The UK Earth System Models Marine Biogeochemical Evaluation Toolkit, BGC-val

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The Biogeochemical Validation toolkit, BGC-val, is a model and grid independent python-based marine model evaluation framework that automates much of the validation of the marine component of an Earth System Model. BGC-val was initially developed to be a flexible and extensible system to evaluate the spin up of the marine UK Earth System Model (UKESM). However, the grid-independence and flexibility means that it is straightforward to adapt the BGC-val framework to evaluate other marine models. In addition to the marine component of the UKESM, this toolkit has been adapted to compare multiple models, including models from the CMIP5 and iMarNet inter-comparison projects.

The BGC-val toolkit produces multiple levels of analysis which are presented in a simple to use interactive html5 document. Level 1 contains time series analyses, showing the development over time of many important biogeochemical and physical ocean metrics, such as the Global primary production or the Drake passage current. The second level of BGC-val is an in-depth spatial analyses of a single point in time. This is a series of point to point comparison of model and data in various regions, such as a comparison of Surface Nitrate in the model vs data from the world ocean atlas. The third level analyses are specialised ad-hoc packages to go in-depth on a specific question, such as the development of Oxygen minimum zones in the Equatorial Pacific. In additional to the three levels, the html5 document opens with a Level 0 table showing a summary of the status of the model run.

The beta version of this toolkit is available via the Plymouth Marine Laboratory Gitlab server and uses the BSD 3 clause license.