



## ***Interactive comment on “Evaluation of a near-global eddy-resolving ocean model” by P. R. Oke et al.***

### **Anonymous Referee #1**

Received and published: 4 February 2013

#### General comments:

The manuscript describes setup and performance of a near-global eddy-resolving ocean model developed for analysing ocean dynamics and variability. This latest version of OFAM has been extended to all longitudes between 75S–75N and includes a simplified biogeochemistry module.

The manuscript is easy to read and understandable. Model development and results of model evaluation are presented in a comprehensive manner. But figures (fig. 11) and labelling of figures have to be improved (see specific comments). I have only a few comments and some questions which address primarily the newly included biogeochemistry module. I recommend this manuscript for publication if the following points will be clarified.

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Specific comments:

My major questions are related to the set up of the biogeochemistry module.

1. To me it is not obvious, why biogeochemistry has been included in this modelling effort. The discussion on chlorophyll is very limited. Other tracer e.g. DIC, Alk or nutrients are not presented/discussed at all. Furthermore, Fig.11 should display model results on chlorophyll, but it shows satellite observations (identical to Fig.12). The modelled RMS of chlorophyll is quite different to the observed one, but the discussion on potential reasons is rather poor (p 4319, line 9-11)

2. The formulation of detritus remineralisation seems to be only temperature dependent. Given that oxygen is a prognostic tracer I would expect that oxygen limitation on remineralisation is included in a near-global model. There are large areas where remineralisation of organic material is restrained due to the lack of oxygen. Furthermore, eq. B12 directly relates changes in N to changes in O<sub>2</sub>, which consequently leads to negative oxygen concentrations if remineralisation is not limited by O<sub>2</sub>. This has to be discussed in greater detail.

3. The BGC module includes the formation of calcite. The dissolution of this mineral is primarily dependent on the saturation state of calcium carbonate in the water column. According to eq. B11 and Table 2 the authors apply a globally constant, temperature dependent dissolution rate and neglect the saturation state. Moreover, this dissolution rate increases with increasing temperature which is completely wrong for calcite. This mineral dissolves faster in cold water. For what reason is calcite production considered in this context?

4. Subsection 3.5: It is not an appropriate tool for model evaluation to compare observed and simulated NINO indices when the model is relaxed to monthly-averaged Reynolds SST (Reynolds et al., 2007) with a restoring time-scale of 10 days. I would expect nothing less than an excellent agreement for the correlation. Therefore, I recommend removing this whole subsection from the manuscript.

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Technical comments:

Introduce all abbreviations: ACC, EAC, BMC, WBC

page 4311, line 26, wrong fig. number (4c)

page 4312, line 11 and 14, fig. numbers wrong

page 4314, line 7, typo INSTANT

page 4315, subsection 3.7.1. should be restricted to data description. All information of model-data comparison should be given in the following subsections

page 4316 line 1 ff, explain in greater detail which data have been excluded from the AMSR-E SST data set (what is e.g. near coast?) page 4320 line 2 SSTA instead of SST

page 4322 line 13 typo in relationship.s

page 4325 line 12 give reference for SeaWIFS<sub>Kd-490</sub> and explain the concept briefly

page 4330 line 13 why is it here explicitly mentioned that nutrients are controlled by upwelling? No term in eq. B4 is referring to physical ocean dynamics, but, of course, ocean physics affect all tracer fields.

page 4330 line 15 "Redfield" ratio for O<sub>2</sub> is commonly given as negative number, see eq. B12

page 4330 line 25 replace "particulate organic carbon" by "detritus" according to eq. B3

page 4345 correct figure label

page 4349 to 4351 replace top/bottom with a/b

page 4352 wrong figure is displayed

page 4353 label and color bars are difficult to see - please improve figure 11 and 12

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Interactive comment on Geosci. Model Dev. Discuss., 5, 4305, 2012.

**GMDD**

5, C1418–C1421, 2013

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