Geoscientific
Model Development
Discussions

Interactive comment on "C-Coupler1: a Chinese community coupler for Earth System Modelling" *by* L. Liu et al.

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We thank Reviewer #3 for the comments and suggestions. We will modify the manuscript according to all of them in the revision process. In the following, we select some comments to reply.

1. MCT is not intended to be a coupler. It is a library from which one can build a coupled model with or without a coupler. Since MCT is not a coupler, it doesn't care about "codecouple" or "namcouple". See OASIS3-MCT for example of using MCT in a namcouple coupler.

Response: We view the software for model coupling as a coupler. So we call MCT as a coupler. It seems that the definition of a coupler is not clear. For example, the

C-Coupler can also build a coupled model with or without a coupler component, like the MCT; there is no standalone component for the CPL7 in the CCSM4/CESM and the CPL7 can be viewed as a library for coupling and driving the whole coupled model. We should not emphasize "codecouple" and "namcouple" much.

2. Does CoR support unstructured grids? This should be more clearly stated.

Response: Compared to the software SCRIP, the CoR can handle more kinds of grids, including unstructured grids. For example, when using bilinear remapping algorithm in the SCRIP, the source grid cannot be a cubic spherical grid, while the CoR can handle this case. The 2-D remapping weights generated by the CoR can also be used by other couplers because the weight values can be formatted in the "SCRIP format". We will introduce more about this in the paper. We briefly introduced CoR on CW2013. Now it can be freely downloaded. We may prepare a paper for CoR in a few years to introduce it with more details.

3. The text implies C-Coupler is handling all of the restart data for all the components of a coupled model. Fields needed for a restart aren't necessarily needed for coupling so why is C-Coupler1 handling that? What happens if a component already has its own restart system? Maybe this was mis-stated.

Response: As the C-Coupler is a library for model development and it must have the function of restarting for its internal fields, we export this function to component models in order to simplify the code for restarting. A component model can still use its own restart system or use the function from the C-Coupler.

4. p 3910, line 20: please clarify what is meant by different data types. float or double?

Response: Yes, the data types mean float, double, integer, etc.

5. C-Coupler has borrowed ideas and concepts from many existing coupler systems which is fine but those debts should be referenced alongside the description of the corresponding C-Coupler feature. For example, the steps to run a model in 4.3 are almost

exactly the same as the CESM system including the invocation of a "create_newcase" script. That is probably not a coincidence. The parallelization of the remapping algorithm (p 3911) is the same as MCT. A registry of functions in a coupled system was first advanced by ESMF. The references could be made as the features are described.

Response: We started to design and develop the C-Coupler after learning a lot of knowledge from existing couplers, which we view as giants to the C-Coupler. As the four major steps to run a model in the CPL6/CCSM3 are very convenient for scientists, we designed similar four major steps in the C-Coupler. The detailed implementation for these four steps is different from the CPL6/CCSM3 for some specific purposes, such as reproducibility (please refer to the GMDD paper "Enhancing reproducibility of numerical simulation result on the C-Coupler platform" for details). The parallelization of the remapping algorithm is similar to the MCT with slight difference that the C-Coupler keeps bit-identical result always. For the registry of functions, we will study the details in the ESMF. Thanks a lot for these suggestions. We will add the corresponding references in the revised manuscript.

6. Can C-Coupler support 3 or more components coupled simultaneously? The FGOALS example suggests that it can but Figure 5 is so stripped down its not clear C-Coupler is doing more that "atmosphere-surface" coupling. This should be clarified.

Response: The C-Coupler can support more than 3 components coupled simultaneously. Figure 5 states five components implicitly. For example, a2c in Figure 5 means the data transfer from atmosphere model to coupler component.

7. Section 5.6: what does it mean to add a single model to the C-Coupler platform? I'm not sure what feature is being described here.

Response: Here we'd like to describe the compatibility of the C-Coupler platform which supports simulations for various models with the enhancement of bit-identical reproducibility for simulation results.

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