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Biogeosciences Discussions

Interactive comment on "Short scale (6 h) temporal variation of sinking fluxes of planktonic and terrigeneous lipids at 200 m in the NW Mediterranean Sea" *by* L. Méjanelle and J. Dachs

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Answers to the review of the referee 1

The authors thank the referee for the comments which have contributed to improve significantly the manuscript.. The new version of the manuscript have been corrected to take the comments into account. Below we give our answer to the comments of the reviewer after partially quoting them.

-" However, it is still not fully clear to me which novel conclusions can be drawn from .... The importance of biomarker studies is not clearly demonstrated, as I mentioned in the first review on the initial paper."

Both reviewers question the additional values of molecular biomarker study, in particular with respect to pigment or lipid class investigations. One of the values of molecular biomarkers is the broader sources covered by the molecules: higher plants, oil pollution and haptophytes are novel targets with respect to the other approaches. Still, the point of studying biomarkers is not to complement only these information. Molecular biomarkers bring information in a very similar manner than do microscopic observations, pigment and lipid class analyses. Each type of indicator bears its own limitations. Sterols and pigments have multiple sources . The pitfall of microscopic studies is the difficulty to address all the phytoplanktonic community (nano and picoplankton, haptophytes are not determined in the DYNAPROC program). Therefore, microscopic observation, pigments, lipid classes, molecular biomarkers give information on the composition of the organic matter, clear and uncomplete in distinct ways. The strategy elected in DYNAPROC2 is to employ multiple proxies, so that they can bring complementary information. (Fortunately) the various approaches come to the same conclusions on a number of points, it may seem repetitive, but it also strengthens these points and validates the approaches. An advantage of lipid biomarkers is that lipids better survive degradation than pigments and can be registered in "old" organic matter, making possible to use them for palaeoproductivity and palaeoclimatic reconstructions. Still there is need to implement the number of proxies, and their significance. The discussion on the source of sterols with unknown specific sources is in this line of research. The new version states this objective more clearly in the introduction, lines 83-87, at the beginning of the discussion section 5.2, lines 380-385.

-" I suggested to use only particular biomakers (preferentially those providing a complete or almost complete record, not the ones shown in Figure 2)"

Accordingly, biomarkers specific of higher plants are shown on figure 3, biomarkers of haptophytes (alkenones in and brassicasterol on figure 4 and on figure 6), biomarkers of eustigmatophytes, dinoflagellates and diatoms (diols, dinosterol and 24-methylenecholesterol, respectively) on figure 6. The figure with C29 sterols have been

removed to supplementary material. . -“The fluxes of biomarkers clearly follow the fluxes of organic carbon and total mass (page 7693). So why biomarkers, what are the advantages? Which additional conclusions can be drawn from the biomarker investigations?”

At first sight, yes, biomarker fluxes follow organic carbon flux. However this trend is not absolutely true and their peaks have different relative intensities. This is shown on figure 4. The outcomes is that the ratio of organic carbon to biomarkers changes in short time and from one series to the other. A figure showing the evolution of OC-normalized concentrations was in the supplementary material in the previous version, it has been moved to the main section, changed to shown a shorter selection of “specific biomarkers” and we discussed more this issue in the new version, lines 529-539 and lines 550-557.

- "one important issue is the day-night variability in mass and biomarker fluxes which is discussed at page 7692 (chapter 4.3.).... trap recoveries. Please comment on that.”

The Figure 3, with the grey filling indicating night time, shows that a consequent maxima in biomarker fluxes occur during day time. The comment of the reviewer on collection offset has been added lines 494-495. Particles more likely integrates algae that have remained in the euphotic layer for a longer time than the 6 hours of collection, due to the low export ratio (lines 493-494).

-”for the description of the study area (now in results 3.1.), I suggest to make an extra chapter following the method section Âż

OK, it has been corrected accordingly.

-“ almost all figures are too small and contain a lot of information, which makes them difficult to read. The tables (e.g. Table 7) are almost unreadable too. Some figures are not fully explained, e.g. Fig. 1. What are the pink symbols, is the sampling site (red star) the time series site at DYFAMED?”

The figures have been changed, also in agreement to the comment of the other referee, figure 2 has been split. The plotted sterols have been selected to show only the specific ones, while C29 sterols are removed to Supplementary material. Figure has been changed and the legend improved according to the comment. The tables have been enlarged and split on two pages, so that the font is larger (font 10 points).

-“why is day-night grey-filling shown in Figures 5 and 6 but not given in Fig. 3.... Figure 3.”

They have been added to the revised figure.

-“as I mentioned above, some of the figures appear to contain to much information and.... 2 would benefit from a combination with Figure 3, which also shows a bulk parameter (besides three biomarkers). “

The lower panel of Figure 2 has been moved to a separated figure. Biomarkers specific of higher plants are shown on figure 4, biomarkers of haptophytes (alkenones in figures 3 and brassicasterol in figure 7), biomarkers of eustigmatophytes, dinoflagellates and diatoms (diols, dinosterol and 24-methylenecholesterol, respectively) on figure 7. Biomarkers of zooplankton and digestive oxidation (sterol, dehydrosterol, steroid ketones) are plotted on Figure 6. The figure with C29 sterols have been removed to supplementary material.

-“please refer more to the figures in the discussion section”. Corrected.

-“concerning trapping efficiencies (page 7693-7694), the authors mention some discrepancies (Schmidt et al., 2009). How much? Please give more detailed information.”

The values have been given and the paragraph describing the conclusions of Schmidt et al. have been increased (lines 457-464).

-“ page 7676 line 5: ? .... over a timescale of 4 h ?”

No, the sampling frequency of drifting sediment traps deployed during DYNAPROC 1

in May 1995 was really 4 hours.

-“page 7689, line 1: in addition, ...”

Corrected.

Interactive comment on Biogeosciences Discuss., 6, 7673, 2009.