

Interactive comment on “OASIS4 – a coupling software for next generation earth system modelling” by R. Redler et al.

Anonymous Referee #1

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General comments;

This paper describes the detailed functionalities and structure of a newly developed coupler OASIS4 and evaluates its performance by applying it to realistic models. Coupler is a software component that connects the component models of ESM and exchanges the data between each component. It is thought that the importance of coupler will increase more and more, with development of ESM and increase of the complexity of machine architecture. Therefore, grid search algorithm, data exchange method etc presented in this paper are very important information for model developers and climate researchers. But concrete data showing the superiority of this coupler are insufficient and it might be difficult for readers to estimate the efficiency of new method. Therefore the referee strongly recommends to show data which can prove the advantage of new

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coupler objectively for the authors.

Specific comments;

P805, L6-

Some AGCM have a function to change delta T during the time integration not to exceed CFL limitation. In this case, how exchange frequency is controlled by the coupler and/or SMIOC XML configuration file?

P806, L1-

As the author mentions, the number of subroutines and the number of arguments are trade-offs. Therefore, it is insufficient only by the list on API subroutines to insist on simplicity of the interface of OASIS4 coupler. Arguments of each subroutine should be listed with the routine name on Table 1A.

P810, L4-

The algorithm of point-based search for block-structured grids is most important issue of this paper. Nevertheless the explanation of this search algorithm, especially about the case that target point is located in an overlap region, is incomprehensible for the referee. It is preferable to add some more detailed explanation with the schematic figures of every search step.

P812, L24-

OASIS4 coupler provides two choices for domain-partitioned source grid search, “local search” and “global search”. But, in general, result of parallel computation should not be affected by pattern of domain decomposition. Is there any advantage for using “local search” algorithm?

P819, L14-

What is difference of data structure between OASIS3 and OASIS4 that causes trunca-

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tion error and leads the difference of results?

P821, L6-

It is not clear whether a buffer used for data exchange is explicitly allocated in the coupler code or is internal data buffer defined in the MPI library. If the buffer is non-blocking MPI buffer, is there any risk of buffer overflow error caused by large number of data exchange?

P821, L6-

Must PRISM_put and PRISM_get have one to one correspondence? It is preferable to show the data flow from model A to model B including MPI routine call.

P822, L5-

As mentioned in general comment, objective evidence about the efficiency of multi-grid search algorithm proposed in this article is indispensable. Comparison of wall-clock time or the number of floating point operation, - can be obtained by some performance measurement tool such as "ftrace" or "PAPI" etc -, between OASIS4 and OASIS3 grid search must be presented.

P826, L20-

As far as the result of table 1 is concerned, the speed of the data exchange is dictated by the number of Transformer processors, as the author says. But under a realistic situation, the number of processors of AGCM and OGCM might exceed several hundreds at the number of grid point used on this experiment. In such case, is the same conclusion able to be red?

Interactive comment on Geosci. Model Dev. Discuss., 2, 797, 2009.