Interactive comment on “Skill assessment of the PELAGOS global ocean biogeochemistry model over the period 1980–2000” by M. Vichi and S. Masina

Anonymous Referee #3

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In the ms. the authors describe the model – data comparison of their model for several episodes within the 1984-2001 period both for global maps (1998-2001) and two JGOFS stations (BATS and HOT) 1989 – 1998 mainly with regard to NPP and Chl. The strength of the paper lies in the various objective skill measures that are employed. On the weak side, little new science is presented and it is not immediately clear what the purpose of the paper is. The use of biogeochemical models for climate projections is used as a motivation for the study, but then the comparison focuses almost entirely on NPP and Chl rather than on export production or variations of the physical pump, which are more
important for carbon uptake by the ocean.

To proceed I see two pathways: one would be to focus on the evaluation methods, demonstrating the ‘added value’ of employing the various skill measures (as it is, the authors arrive at the well known ‘reasonably well’ etc statements). Another possibility would be to focus on the inter annual variability and to examine a) the driving processes and how these are represented in the model and b) to what extent the variability resembles expected future changes in the ocean (i.e., to examine how valid is the statement that it is crucial to get inter annual variability right to get reliable climate projections). The autotrophy/heterotrophy issue could be further pursued since in the model world it is possible to quantify any non-local sources of organic matter. As it stands, the ms. is of limited value for the BG readership.

In general, the paper could have been more clearly written.

Specific comments

p3512 l 5: replace To this by For this
l 6: replace interannual by multi-annual
l26: these results have been further strengthened - what is meant here? That more analyses are added?
p3513 l 7: OBGCM(s) is used inconsistently throughout the text for sgl/pl
l11: autotrophic and heterotrophic misspelled
l20: change to: the oceanic biological pump
l22: climate change (not changes)
p3514 l 2-4 why ‘most importantly’ ?
l 5 which ‘task’?
12 section 2.2?

15 carbon rates - what is meant?

16 is ‘are needed’ meant instead of ‘that allows’?

17 change implies to requires

p3515 l 8 why 2007b,a, not a,b? [a,b should be swapped in the references]

p3516 l 11 insert ‘compared’ to, change generalized to general

p3518 l 23 in turn (not turns)

24 operated?

p3519 l 3 change underestimates (sgl) to underestimate (pl)

18 how can ‘higher-than-observed’ variability be caused by ‘too low summer concentrations’ (when Chl concentrations should be high)

22 how can a spring bloom be driven by the sudden starting of stratification? Isn’t it the increasing light availability that’s crucial?

28 change ‘best’ to a ‘better’ predictor

p3520 l 7 change to Figure 3 ‘allows’

l 11 south of (not southern of)

21 which resulted greatly underestimated? what is meant?

p3521 l 12 change Fig 1 to Fig. 5

l 18 change to: the South American continent

23 AACC?

p3522 l 3 underestimated misspelled
I 6-7 The comparison . . . can be considered an assessment. . . what is meant here?
I 16 change then other to then others
p3524 I 4 change ranges to range
I 6 correct ‘quality’
I 15 the improvement . . . is (not are)
I 15/16 this sentence is incomplete
I 20 . . . estimates of NPP do not. . . (not does)
p3525 I 2 ‘either the highest or lowest than’ does not make sense
I 16 replace ENSO by La Nina (1988 was not an ENSO year)
p3526 I 8 is conventions meant instead of conversions?
I 10 western (not eastern) boundary
I 26 from Fig 8 and 9 there is a lag of at least 2-3 months between MLD and PP – this should be discussed
p3527 I 4-6 this sentence is unclear
I 8 ‘the model is able to partly recovery the export’ - a) unclear b) how is export coming into play?
I 18/19 replace more than twice higher by more than twice as high
I 27 biomass is (not are)
p3528 I 4 rephrase ‘to bring MEF higher than 0’
I 5 which has a no bias – a or no?
I 11 change to: in the appendix
I 13 it presents? – rephrase
I 19 ... results... capture (not captures)
I 20/21 the tendency of models ... has (not have)
I 26/27 by the filter. leading to ... ??
I 27 NPP1 and NPP2 show (not shows)
p3529 l 4 correct chaotic
p3530 l 18 participating in (not to)
p3531 l 1 change to long but weak El Nino phase (or use ENSO cold and warm event, if you prefer, but not ENSO for both cold and warm events)
I 13 the issue of interest here is on ... rephrase
I 23 sparse measurements (not measures)
I 24 ocean basin scale (not scales)
I 24/25 one of the largest .. datasets (not dataset)
I 27 have an ... (not have the)
p3533 l3 the 'whole' Atlantic - 'north of 45 deg S' ?
p3534 l 3 evidence (not evidences)
I 19 ESMs 'solve' the carbon cycle – rephrase
again here is a reference to carbon sequestration, but this is never discussed in the ms. so the following statements are a bit misleading
p3535 l1 add ‘ones’ after climatological
I7 of ‘an’ adaptive .... ratio
l15 change important climatic region to climatically important region
l22 correct robustly
l25 correct to: independent test with JGOFS stations increases . . .
l27 but HOT is also a JGOFS station?
p3536 l1 correct to: is needed (not are, this refers to further discussion (i.e., sgl))
l15 correct to: oceanic conditions
l16 correct to: current state (not status)
p3538 l4 on the other hand is close to ?
p3539 l5 correct depends to depend (pl)
p3540 l26 correct Behrenfeld
p3547 Skill assessment indices for PELAGOS with the . . . data – rephrase
p3551 Fig 2 is there really an overlap of 20deg? NH and tropical look fairly similar while SH is quite different
p3553 Fig 4 is the mean annual NPP (sum) or the annual mean NPP shown? Numbers are similar to Fig 5, where zonal and annual means are Shown so this implies annual means are shown in 4a
p3556 Fig 7 correct second (b) to (c)

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