Geoscientific
Model Development
Discussions

Interactive comment on "Coupling Library Jcup3: Its philosophy and application" by Takashi Arakawa et al.

Anonymous Referee #2

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The study aims to give design details of new coupling library to couple different earth system model components. Unfortunately, the current status of manuscript makes it hard to judge its contribution and added value to the previous works related with model coupling when other existing coupling libraries such as OASIS, ESMF and MCT are considered. The most of the presented low-level details of the proposed library already exists in other coupling libraries and frameworks. For example, applying SMM (Sparse Matrix-Multiply) to interpolation weights is very common among model coupling libraries. The manuscript also lacks to have comparison with the current implementations and existing ones (OASIS, ESMF, MCT ...) in terms of scalability under different loads, flexibility and error margin different interpolation methods such as bilinear, conservative etc. using a set of analytical functions like ones provided by SCRIP

interpolation library developed by LANL.

Specific comments about individual sections can be found as follows,

Introduction: - need to mention other model coupling libraries such as ESMF, MCEL etc. to indicate the main difference of the current implementation than others. this is not clear in the current version of the manuscript. - figure 2 need to be redesigned. it is hard to understand the interaction between components. sequence diagram can be an option.

Section 3.4.3: - interpolation routines are not implemented as black box in the other open source coupling libraries such as MCT, ESMF, OASIS. user can always look at the code (i.e. subroutine that calculates interpolation weights) and make modifications if it is desired. for example in ESMF user can pass interpolation weights calculated outside of the library to handle interpolation between different computational grids. Or custom extrapolation methods can be implemented by using multiple routehandle. - it is better to use interpolation weights rather than mapping table in general. if mapping table is something different then interpolation weights, it must be explained detailed to prevent confussion.

Section 4.3: Fig. 3 must be revisited and simplified. it is very confusing and hard to understand.

Section 5.1: - need to give more detail about bit-to-bit reproducibility. how it is achieved. it is not only related with the coupling library. it is also related with MPI library itself expecialy using reduction operator and limited floating point representation.

Section 5.2.1: - In Fig.5, please give detail of the labels used in x axis such as GL09RL01 in the caption of the figure or in the text. it seems that it is combination of rlevel and glevel but it is better to clarify it.

Typos: - in gereneral style for citation must be revisited such as (Graig and Valcke, (2017)) need to be fixed as (Graig and Valcke, 2017) - page 16, line 20: suggestion to

change "non-hydrostatic equation system" to "non-hydrostatic dynamical core" - page 20, line 14: CLF must be CFL