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Interactive comment on "Spatial and temporal variability in coccolithophore abundance and distribution in the NW Iberian coastal upwelling system" *by* Blanca Ausín et al.

Blanca Ausín et al.

blanca.ausin@erdw.ethz.ch

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We want to thank Mário Cachão for his thoroughly revision of this manuscript, which we find relevant and constructive. We have reviewed our manuscript following his suggestions and made the appropriate changes whenever possible. Further explanation for some minor comments (point by point) can be found below the original Reviewer comment file in the attached file (File 2). Required minor changes in bibliography, terminology, equations, etc. have been done following Cachão's comments. Therefore, related comments have been deleted in such file.

Here, we address the three main concerns Cachão raises on our Manuscript.

1. Although authors refer to our paper of the Liths/Spheres model to justify (and well) to keep both data sets separately, the manuscript often refers to coccolithophore abundances based on coccolith abundances and not cell(coccosphere) abundances which may induce the reader (specially the biologically driven reader) in error. Thus, this paper should be mainly dealing with coccosphere abundances. Coccolith data should be used to complement and compare to the cell counts (the model L/S cannot be applied because the sampling was performed monthly) and not the other way around as this paper does;

Reply: We decided to use the coccolith species data set in the previous version because: i) a previous exploratory analyses showed that temporal distribution of coccolithophore species and their corresponding coccoliths was very similar (of course they differed in their vertical distribution since rarely coccospheres make it to the seafloor). ii) the confidence limits for the detection of minor species was better if using the coccolith data set, which allowed higher statistical significance when performing statistical analyses, but also the consideration of more deeper samples in the CCA (since at greater depths some samples where barren for coccospheres but not for coccoliths, and barren samples have to be removed from CCA) enriching this analyses. According to Fatela and Taborda (2002; Fig. 2), the detection of a minor species (here considered to be < 2% of the total assemblage) is performed at a confidence level of 100% when counting 500 specimens (i.e. coccolith data set); and it is of 90%-100% when counting 100-300 specimens (i.e. coccosphere data set). The latter is in any case a reasonable confidence limit too, which has proven to be valuable and informative, even when only identifying a maximum of 100 coccospheres per sample by polarized light microscopy (e.g. Bai et al., 2014; Sun et al., 2014).

But in summary, we agree with Cachão and the other reviewers that ecological inferences have to be based on the coccosphere data set. Therefore, we base interpretations about coccolithophore species ecology (section 5.2. of the manuscript) on the coccosphere data set in this new version. We still present and interpret the coccolith

data set to provide additional information on other matters that cannot be assessed by using the coccosphere data set (i.e. resuspension events).

2. The authors do not consider the existence of the species Gephyrocapsa muellerae. Possibly this species was integrated into the small Gephyrocapsa group but this is nor referred. I find this a critical point to accept this paper since it compromises the conclusions based on gephyrocapsids and misses important ecological inferences. I attribute this to the fact that coccolith counts were performed with only x1000 magnification. In addition SEM should also be used to complement taxonomic identifications namely with other coccolithophore taxa difficult to identify only by optical microscopy.

Reply: The species Gephyrocapsa muellerae was indeed considered, identified, and counted, separately from small Gephyrocapsa group, and was being shown (and still is) along with other minor species in Supplementary Figure S3. For this reason, ecological inferences with small Gephyrocapsa group have to be discarded since they are not possible.

Despite G. muellerae shows very low abundance, we do not think it is due to the use of x1000 magnification. Counts in our lab are always produced with such magnification and G. muellerae is always identified without any difficulty, as the Reviewer may know well. The main author of this manuscript and also co-author J.A Flores have used that objective in other numerous studies in which G. muellerae is ofen identified as one of the major species. Besides, due to the importance of this species as paleoecological indicator, special care is always placed when identifying potential G. muellerae. But in any case, if small Gephyrocapsa can be identified and differentiated from E. huxleyi with x1000, G. muellerae (which is larger, > 3-3.5 um) can too, being differentiated from similar Gephyrocapsids. It is worth mentioning that at the beginning of this study 9 well-preserved and diverse samples from different months were scrutinized by Scanning Electronic Microscope for exploratory analyses of preservation, species presence, and picture collection. Nevertheless, not a single coccosphere of G. muellerae was found.

Reply: Minor concern. The presence of C. pelagicus ssp. pelagicus as coccoliths may derive from reworking. However it can also be specimens from the lower end of the C. pelagicus ssp. braarudi morphotype (under current revision). Because the authors don't refer the classification criteria it is difficult to distinguish which might be the case.

Clasification of C. pelagicus ssp. pelagicus was made according to size criteria (< 10 μm) (e.g. Parente et al., 2004, and references therein) and it is now stated in the text. Specimens of C. pelagicus were measured with the calibrated scale (reticule) placed into one eyepiece of the microscope. No other detailed morphometric analyses were undertaken since that is other study itself formulated to respond other questions and that should be conducted differently. Only one coccosphere of this subspecies was found (in CALIBERIA-March-2012 at 100 m) by optic microscope. None was found within the 9 samples observed with SEM, although these samples were mostly from 10-50 m depth, and coccoliths of C. pelagicus ssp. pelagicus were mostly found in deeper waters. We cannot really tell if these are either reworked specimens or from the lower end of the C. pelagicus ssp. braarudi morphotype. Nevertheless, two notions might suggest the later: 1.- Distribution of C. pelagicus ssp. pelagicus does not match with the few reworked specimens identified in both CALIBERIA and RAIA (New supplementary figures). 2.- As stated in the manuscript ". C. pelagicus ssp. pelagicus spp., and Coccolithus pelagicus ssp. braarudii showed similar distributions". This might suggests they are both the same species. However, we cannot conclude one thing or the other, although this is now briefly discussed in the text. Access to the paper under revision mentioned by the Reviewer could be very useful to discuss this topic in further detail.

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pelagicus s: l. (Coccolithophore, Haptophyta) from offshore Portugal, during the last 200 kyr, Micropaleontology, 50, 107–120, 2004. Sun, J., Gu, X.Y., Feng, Y.Y., Jin, S.F., Jiang, W.S., Jin, H.Y., Chen, J.F.: Summer and winter living coccolithophores in the Yellow Sea and the East China Sea, Biogeosciences, 11, 779-806, 2014.

Please also note the supplement to this comment:
https://www.biogeosciences-discuss.net/bg-2017-236/bg-2017-236-AC1-supplement.pdf

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