

# ***Interactive comment on “Physico-chemical and biological factors influencing dinoflagellate cyst production in the Cariaco Basin” by Manuel Bringué et al.***

**Manuel Bringué et al.**

mbringue@geol.sc.edu

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Author Comments on “Physico-chemical and biological factors influencing dinoflagellate cyst production in the Cariaco Basin”, by Manuel Bringué et al. (bg-2017-497)

Response to Referee 2 (Dr. Ribeiro)

The authors are very grateful for Dr. Ribeiro’s positive and thoughtful comments, which validate the research featured in this manuscript while helping improve its content. The authors’ response to the referee’s specific comments, are detailed below in the order they were listed:

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- Keyword 'Harmful Algal Blooms': The purpose of this keyword is to ensure that researchers interested in Harmful Algal Blooms are made aware of this study because of the record it provides on potentially harmful taxa, even though it is indeed a relatively minor component in the study. Since the suggested keyword 'dinoflagellate cysts' is already stated in the title, we think it is best to retain 'Harmful Algal Blooms' in the list of Keywords.

- 'Episodic or permanent anoxia': We agree that this needs to be specified and 'permanent' will be added at both places in the text (Page 2, Line 10 and Page 3, Line 23). To be accurate, ventilation events that are discussed in the papers cited refer to intrusion of waters down to  $\sim 320$  m depth (e.g., Astor et al. 2003, Continental Shelf Research 23, 125-144), leaving the rest of the water column (i.e., down to 1400 m) under fully anoxic conditions. Note that 'permanent' anoxic conditions refer only to the Holocene (as well as other interglacials), since there is evidence in the sedimentary record of the basin that bottom waters were oxygenated during the last glacial (e.g., Peterson et al., 1991, Paleoceanography 6, 99-119); however, given the time scale of the present study and for clarity, we will simply specify 'permanent' in the text.

- Considering analyzing the sediment trap content in all traps from the deployment: We are considering doing this work in the nearest future.

- Using the record from other (deeper) traps to fill gaps in the Trap A record: This is something the authors considered, as records from Trap A and B have been showed to yield comparable mass fluxes (e.g., Thunell et al. 2000, Limnology and Oceanography 45, 300-308) and were used interchangeably in the study of other microfossil groups at the site (e.g., Romero et al., 2009, Deep-Sea Research Part I-Oceanographic Research Papers 56, 571-581). Samples from deeper traps, however, typically yield very little material (Thunell et al., 2000, op. cit.) and may be affected by turbidity flows (Thunell et al., 1999, Nature 398, 233-236) and were thus were not deemed suitable for analyses. Unfortunately, for the duration of the time series of the present study, no sample from Trap B were available to complement the Trap A record. This will be

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clarified in the text.

- Palynological processing method: We respectfully disagree with the referee on the idea that the palynological processing method is 'rather standard'. While there are large similarities between methods used in different labs (e.g., repeated wet sievings, use of HCl and HF), there are particular steps in the method that are not necessarily standardized, especially when it comes to processing sediment trap samples (for instance, timing of sonication, limited time the samples are exposed to HCl, etc.). It is worth noting that the wording of 'warm' HF in Pospelova et al. (2005) was meant to be read as 'room temperature' (as opposed to 'refrigerator-cold'), and we will thus change the reference to Pospelova et al. (2010) to avoid any confusion.

- Use of past tense in Results: We agree that the use of past tense is more appropriate to relate changes that occurred at the time of sample collection. This will be addressed in the revised version of the manuscript.

- About the 24 extant taxa previously reported in the basin that were not encountered in this study: we believe that the most likely explanation for the absence of these 24 cyst taxa in our 2.5 year-long record is because these taxa were documented from sediments spanning the last ~ 73,000 years, as stated in the text (parenthesis before the enumeration of taxa). Most of these taxa are quite rare in the Cariaco Basin sedimentary record (see Gonzalez et al. 2008, *Paleoceanography* 23, and Mertens et al., 2009, *Boreas* 38, 647-662) and it is not surprising that they were not captured during the short window (2.5 years) of our survey.

- Chaetoceros resting spores: This comment refers to the statement: '(...) the large increases in diatom fluxes recorded in 1999 are mainly attributable to small and/or weakly silicified species, namely *Cyclotella litoralis* and resting spores of *Chaetoceros* (Romero et al., 2009), which may not result in elevated mass fluxes of bioSi.' We recognize that the wording is confusing, and the statement will be changed in the text to: '(...) the large increases in diatom fluxes recorded in 1999 are mainly attributable to

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small (e.g., resting spores of *Chaetoceros*) and/or weakly silicified (*Cyclotella litoralis*) species (Romero et al., 2009), which may not result in elevated mass fluxes of bioSi.'

- Reference to Jeong et al. 2010: We thank the referee for bringing this to our attention. The reference to this review will be added here (Page 15 Line 27).

- Use of past tense in the Conclusion: We agree that using the past tense is more appropriate here as well; this should and will be corrected in the revised version of the manuscript.

- Technical corrections (terminology): 1. Biogenic/biogenous. The word 'biogenic' will be used everywhere for consistency in the revised version of the manuscript. 2. Primary production/productivity. We thank the referee for bringing this point to our attention. However, what may appear as an inconsistency actually refers to different aspects, with 'production' generally used with quantities in mind (either masses or rates), and 'productivity' referring more to the process itself. 3. Planktic/planktonic. 'Planktonic' is already used everywhere in the text. 4. Biogenic silica: The use of 'bioSi' as an abbreviation for 'biogenic silica' (as opposed to 'BSi') is a matter of preference and both are routinely found in the literature. To the best of our knowledge, there is no formally accepted convention.

- Point-by-point suggestions (Pages 2 and 3): All suggested changes will be implemented.

- 13 citations on Page 3, Lines 3-5: We respectfully disagree with the referee on this point, as we find it important to acknowledge previous work that set the ground for this study and there are few redundancies in terms of geographical areas.

- Point-by-point suggestions (Page 4): We thank the referee for bringing this to our attention; however, we prefer to keep the wording as it is, because it allows the first 2 sentences of the Material and Methods section to rapidly summarise the sampling program (despite the bit of repetition elsewhere), an important aspect for a reader who

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is interested into this aspect of the study.

- Point-by-point suggestions (Pages 5, 7): The referee's suggestions should and will be implemented in the revised text.

- Point-by-point suggestion (Pages 9, Line 4): 'An' will be retained since the symbol '~' stands for 'approximately'.

- Point-by-point suggestions (Page 9, Lines 8, 17): The suggested wording is better and will be implemented. However, the use of 'share' will be retained (instead of 'show') as it indicates the common pattern of variation between biogenous material and total mass fluxes.

- Point-by-point suggestions (Page 10, Line 15): We think that the original wording of 'Over the duration of the time series' should be kept for accuracy.

- Point-by-point suggestions (Page 10, Lines 19, 30): The suggestions will be implemented, thank you for noticing.

- Point-by-point suggestions (Pages 12, 15, 16): The suggestions will be implemented, many thanks!

(A formatted version of these comments is provided as supplement).

Please also note the supplement to this comment:

<https://www.biogeosciences-discuss.net/bg-2017-497/bg-2017-497-AC2-supplement.pdf>

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Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2017-497>, 2017.

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