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How to customize the GRID for a broad usage in Earth-System-Sciences?

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Today's meteorologists intensively work on new concepts to describe and predict the climate of tomorrow. Some of the important tasks deal with the calculation of different key parameters of the Earth climate like the atmospheric branch of the hydrological cycle or the energetics of the atmosphere. With respect to climate change, a lot of questions have to be answered using different datasets, such as observational data and global climate model simulations for present and future time slices. Since rising computing power is increasing the ability of capturing regional aspects and studying regional climate models, the number of different datasets increases dramatically.

These tasks demand the usage of fast computers, as well as various datasets from different sources. Technical tasks like the creation and maintenance of different datasets at various computing centres consume a lot of valuable time from today's scientists. To enable the meteorologists to spend more time on their primary tasks, C3-Grid, founded by the German BMBF, is developing a unified interface to various tools and data sources and provides means of coupling these "on demand". Thus, the scientists can easily accomplish diagnostic tasks, applying them on various sets of observations and model datasets with the ease of a fingertip.

Interviews and user surveys show that a Grid capable of managing the above-mentioned tasks would expand the time scientist can use for scientific work at the expanse of the time spent on technical duties.

For a sustainable use of the Grid, it is crucial to expand its functionality according to the user-requirements. From the scientist's point of view, it is important to get access to all datasets, assign these to various analysis-tools and get a visualisation of the output. Interviews and user surveys clearly state that more flexibility is needed to create a productive work environment. As a result, the user is interested in (a) tuning standard-workflows by changing some parameters (e.g. the number of ensemble members), (b) combining different tools to create an own workflow using a tool box and (c) integrating own source-code or diagnostic-tools to the existing grid infrastructure in an easy way. These users' need require the development of metadata describing the tools' interfaces to the hard- and software resources.

Conceptual approaches for (a), (b), and (c) are presented along with an example workflow to analyse the atmospheric water vapour fluxes and budgets.