

Australia's Marine Virtual Laboratory

Peter Blain, Integrated Marine Observing System, peter.blain@utas.edu.au

Peter Oke, CSIRO Marine and Atmospheric Research, peter.oke@csiro.au

Roger Proctor, Integrated Marine Observing System, roger.proctor@utas.edu.au

Uwe Rosebrock, CSIRO Marine and Atmospheric Research, uwe.rosebrock@csiro.au

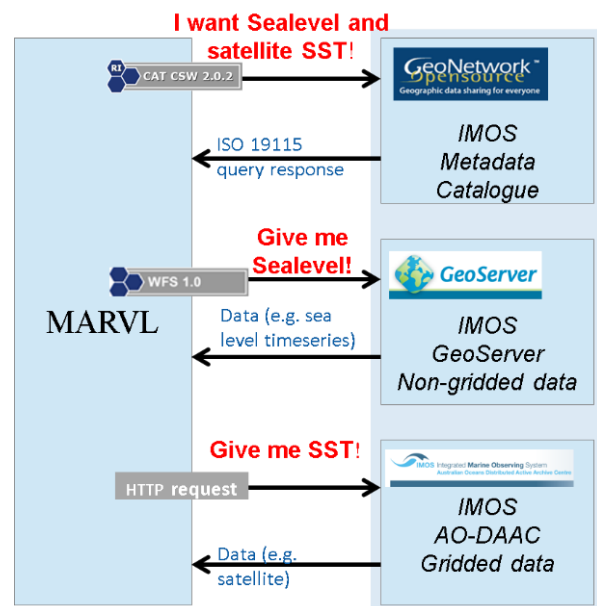
Brendan Davey, Tasmanian Partnership for Advanced Computing, brendan.davey@utas.edu.au

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 simulation of value. The steps are generally the same, and are 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 completed every time, irrespective of the simulation – the more complex the processes, the more effort is required to set up the simulation.

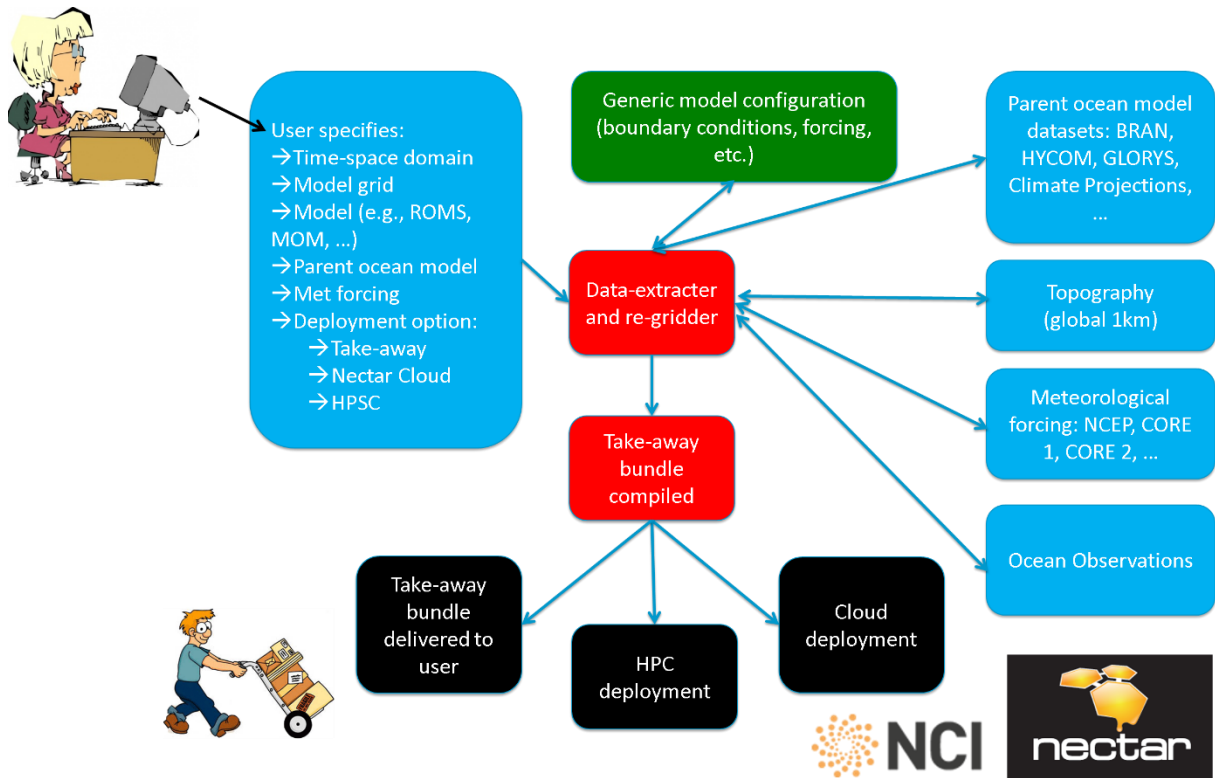
The Australian Marine Virtual Laboratory (MARVL) is a new development in modelling frameworks for researchers in Australia. MARVL uses a java-based control system that allows a non-specialist user to configure and run a model, and to automate many of the modelling preparation steps, bringing the researcher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

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

1. efficiently configure a range of different community ocean (MOM, ROMS, SHOC) and wave models (WW3, SWAN) for any region around Australia, for any historical time period, with model specifications of their choice, through a user-friendly web application,
2. access data sets to force a model and nest a model into,
3. discover ocean observations from the Australian Ocean Data Network (AODN, <http://portal.aodn.org.au/webportal/>) through machine-to-machine web service queries (figure, right) and assemble them in a format that is suitable for model evaluation or data assimilation, and
4. Run the assembled configuration in a cloud computing environment, or download the assembled configuration and packaged data to run on another system of the user's choice.



The schema for MARVL is shown in the figure below ; through the browser (top left) the user can configure all the steps through the intuitive user interface, and decide on the destination of the assembled datasets.



In partnership with the Australian Institute of Marine Science, Bureau of Meteorology, CSIRO Marine and Atmospheric Research, South Australian Research and Development Institute, University of NSW and University of WA, MARVL has been applied in a number of case studies around Australia ranging in scale from locally confined estuaries to the large scale Tasman Sea between Australia and New Zealand. In time we expect the range of models offered will include biogeochemical models.

Biographies

Peter Blain is the information systems architect at IMOS. He leads a software development team that builds open-source software for the geo-spatial community. Peter's team is also responsible for building and maintaining the information infrastructure behind the Australian Ocean Data Network (AODN). Peter was previously the software development manager at the Tasmanian Partnership for Advanced Computing (TPAC). Prior to his move into e-research, Peter was a freelance analyst/programmer in the banking sector – both locally and internationally. Peter has a PhD in cognitive science, a Masters degree in accounting, and a Bachelor of Engineering degree with a major in computer systems.

Roger Proctor has been the Director of the eMarine Information Infrastructure facility of the NCRIS capability Integrated Marine Observing System since 2008. He is responsible for developing and managing the information infrastructure for discovery and access to IMOS data, and developing the wider Australian Ocean Data Network. He is on the Steering Committee of the EU-US-Australian Ocean Data Interoperability Platform project, co-chair of the Research Data Alliance Marine Data Harmonisation Interest Group, and is a member of the US-IOOS Data Management and Communications Steering Team. He has a degree in mathematics and a phd in numerical modelling. Prior to moving to Australia in 2008 he led the UK Natural Environment Research Council marine science programme 'modelling and observing systems for coastal seas'.

Uwe Rosebrock is a Software Engineer and Architect at CSIRO Marine and Atmospheric Research in Hobart, Tasmania. Uwe has many years experience leading the development of software projects in private industry and addressing scientific problems such as under BlueLINK, WAMSI, NECTAR and others. He has successfully collaborated with many senior scientists in his projects and manages a team of software engineers.