



YAC 1.3.0: An extendable coupling software for Earth system modelling

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A light-weight software library has been developed to realise the coupling of Earth system model components. The software provides parallelised 2-dimensional neighbourhood search, interpolation, and communication for the coupling between any two model components. The software offers flexible coupling of physical fields defined on regular and irregular grids on the sphere without a priori assumptions about the particular grid structure or grid element types. All supported grids can be combined with any of the supported interpolations. The modular programming approach allows to add new interpolation schemes without interfering with existing code. The library sourcecode is developed together with a large set of unit tests. These inexpensive tests cover a large portion of the library code. This helps to highlight unintentional bugs while integrating new software and thus contributes to speed up the development cycle.

We describe several aspects of our approach and provide an overview about selected algorithms we are using and the implemented functionality. We present performance measurements of a set of realistic use cases to demonstrate the potential performance and scalability of our approach. The coupling software is now used for the coupling of the model components in the ICOSahedral Nonhydrostatic Earth System Model (ICON-ESM).

See also: Moritz Hanke, René Redler, Teresa Holfeld and Maxim Yastremsky, 2016: YAC 1.2.0: new aspects for coupling software in Earth system modelling. *Geoscientific Model Development*, 9, 2755-2769.