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Revised version of the Paper

NEMO on the shelf:

assessment of the Iberia – Biscay – Ireland configuration.

No osd-10-83-2013

BY C. MARALDI, J. CHANUT, B. LEVIER, N. AYOUB, P. DE MEY, F. LYARD, G. REFFRAY,

S. CAILLEAU, M. DREVILLON, E. A. FANJUL, M. GARCIA SOTILLO, P. MARSALEIX

AND THE MERCATOR RESEARCH AND DEVELOPMENT TEAM

Dear Editor,

We sincerely thank all the reviewers for their review of our paper. The aim of this letter is to detail how we addressed their comments on our manuscript No osd-10-83-2013 untitled NEMO on the shelf: assessment of the Iberia-Biscay-Ireland configuration.

ANSWERS TO REVIEWER #1

- Comment 1. Eqn. 7: the right-hand side of the equation is hard to understand/read. For instance, maximum of two quantities is not specified, e.g. H_max = max (a,b). Please improve the display style. *We agree with the reviewer comment. Actually, Eqn 7 was written, as suggested by the reviewer, with the "max(a,b)" display style in the draft manuscript but not in the draft edition anymore. This omission had not been identified in the draft edition. More particular attention will be given to ensure that the edited version of the article converted in the Ocean Science format fully matches our manuscript document*
- Comment 2. Page 98, lines 8-16: Do you use a vertical mixing scheme which parameterizes internal wave mixing and, if so, did you reduce/eliminate the mixing coefficient in this scheme because you explicitly resolve internal tides? *Mixing*

induced by unresolved internal wave breaking is accounted for by the two-equation k-epsilon sub-model (there is no any additional Richardson number based parameterization for instance; Page88, l.24 to Page 89 l.6). Away from boundary layers, turbulent kinetic energy reverts to a user chosen minimum value q which contain the background energy due to unresolved processes such as internal wave breaking, while the mixing length (l) is bounded by the so called Galperin limit in the case of stable stratification: l < c /N where c is a constant. Background diffusivities then naturally follow the classical formulation for internal wave mixing (Holt and Umlauf 2008). The minimum kinetic energy level (taken as constant) has been set after testing its effect on the modeled thermoclines compared to limited in situ observations over French shelves. The value retained ultimately appears in agreement with what is reported elsewhere.

With partially resolved internal waves, it is unlikely that the current turbulence model, "as is", correctly accounts for the associated mixing due to the still unresolved breaking. In generation areas, the parameterized mixing is anyway much greater than the background mixing described above. Note that parameterizations of the mixing induced by resolved internal waves even in non-hydrostatic models are very recent (see Klymak and Legg, 2010: A simple mixing scheme for models that resolve breaking internal waves. Ocean Modelling*, 33(3-4), 224-234). There will probably be a long way before its use in the present operational modelling context where sticking to state of the art schemes and robustness is the key.*

- Comment 3. Page 104, line 1: Figure 7 ==> Figure 7a. Add label (a) to Figure 7a. *Figure 7 is now labelled using the same label in the text and in the corresponding figure. Figure 7a represents the Taylor diagram of the observed and modelled SST at buoy locations.*
- Comment 4. Page 104, line 27: Figure 7 ==> Figure 7b. Add label (b) to Figure 7b. *Figure 7 is now labelled using the same label in the text and in the corresponding figure. Figure 7b represents box plots of the observed and the modelled SST diurnal cycle amplitudes.*
- Comment 5. Page104, line 16, 17: ". . . SST data assimilation leads to realistic SST simulated fields in PSYV3." The word "realistic" is non-scientific. Please be more specific what you mean, e.g. closer agreement with observations. *We agree with the reviewer that "realistic" was not the appropriated term. The sentence has been rewritten following the reviewer suggestion and is now "… SST data assimilation leads to closer agreement with observations in PSY2V3".*
- Comment 6. Page 104, lines 26 to page 105, line 2: Something seems to be wrong here and/or does not match the figures shown. I cannot see the three Dsst amplitudes in the box plots of Fig. 7(b), only two are shown. Please adjust text and figure accordingly. *We agree with the reviewer that the text bit confusing. Actually there are only two box plots in Figure 7b: one for the model and the other for the observations. The boxplots correspond to Dsst computed over (a unique "global" region covering the Bay of Biscay, the Celtic Shelves and the North Sea).*
- Comment 7. Page 116, line 18: In surface ==> At the surface. *"In surface" has been replaced by "at the surface".*
- Comment 8. Page 127, line 1: manuel ==> manual. *The word has been replaced.*
- Comment 9. Page 131, Table 2: explain table heading acronyms SEMA, SEM, Inc and Pha in table caption. *The acronyms are now explained in Table 2: semi-major axis (SEMA), semi-minor axis (SEMI), inclination (Inc) and phase (Pha).*

- Comment 10. Page 133, Table 4: Figure heading: Organism ==> Organisation???. *The word "organism" has been replaced by "organisation".*
- Comment 11. Page 138, Fig. 5: explain acronyms TOV, TMV and TMS in figure caption. *The acronyms are now explained and the caption for Figure 5 is now: "Transports (outflow) at Gibraltar Strait for TOV (Transport-Observation-Velocity; the interface used to separate the inflow from the outflow is defined as the time dependent depth of the surface of zero low-pass frequency velocity), TMV (Transport-Model-Velocity) and TMS (Transport-Model-Salinity; the outflow transport is computed using the commonly used 37.25 isohaline".*
- Comment 12. Page 140, Fig. 7: crosses are invisible or very hard to see. Please use bold font for crosses. *Crosses on Figure 7a have been redrawn using bold font as suggested by the reviewer.*

We are confident that our corrections will address all of the suggestions made by the reviewers. We look forward to hearing from you soon.

Yours Sincerely,

C. MARALDI, J. CHANUT, B. LEVIER, N. AYOUB, P. DE MEY, F. LYARD, G. REFFRAY,

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