

Dear author,

Thank you for your revised manuscript. Your manuscript answers most comments from the reviewers, but I consider that some of the reviewers' remarks are still not addressed in a fully satisfactory way. So I would like you to consider the following remarks and provide an updated manuscript addressing them, before I can consider it for publication. These remarks are grouped in "1. Your answers to Referee 1's remarks", "2. Your answers to Referee 2's remarks" and in a third section gathering additional remarks from my side.

With best regards,
Sophie Valcke

1. Your answers to Referee 1's remarks (the text in italic is the referee's original remark)

- *p.4 l.29 explain "consistently respecting the underlying discretization"* :
You wrote: without approximations to the component field discretizations (type \in [FV,FEM]and order); please turn this mathematical sentence between the parentheses into an English one and replace FEM by FE
- *p.7 ll.30-32 in what exactly is the MBTR stack an improvement* :
Explain why this is an improvement as requested by the referee; just saying that storing the connectivity is an improvement is not a satisfactory answer if you don't explain the positive impact of doing so.
- *p.11 ll.2-3 state here (or anticipate) the rational for replacing MCT as a broker.*
Please add these arguments somewhere in the text to answer the referee's comment.
- *p.12 ll.26-29 Fig 6. is not immediate to read without some further "step to step" details in the text.*
Yes, the advancing front algorithm should be better explained. Give more details on the relation between the text and the figure. I suppose the source cells are in red and the target cells are in blue? What does the bottom figure represent?
- *pp.12-13 subsection 3.3.1 does the seed determination can be fully automated or its efficiency depend on user tuning?*
Details on this automation should be added, as part of a better explanation of the advancing front algorithm.
- *p.14 l.7 does "to all tasks" refer to tasks (or rather processes) on the source side?*
I don't understand your answer ("Description in rebuttal is detailed"); please specify "target" or "source" or "coupler" tasks.
- *p.14 l.8 "Cells [...] are sent": how are they represented?*
Again, I don't understand your answer ("Description in rebuttal is detailed"). Please add the details you describe in your answer to the referee in the text or explain where they can be found if already in the text.
- *p.14 l.10 please clarify the term "superset": a superset usually refers to inclusion of similar objects.*
Again, I don't understand your answer ("Description in rebuttal is detailed"). Please add the details you describe in your answer to the referee in the text or explain where they can be found if already in the text.

- *p.15 l.5 how expensive can be the communication of ghost intersection elements on highly distributed components?*

You wrote that you modified the text p.16, l.21. But beside the added references, I see no modification p.16, l.21.

- *p.16 l.28 "it is non-trivial to": did you find a way?*

Both referees asked for more details. Please add details in the text.

2. Your answer to Referee 2's remarks (the text in italic is the referee's original remark)

- *Page 6, line 20 "oas (2018)"*

For OASIS3-MCT_4.0, please cite: Valcke, S., Craig, A. and Coquart, L. (2018), OASIS3-MCT User Guide, OASIS3-MCT4.0, CECI, Université de Toulouse, CNRS, CERFACS - TR-CMGC-18-77, Toulouse, France , Technical report XXXXX

- *Page 16, line 28, bit-for-bit capability is sometimes important to achieve*

Both referees asked for more details. Please add details in the text.

- *Page 20, lines 18-19. For the 10243 test case, are weights being generated in 2d or 3d?*

Please add in the text some details about your motivation, as you detail in your reply to the referee.

- *Page 21, Figure 10, I am struggling to read the axes and other text on the plots*

You wrote that you have zoomed the graphs but I don't see any difference; please redo the plots with captions and axis readable for a printed article (A4 format).

- *Page 25, figure 13. Is there benefit to showing the three results (colocated plus two disjoint).*

The manuscript diff you point to do not address the referee's question. The ones that do are p.28, l8-9. But there you only mention that "the scaling of the remapping algorithm is nearly independent of the PE layout." Please discuss a bit more as, as you state, this is very counter intuitive.

- *Page 26, figure 14b. I am surprised there is so little scaling of the send/rcv at NE120 and the core counts presented.*

Again, the manuscript diff you point to do not address the referee's question. Please add something on the lack of scalability above 128 cores as you detail in your reply to the referee.

- *For page 27, figure 15, maybe remind us that it's case B of Table 1 (I think that's correct) in text.*

Please do as suggested by the referee.

3. Please consider the following additional remarks from my side (pages and lines now refer to your gmd-2018-280-author_response-version2.pdf)

- p.2, l. 14: please consider changing "or include trivial linear transformations " by "or are not linked by any trivial linear transformations
- p.2, l. 17: change "need" by "needs"
- p.4, l.8: what does "nonlinearly" means in "Conservative remapping of nonlinearly coupled solution fields" ?

- p.4, l.17-26: Why do you split into two paragraphs “1. NC/GC” (under which you describe NC or NC/GC or GC solutions), and “2. LC/GC” (under which you have LC/GC and LC solutions)?
- P.4, l.22: What does L2 or H1 refer to?
- P.4, l.23 : define “FD” and “FV”
- P.4, l.31: what does “locate infrastructure” mean?
- P.5, l.5: please consider changing “the solution field projection between grids” with “the solution field projected on the target grid”.
- P.5, l.12: define “L2”
- P.6, l.23: OASIS3-MCT is certainly not a climate application, it is a coupler
- P.7, l.3-4: You wrote “ESMF and SCRIP traditionally handle only cell-centered data that targets Finite Volume discretizations (FV to FV projections), with first-order conservation constraints” . This is not true as both ESMF and SCRIP offer also 2nd order conservative remapping. Please correct.
- P.7, l.6: I don’t understand what “matches the areas ... to the weight ... “ means. Please modify.
- P.7, l.30 : in “the online remapping computation uses the exact same input grids, and ...”, the same input grids than what?
- P.8, l.14: replace “treats” by “treat” as “which” refers to the datatypes
- P.9, l.25, please rephrase “While the MCT infrastructure only allowed for a numbering of the grid points”, as MCT certainly allows for more than this!
- P.12, first paragraph and p.16, l.14-22 : Referee 1 asked you to use MPI “processes” and OpenMP “tasks” coherently through the text so please change “tasks” for “processes” in thus paragraph. Also, p.8, l.10, change “tasks” for “processes”. Alos p.26, l.27, change “task” for “process”.
- Figure 8, p. 17: this is almost the same than Figure 7; I don’t understand what additional information does Figure 8 bring?
- P.22, l.4: please consider removing “on the BlueGene-Q machine (Mira) at ANL” as this is stated l.10.
- P.22, l.10-15: Please refer more precisely to graphs a), b) and c) in Figure 10 where appropriate and discuss the results; it looks to me that only Figure 10 c is analysed/discussed.
- P.22, last paragraph: you write “The full 3-D point location and interpolation operations provided by MOAB are comparable to the implementation in Common Remapping component used in the C-Coupler Liu et al. (2013) (Liu et al., 2013) and provide relatively much stronger scalability on larger core counts Liu et al. (2014) (Liu et al., 2014) for the remapping operation” ; how do you get to that conclusion?
- Figure 11 b: In b) how is remapped field evaluated on land point? I.e. continents seem to have a value as they are not white on the figure.
- P. 24, l.7: define CS (Cubed Sphere) the first time you write it in the text.
- Table 1 captions: Remind the resolutions and that it is for the fully colocated PE layout

- P.28, l.8, section 4.4: mention Figure 14-(b)
- P.28, l.9, section 4.4: in “is insignificant”, replace “is” by “should be” as you don’t have numbers to demonstrate this here
- P.28, l.12: the text in parentheses “(volume should remain similar to Fig. 14-(b))” seems contradictory to the rest of the sentence
- P.29, section 4.5, last sentence: “However, a direct comparison between these two workflows is not yet possible, but we expect the aggregated communication strategies in the crystal router algorithm Fox et al. (1989) (Fox et al., 1989) in MOAB, to provide relatively better performance at scale.” Can you explain why the two workflows are not comparable? Also why do you put this sentence here in a section on “Note on Application of Weights”?
- P.30, l.14” replace “is” by “are” in “which is then consumed”