Biogeosciences

Discussions

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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.

Anonymous Referee #2

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This study provides a microscopy-based analysis of coccolithophore abundance, composition, and diversity at two locations off the northern Iberian peninsula. Observations were made monthly over a 1-year period and contextualized to help interpret paleontological data. The results presented will be valuable to the scientific community and appear to have been analyzed appropriately.

I have a few questions, comments, and requests for clarification in the text. These relate primarily to statistics of coccolithophore counts and how environmental data (upwelling index, river discharge) were included in the statistical analyses (see detailed comments below).

I would also suggest alterations to some of the figures. It makes more sense to me to group figures by station, instead grouping both stations together for each variable. For example, I kept flipping between all the figures to compare variables at one station. It would be easier to interpret if all variables were plotted next to each other for a station, if that is possible. For me, it is less valuable to have the data from the two stations plotted next to each other. Also, I suggest changing the color scale/greyscale on figures 6 and 7 because similar shades are impossible to distinguish from one another.

Diatom analysis: Zuniga et al 2017 citation does not have year in reference list. How many total diatom cells were counted, and what is the uncertainty associated with these counts? This does not appear to be presented in Zuniga 2017.

3.2 Coccolithophore analysis: How many total cells and/or field of view were quantified per sample? The authors refer to the confidence limits based on the number of species-level counts. What were these? What was the confidence level of the total coccolithophore count?

Statistical analysis- Were these analyses performed only on the coccolith data? If so, the language needs to make this clear. For example, is n the total number of individuals, or total number of coccoliths? What affect might diversity in coccolith production among species have on equating coccoliths with community composition? I would like to see some discussion of this. Is it common to use coccolith composition as a proxy for species composition? Does coccolith composition accurately reflect species composition? Reference to equation 2: is this your equation 2, or are you referring to an equation 2 in Hammer et al. 2001? The equation syntax is unclear. If the calculation is made by adding the squared fractional abundance of each species, shouldn't this be represented by a sigma symbol?

Results: 4.1 Environmental conditions: Why is phosphate the only nutrient reported? Nitrate and silicic acid have a much larger impact on coastal production, and are likely important in determining coccolithophore growth or their ability to competition with

other phytoplankton groups.

4.3 Coccolith absolute abundance Line 24 "suggesting that their disaggregation takes places right after the cells die"- I would not expect to find many suspended coccolithophores (or any other phytoplankton) in 2-5 L of seawater collected below the euphotic zone/mixed layer. This does not necessarily mean that cells "disaggregate" right after they die, although it is a possibility. By disaggregate do the authors mean lose their coccoliths? The terminology is unclear. Intact coccospheres are probably mostly transported below the euphotic zone in larger particles, which were not sampled in this study. Alternatively, intact coccospheres may sink below the mixed layer at specific times of the bloom cycle that are unlikely to be resolved by monthly observations. Either way, I don't think this study can really resolve the fate of coccospheres due to the sampling methods used (i.e. filtering small volumes of seawater). Line 30 again refers to disaggregation. Is this a common term when referring to coccolithophore cells? Cells are not aggregates. To me, disaggregation involves organic particles like marine snow. What do the authors mean by "mature" when referring to a bloom? Is this the bloom peak, or the decline? More precise language would be helpful.

4.6 Diversity: Dominance figures: I cannot distinguish the difference between 50, 100, and 150 grey tones. Also, 250 and 300 m both appear to be black to me. Cannot see a clear or consistent relationship between dominance and depth, although it may be obscured by the similar grey tones. In many cases, the deeper depths have higher dominance than the shallower samples, opposite of statement page 7, line 29.

4.7 CCA: How was upwelling index incorporated into this dataset? Was the index number from the day of sampling used, the week-long cumulative value, or a monthly average? A randomly selected value on any day of the month wouldn't necessarily reflect the time scale or ecologically relevant physical processes. These probably occur on a weekly time-scale (I think, though I am not familiar with that specific system). Similarly, how were wave-height and river discharge data incorporated? These will have similar issues: the data point on the day of sampling doesn't reflect the physical

influences leading to the community sampled that day. Why is March characterized as "upwelling"? According the figure 1, the water column appears similarly mixed/mixing as February. I am confused by what could cause the CCA second axis, where upwelling index forcing is on the negative axis and water temperature on the positive, even though water temperature is highest during the months classified as "upwelling". The major separation of samples along this second axis seems to be primarily defined by the February-March period when the water column was well-mixed and surface waters were cold.

Regarding the placement of Syracosphaera on the ordination, its variation does not appear to be explained by these axes, so there is little you can say about it. The ordination does a good job explain variation between the others though.

Discussion 5.1 The title of this section should be changed to reflect the abundance measurement that this study is based on, since productivity was not measured. 5.1.1 Line 4: Is there a citation for this statement ("no vertical flux of coccoliths nor coccospheres is observed at those times") Line 16: I think the wording in this sentence should be changed, since productivity was not measured. 5.1.2 Line 19: Again, should refer to abundance, not productivity. Line 20: "donwelling" typo

Page 10, line 15: "Yet, our outcomes highlight that both species are unambiguously linked to the upwelling regime and high primary production." Again, since production was not measured, there is no direct link to production in the dataset presented.

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