this paper on the coupling aspect and just reference to elements already published before.

I therefore recommend major revision before this article is published in GMD.

Minor comments:

line 46: tranDAsfers → transfer

page 6: MPI Communicators: is this discussion not too technical?

Section 5: How the system scales for a fixed ensemble size?

Figure 6: the label mentions relative execution times, but the unit on the axis is [s].

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2019-167>, 2019.

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