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

R. Redler et al.

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We thank referee 1 for the detailed suggestions to improve the paper. We seriously considered the remarks made and follow most of the given advises. A few minor points remain where we cannot follow the reasoning of the reviewer and we provide arguments in the reply to underline our opinion.

General comments

Referee 1 strongly recommends to show data which can prove the advantage of the new coupler objectively. It is further stated that concrete data showing the superiority of the coupler are insufficient.

We understand the reviewer's general concern. To answer this concern, we have

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adapted the benchmark testcase to the OASIS3 coupler and run it with OASIS3 and OASIS4 for different resolutions and compare the results. The numbers discussed in a new subsection in section 8 clearly show the benefit of the multi-grid neighborhood search when compared to a classical search and the increased general performance of OASIS4 over OASIS3 even in a simple not parallel case.

Specific comments

P805, L6

The exchange frequency of data cannot be changed at runtime. However a changing component timestep duration is supported as the exchange frequency itself is expressed in time units rather than an integer number of the model time steps.

As this is closely related to remark P821 L6, we now explain this in the second paragraph of section 7 (Data exchange) rather than adding a detail to the more general description in the section 3.

P806, L1

We agree with the referee and we already thought about this when writing the paper. However, instead of listing each function call with its detailed list of parameters we decided to provide the reader with a reference to the OASIS4 user guide where the API is described in detail (see P805, L26 and the link provided with the reference to (Valcke and Redler, 2006).

P810, L4

We have now better detailed the description of the search in sec 5.1. We hope the description of the algorithm with the help of Figure 2 is now comprehensible.

P812, L24

We share the opinion with both reviewers (see also referee 2, General comment no 5). There is no other advantage for the local search algorithm but performance. It may be

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of interest for the OASIS4 user to investigate the overhead caused by the additional search across process domains. Nevertheless, to follow the reviewers remarks, we do not mention this in the text anymore.

P819, L14

The source points that are used for a particular interpolation stencil may arrive in a different ordering. The different data are multiplied with their individual weights and summed up. A different ordering during the summation leads to truncation errors.

This is now explained in the text in the before last paragraph of section 6.

P821, L6

For sending data memory is allocated below the prism_put but outside of MPI. We have now clarified this in the text.

There is no danger with a standard conform MPI implementation to get a buffer overflow in the MPI. We have commented on this in the text.

P821, L6

The individual components are free to call prism_put and prism_get individually at any frequency. However, the periods of time covered by the date bound arguments to these call have cover the run duration with no overlap and no gap. Inactive prism calls will return without performing any MPI calls. Only active prism calls (calls that are performed for a date at which an exchange has to occur) will call the MPI library to exchange data. OASIS4 verifies that the successive date bound arguments cover the run duration with no overlap and no gap and therefore ensures that the active calls have a one to one correspondence.

We have clarified this in the text.

P822, L5

As stated above, we now have included a new subsection in section 8 in which we discuss the benefit of the multi-grid neighborhood search when compared to a classical search and the increased general performance of OASIS4 over OASIS3. We decided to provide only wall clock time, as the typical OASIS4 user is mainly interested in this measure and not in floating point operations (flop).

P826, L20

Unfortunately we had no system available to test OASIS4 for a higher number of processes. A German project has just started to to investigate exactly this. For the moment we do not have any specific concerns regarding the scalability and performance when it comes to higher number of processors or larger grid sizes (see also ref 2, general comment 6).

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