

On the barium-oxygen consumption relationship in the Mediterranean Sea: implications for mesopelagic marine snow remineralization
Authors: Jacquet et al.

Response to Referee #1 – Second Round

Section 2.2. Sampling and Analyses.

- Line 134: Precise in which section you will discuss about the biogenic Ba fraction in more details. 'Section 3.1' instead of 'see below'.

Reply : Ok, modified.

- Lines 151-156: The method for measuring PHP is still not explained. It would make it a lot easier for the reader if it was briefly explained, even if it is the same method than in Tamburini et al. (2002).

Reply : according to co-authors who wrote this section, it is not necessary to further develop on the method. It is sufficiently summarized. Details can be found in Tamburini et al. (2002).

Section 3.1 Particulate Baxs vertical distribution

- Lines 163-164 and lines 169-170: Could you please mention that the main focus of this manuscript is on the mesopelagic layer and that having the biogenic Ba greater than 80% in this layer is essential for neglecting the lithogenic fraction here? As it is now, reading that the biogenic Ba range between 50 and 90% - or instead that the lithogenic fraction is up to 50% - still gives doubt on the Baxs estimation. Please, include in the text what you said in your replies.

Reply : ok, added.

Section 3.2 PHP

- Lines 195-198 (Figure 2b): I wonder how does the KEOPS2 correlation compare with a global correlation (ie, taking into account all data points, including KEOPS1, KEOPS2, ANTARES and PAP data)? Maybe you could use this global correlation instead of constraining to only KEOPS2? This would generalise your conclusions.

Reply : KEOPS1 is used as a reference. The aim is not to define a single correlation combining the different cruises but to compare different seasonal situations in a same sector and understand potential evolution. That is why it is non-sense to generalise a single correlation.

Section 3.4 Estimated particles remineralisation rates and implication

- Lines 253-259: It is not clear to what Ba fluxes correspond to. Are they downward export fluxes, Ba release fluxes? Why are the Ba fluxes in ANTARES so much lower than in DYFAMED or in the Alboran Sea?

Lines 260: Are the fluxes from Speicher et al. (2006) from the Mediterranean Sea as well? Please, precise the location and also the POC fluxes (give numbers).

Reply : mesopelagic remineralization (100-1000m) = difference between surface production (upper 100 m) and deep (below 1000) export. Differences could be due to the season stage and to the particles collection system used (bottles vs sediment traps) or type of calculation (Th-derived data, profile integration...). We already noticed in the ms. the associated method to fluxes reported.

- Lines 263-264: You say 'remineralisation rates in the Mediterranean Sea is far from being achieved' but what does it mean? Is it about the spatial resolution, the seasonal changes, the global understanding? What else has to be done?

Reply : Ok, explained. Inter-basins variability and season advancement are the main questions.