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Calibrating a global ocean model of N, P, O cycles against observed tracer distributions

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Global biogeochemical ocean models usually contain a variety of biogeochemical tracers and interactions, often more than data sets available for comparison. This creates problems not only with respect to their skill assessment, but also with respect to the initial conditions from which they are started. One way to circumvent the latter problem is to start these models from arbitrary tracer distributions, and integrate them until near steady state. In the absence of strong non-linearities, the model state will then be independent of initial tracer distributions, and we may use the available global (or local) data sets to compare the model to. We here first evaluate steady state nutrient and oxygen distributions simulated by different global biogeochemical ocean models, with respect to their fit to global data sets of observations. We further examine the models' representation of more complex features such as benthic fluxes, nitrogen fixation, and distribution of suboxic zones, and their usefulness for skill assessment. Using multiple biogeochemical tracers and fluxes for model validation requires some form of scaling of the different model-data mismatches. We finally discuss the effect of different weights for examining global combined metrics.