



## A comprehensive validation toolbox for regional ocean models – Outline, implementation and application to the Baltic Sea

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The systematic and objective comparison between output from a numerical ocean model and a set of observations, called *validation* in the context of this presentation, is a beneficial activity at several stages, starting from early steps in model development and ending at the quality control of model based products delivered to customers. Even though the importance of this kind of validation work is widely acknowledged it is often not among the most popular tasks in ocean modelling.

In order to ease the validation work a comprehensive toolbox has been developed in the framework of the MyOcean-2 project. The objective of this toolbox is to carry out validation integrating different data sources, e.g. time-series at stations, vertical profiles, surface fields or along track satellite data, with one single program call. The validation toolbox, implemented in MATLAB, features all parts of the validation process – ranging from read-in procedures of datasets to the graphical and numerical output of statistical metrics of the comparison.

The basic idea is to have only one well-defined validation schedule for all applications, in which all parts of the validation process are executed. Each part, e.g. read-in procedures, forms a module in which all available functions of this particular part are collected. The interface between the functions, the module and the validation schedule is highly standardized. Functions of a module are set up for certain validation tasks, new functions can be implemented into the appropriate module without affecting the functionality of the toolbox. The functions are assigned for each validation task in user specific settings, which are externally stored in so-called *namelists* and gather all information of the used datasets as well as paths and metadata.

In the framework of the MyOcean-2 project the toolbox is frequently used to validate the forecast products of the Baltic Sea Marine Forecasting Centre. Hereby the performance of any new product version is compared with the previous version.

Although, the toolbox is mainly tested for the Baltic Sea yet, it can easily be adapted to different datasets and parameters, regardless of the geographic region.

In this presentation the usability of the toolbox is demonstrated along with several results of the validation process.