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Data Assimilation Workbench

COSTA offers a modular framework for data assimilation and model calibration. Using COSTA it is possible to try out alternative data assimilation methods quickly and create new assimilation methods.

Object Oriented Approach

COSTA defines and implements a large number of building blocks for creating your own data assimilation system. The building blocks as illustrated in Figure 1 are combined in an object oriented way.

An advantage of the object oriented approach is that it is easy to create a parallel version of a COSTA data assimilation system.

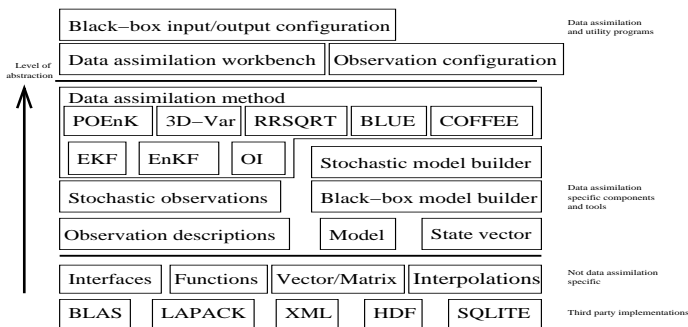


Figure 1. Overview of COSTA's building blocks.

Migration of existing software

Existing models and data assimilation software can be integrated into COSTA.

Different model builders are available that simplify the creation of a COSTA model component and even the possibility to link with black-box models. The creation of COSTA components using existing software is illustrated in Figure 2.

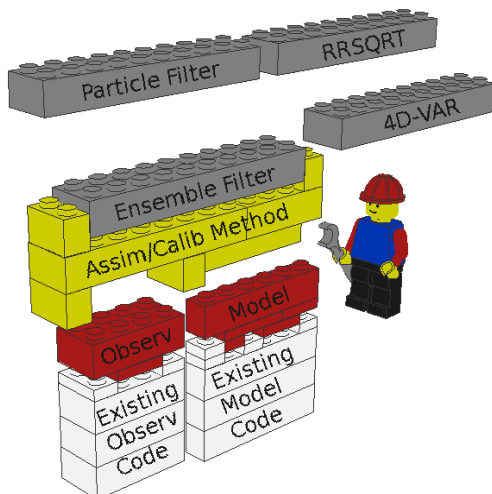


Figure 2. Creating COSTA components and combining them to create a data assimilation system

COSTA model of WAQUA/TRIWAQ

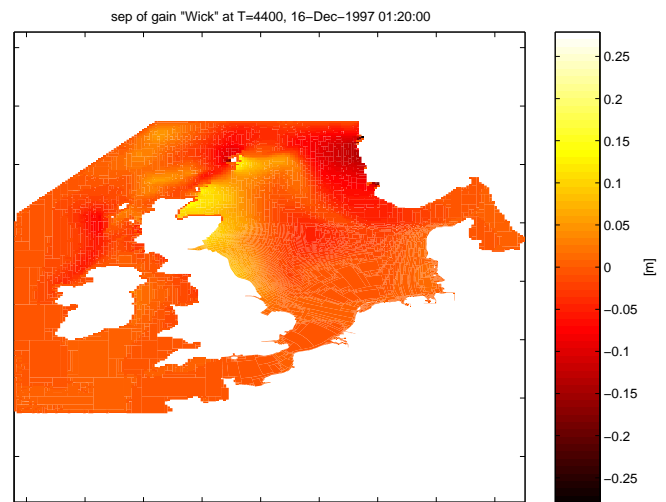


Figure 3. Column of the gain matrix of the Dutch Continental Shelf model. One of the operational models simulated by WAQUA/TRIWAQ

The software systems WAQUA and TRIWAQ for 2D and 3D shallow water simulation are provided with a number of data assimilation methods. There is however a need to apply the same assimilation methods for other models and to extend the number of assimilation methods in the existing software.

In a pilot project it has been proven that with a minimum of programming effort, the COSTA framework can be introduced in the existing software. The project results in a generic and reusable RRSQRT-filter and a COSTA model component of the WAQUA/TRIWAQ model.

The RRSQRT filter of WAQUA/TRIWAQ is already used in combination with the LOTOS-EUROS air pollution model in order to demonstrate the genericity of the created RRSQRT implementation.

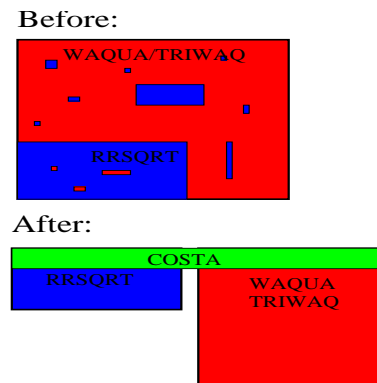


Figure 4. Restructuring of the WAQUA/TRIWAQ program.

More information

<http://www.costapse.org>
 COSTA a Problem Solving Environment for Data Assimilation, CMWR-XVI proceedings, 2006