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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

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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 | 5: replace To this by For this

| 6: replace interannual by multi-annual

l26: these results have been further strengthened - what is meant here? That more analyses are added?

p3513 | 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 | 2-4 why 'most importantly' ?

| 5 which 'task'?

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I 12 section 2.2?

I 15 carbon rates - what is meant?

I 16 is 'are needed' meant instead of 'that allows'?

I 17 change implies to requires

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

p3516 I 11 insert 'compared' to, change generalized to general

p3518 I 23 in turn (not turns)

I 24 operated?

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

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

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

I 28 change 'best' to a 'better' predictor

p3520 I 7 change to Figure 3 'allows'

I 11 south of (not southern of)

I 21 which resulted greatly underestimated ? what is meant?

p3521 I 12 change Fig 1 to Fig. 5

I 18 change to: the South American continent

I 23 AACC?

p3522 I3 underestimated misspelled

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Comment

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I 6-7 The comparison ... can be considered an assessment... what is meant here?

I16 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

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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 I 4 correct chaotic
p3530 I 18 participating in (not to)
p3531 I 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 I3 the 'whole' Atlantic - 'north of 45 deg S' ?
p3534 I 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 I1 add 'ones' after climatological
I7 of 'an' adaptive ratio

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l15 change important climatic region to climatically important region

l 22 correct robustly

l 25 correct to: independent test with JGOFS stations increases ...

l 27 but HOT is also a JGOFS station?

p3536 l1 correct to: is needed (not are, this refers to further discussion (i.e., sgl))

l 15 correct to: oceanic conditions

l 16 correct to: current state (not status)

p3538 l 4 on the other hand is close to ?

p3539 l 5 correct depends to depend (pl)

p3540 l 26 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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