Australia's marine virtual laboratory

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In all modelling studies of realistic scenarios, a researcher has to go through a number of steps to set up a model in order to produce a model simulation of value. The steps are generally the same, independent of the modelling system chosen. These steps include determining the time and space scales and processes of the required simulation; obtaining data for the initial set up and for input during the simulation time; obtaining observation data for validation or data assimilation; implementing scripts to run the simulation(s); and running utilities or custom-built software to extract results. These steps are time consuming and resource hungry, and have to be done every time irrespective of the simulation – the more complex the processes, the more effort is required to set up the simulation.

The Australian Marine Virtual Laboratory (MARVL) is a new development in modelling frameworks for researchers in Australia. MARVL uses the TRIKE framework, a java-based control system developed by CSIRO that allows a non-specialist user configure and run a model, to automate many of the modelling preparation steps needed to bring the researcher faster to the stage of simulation and analysis. The tool is seen as enhancing the efficiency of researchers and marine managers, and is being considered as an educational aid in teaching.

In MARVL we are developing a web-based open source application which provides a number of model choices and provides search and recovery of relevant observations, allowing researchers to:

a) efficiently configure a range of different community ocean and wave models for any region, for any historical time period, with model specifications of their choice, through a user-friendly web application,

b) access data sets to force a model and nest a model into,

c) discover and assemble ocean observations from the Australian Ocean Data Network (AODN, http://portal.aodn.org.au/webportal/) in a format that is suitable for model evaluation or data assimilation, and

d) run the assembled configuration in a cloud computing environment, or download the assembled configuration and packaged data to run on any other system of the user's choice.

MARVL is now being applied in a number of case studies around Australia ranging in scale from locally confined estuaries to the Tasman Sea between Australia and New Zealand. In time we expect the range of models offered will include biogeochemical models.