

Latest developments of the OASIS3-MCT coupler for improved performance

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ABSTRACT

The developments realised in the latest version of the OASIS coupler [1] available since June 2018, OASIS3-MCT_4.0, to improve its parallel efficiency are presented. The most important improvements concern the communication scheme and the hybrid MPI+OpenMP parallelisation of the Spherical Coordinate Remapping and Interpolation Package (SCRIP) library [2]. The new communication method, which can now use the mapping weights to define the intermediate mapping decomposition, takes longer to initialize but offers significant gain at run time, especially for high-resolution cases running on a high number of tasks. The parallelisation introduced in the SCRIP library for the mapping weight calculation allows a reduction in the weight calculation time of 2 to 3 orders of magnitude for high-resolution grids. Also, significant gains are obtained in the initialisation phase by updating the MCT library from version 2.8 to 2.10.beta1 and additional debugging. New methods introduced in the CONSERV post-processing operation ensuring the global conservation of the coupling fields lower the calculation costs by one order of magnitude while still ensuring good level of reproducibility. Finally, additional results obtained with IS-ENES2 coupling technology benchmarks show that OASIS3-MCT_4.0 performs as well as, and even better at very high number of cores, than other coupling technologies.

REFERENCES

- [1] A. Craig, S. Valcke and L. Coquart, "Development and performance of a new version of the OASIS coupler, OASIS3-MCT_3.0", *Geosci. Model Dev.*, Vol. **10**, pp. 3297-3308, (2017), <https://doi.org/10.5194/gmd-10-3297-2017>
- [2] A. Piacentini, E. Maisonnave, G. Jonville, L. Coquart and S. Valcke, "A parallel SCRIP interpolation library for OASIS", Technical Report TR/CMGC/18-34, Cerfacs, France. https://cerfacs.fr/wp-content/uploads/2018/03/GLOBE-TR-PIANCENTINI-cmgc_18_34.pdf