

Interactive comment on “Developing a common, flexible and efficient framework for weakly coupled ensemble data assimilation based on C-Coupler2.0” by Chao Sun et al.

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Dear Dr. Nerger,

Thanks a lot for further discussions.

We still have some questions as follows.

1. About the conception and target regarding the term of “framework”

Response: after reading your statements, we feel that we have a different conception and goal regarding the term of “framework” from you. In our mind, a framework is more about software infrastructure rather than science. It is generally a common middleware

that effectively serves the combination between different scientific modules. Although a user can benefit from the existing DA algorithms that have been adapted to DAFCC by other users (if they'd like to share their contributions), we view it as a common benefit of using a framework but not a specific benefit of DAFCC, because a framework that generally formats a set of interfaces will improve shareability. For specific benefits, we try to make DAFCC as common, efficient and convenient as possible. Although DAFCC does not include and is not bound to DA algorithms that are external procedures in dynamic-linking libraries, we believe that various DA algorithms can be easily adapted to DAFCC, including existing DA methods in PDAF. Moreover, we view a combination DAFCC with specific models and specific DA algorithms as a platform. We sincerely welcome any user to use DAFCC to develop a such platform. According to your statements, PDAF seems more about a platform in our mind, as it includes specific DA methods based on your direct contributions to both science and software engineering. Under such a case, commonality and convenience for integrating a DA method into PDAF are not critical to users of PDAF. Regarding the parallelism of DA algorithms, we still believe that higher parallelism generally means the opportunity to achieve better acceleration. Given that the whole ensemble of 20 members use 10,000 cores, DAFCC conveniently enables a DA method to use a wide range of 1~10,000 cores but not the 500 cores corresponding to a member. This can enable users to find and then use an optimal core number for best acceleration of a DA algorithm.

Now, we tend to think that, we and you have different goals in developing a DA framework. We want to provide freedom and convenience in DAFCC for users to develop a DA system based on their available models and available DA algorithms, while is it your goal to provide the DA methods in PDAF to users?

2. About "For the DA one does not need to develop an actual domain decomposition, but one distributes the state vector that corresponds to a process domain."

Response: Do you mean an implementation based on gather/scatter that is highly inefficient? If not, what the domain decomposition is, and could you please give an

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example?

3. About “COMM_filter is just the full set of processes.”

Response: Do you mean that COMM_filter is MPI_COMM_WORLD? For example, in an ensemble of an air-sea coupled model, given that only the atmosphere model is assimilated, COMM_filter should only cover the processes of the ensemble of the atmosphere component and thus it should not be MPI_COMM_WORLD. Here, we'd like to ask, how to obtain COMM_filter without 'further efforts' under such a case?

Wish more discussions with you again.

Many thanks again.

Best regards,

Li

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