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Interactive comment on "A two-decades (1988–2009) record of diatom fluxes in the Mauritanian coastal upwelling: Impact of low-frequency forcing and a two-step shift in the species composition" *by* Oscar E. Romero et al.

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A two-decades (1988-2009) record of diatom fluxes in the Mauritanian coastal upwelling: Impact of low-frequency forcing and a two-step shift in the species composition composition (bg-2020-336) Authors = Oscar E. Romero, Simon Ramondenc and Gerhard Fischer

Response to Referee 1's comments

As required by BG, the response to the Referees is structured in the following se-

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Discussion paper

quence: (1) comments from Referee 1 (RC1) and (2) authors' comments (AC).

Comments from Referee #1

RC1: Line 25: Please include AMO between brackets the first time it is mentioned in the text.

AC: This will be accordingly corrected.

RC1: Line 91: I believe authors could go a little bit further and state that this is the longest diatom time series sediment trap record of the world's ocean.

AC: the sentence will be accordingly rephrased, and we will mention that the presented sediment trap-based diatom record is the longest so far known.

RC1: Material and methods Line 105 Since there are several gaps in the sediment trap record, authors could provide the number of days sampled during the 19-year record (i.e. the proportion of days sampled versus the total number of days). This would help the reader to have a better idea of the gaps in the record.

AC: the entire study interval (March 1988 until May 2009) extended over 7,734 days. Out of them, samples were collected for 5574 days. The gaps totalize 2160 days. This will be mentioned in Materials and Methods.

RC1: Line 108: Authors should be more specific and specify the depth range of the position of the sediment traps during their study in the text (i.e., not only in Table 1).

AC: the depth range of the traps will be included in the text of the revised version. The range varies as follows: CB1lower, 2,195 m; CB2-5, 7, 9-12, 15-20lower: 3,502-3,633 m, and CB6, 8 and 14upper: 745-1,246 m.

RC1: Line 111. While I agree with this statement, there were two mooring deployments with sediment traps deployed at 700 m and therefore their collection efficiency could have been compromised. Since the collection interval of one of these deployments coincided with an strong ENSO event, it is important that authors discuss in the text

the possibility of collection efficiency issues during these intervals.

AC: It is true that the sediment trap CB8upper, which corresponds to the 1997-early 98 ENSO interval, was deployed at 745 m, while CB9lower was deployed at 3,580 m depth. However, the composition of the diatom assemblage (relative abundance) with the highest contribution of open-ocean and coastal planktonic diatoms -indicative of moderate to low nutrient conditions- shows a significant match between both traps. This is independent of the flux numbers. The total diatom flux is very low in both traps as well, with hardly any dramatic increase or decrease with depth. This is interpreted as sound evidence of no significant difference in the collection efficiency of both traps (despite different trap deployment depths).

RC1: Line 156. Could authors provide annual diatom valve estimates for the years with the most complete records? Even a rough estimate of the annual fluxes at this site would be useful for the specialized reader in order to be able to compare the diatom fluxes of this site with other regions of the global ocean.

AC: this is a helpful suggestion of R1. Yearly fluxes deliver a broader picture of interannual variations at the CBmeso location, as representative of offshore migration of the chlorophyll filament, productivity variations and upwelling intensity, but they are also helpful to compare the CBmeso location with fluxes from other trap locations, deployed either in similar or different oceanographic settings. We will present a Table with yearly fluxes of total diatoms for 13 calendar years and the results will be discussed in 5.1.

RC1: Results - Could authors provide a rough estimation, i.e. average daily and/or annual fluxes, for radiolarian and silicoflagellates fluxes? This would help the reader to understand the contribution of both groups in relation to diatoms. Also, as mentioned before, I would suggest to provide annual estimates in order to facilitate the comparison of the diatom valve fluxes of this site with other regions of the global ocean.

AC: although we agree that fluxes of silicoflagellates and radiolarians can be of interest for scientists working on marine siliceous plankton, we emphasize that the focus of our

long-term traps record is on the diatom fluxes and the species-specific composition of the assemblage. We believe that including data on silicoflagellates and radiolarians would be beyond the MS' focus and would lead the discussion in a quite different direction. There is also a methodological aspect to consider: the use of permanent slides for diatom and silicoflagellates census does not allow the proper quantification of radiolarian skeletons. Due to the low volume used in the preparation of the permanent slides, the low absolute concentration of skeletons is too low for reliable radiolarian census.

RC1: Please avoid the use of acronym TDF, i.e. write the name in full.

AC: The acronym will be avoided throughout the revised version of our MS.

RC1: 266 "the highest"

AC: The sentence has been rephrased and reads now: "Spring and summer show the highest amount of above-the-average total diatom concentration."

RC1: 367 "concluded"

AC: the sentence has been corrected to: "Using observational data and model experiments, Wang and Zhang (2013) concluded. . ."

RC1: Line 385 Please specify/repeat when this change occurs here.

AC: the corrected sentence reads now: "An extraordinary feature of the multiyear dynamics of diatom populations at the CBmeso site is the sharp shift in the species contribution in Mai 2001 (Fig. 2b)."

RC1: Line 429 "5.1.2 The occurrence of the strong 1997 ENSO and the response of the diatom community off Mauritania" The intense ENSO event registered by the traps coincides with the use of sediment trap record collected at substantially shallower depth than most of the other deployments. According to Table 1 the sediment trap from deployment "CBmeso8 upper" was placed at around 700 m while most of the traps used

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Discussion paper

in the experiment were placed at > 3000 m (with some exceptions). The collection area of the shallower sediment trap and collection efficiency of the "CBmeso8 upper" could be different than the other records, and therefore it could have affected the composition of the diatom assemblage collected during this interval. Authors should discuss this point in the text.

AC: It is true that the trap CB8upper was shallower than CB9lower (745 m vs 3,580 m trap depth, respectively; Table 1 in manuscript, see comment above about this issue). However, as mentioned above, we believe that the strong resemblance in the species-specific composition of the diatom assemblage of both traps (highest contribution of diatoms associated with waters of moderate to low nutrient content), without any significant percentage shift, delivers sound evidence on the reliability of the diatom data at CB8 and CB9. We will comment this issue in the revised version of our MS and include this sentence: "We are aware that the two traps temporally corresponding to 1997-1999 ENSO and La Niña were deployed at different depths. Although this might have impacted on the total diatom flux (the lower the trap, stronger the dissolution effect), the good match in the species-specific composition of the diatom assemblage at CB8 and CB9 traps points to the reliable signal of environmental response of the diatoms to an ENSO impact."

RC1: Line 455 Authors could also cite the possible impact of strong ENSO events on the Mediterranean diatom fluxes as reported by Bárcena et al. (2004) and Rigual-Hernández et al. (2013).

AC: We are grateful to Referee 1 for reminding us of these two papers on the ENSO impact on the phytoplankton dynamics in the western Mediterranean Sea. Both articles will be mentioned and discussed in the revised version.

RC1: Figure 4. The graphs in this figure are too small for proper visualization. Please increase the size of the graphs.

AC: the revised version of our MS will include a larger and better resolved file of Figure

4.

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