Dear editor,

We thank A.C. Martiny and the anonymous referee for their constructive comments on our manuscript. We answer point by point to each comment of the two referees. These comments are indicated in italic.

Answer to A.C. Martiny's comments

- *Is the data from this cruise publically available?*
  Data will be freely available in the coming months on the KEOPS2 website:
  http://www.obs-vlfr.fr/keops2/index.php?option=com_content&view=article&id=1&Itemid=3

- *Comments on Figures 1 and 8*
  We have corrected figures by mentioning in the legend all stations indicated on the map in Figure 1 and by adding header to each sub panel indicating the parameters in Figure 8.

- *Figure 13: Are these values the average ratios of sample pairs or is it the overall ratio integrated for the top 200m? As you are having some issues with detection limit for POC and PON, I would recommend that you only include pairs with reliable estimation of the concentration.*
  All our values correspond to sample pairs so we did not make any correction.

- *Figure 13: You should represent the geometric and not arithmetic mean in the box*
  We don't think that the representation of the geometric mean in the box is necessary. We consider that data from one site to another are independent. Furthermore, we did not find any significant difference between the values of the two means.

- *I wonder if there is a correlation between either chlorophyll or fucoxanthin concentration and the elemental ratios because they don't look constant to me (e.g., between high and low biomass regions)*.
  We did not find any correlation between chlorophyll (nor fucoxanthin) concentrations and the elemental ratios. It seems that elemental ratios are rather linked to phytoplankton community compositions, which are very different from one site to another. This point will be discussed in a future paper (in prep.) focused on the phytoplankton community composition during KEOPS2.

- *The discussion has a lot of re-hashing of results and could benefit from being condensed.*
  We agree that some results are mentioned several times but we need to re-hash them to emphasize successive aspects of the discussion or to discuss them in different ways. But, we made an effort to synthesize some points when they didn't add any constructive information to the discussion. We have removed one paragraph page 8282 from line 9 to 20.

- *P8286: I assume that the presence of empty frustules could be important too in increasing the Si:POC or Si:PON ratio. Are you able to evaluate this with your data?*
  Countings revealed that the numbers of empty cells were very low compared to living cells at the iron-fertilized stations, which could not explain such high Si:C/N/P ratios. We have added comments in the revised version P8286 line26-28 "The high Si:C and Si:N ratios observed at the iron-fertilized stations could be explained by a differential recycling of organic matter and biogenic silica, increased Si requirements by the dominant species and/or the presence of empty cells." and P8287 line 6 "Furthermore, countings revealed that the numbers of empty cells were very low compared to living cells at the iron-fertilized stations (Lasbleiz et al., in prep.), which could not explain such high Si:C/N/P ratios.".

- *P8290: I would be interesting in seeing a bit more analysis of the C:N ratio. In a recent paper (Martiny et al., 2013, GBC), we show that the C:N ratio is lower in high nutrient regions.*

Gleaning over your data, it seems that this could perhaps be the case around KP as well. It would also be interesting to see if any elemental ratios evolved over time. I would predict them to drop at A3. Overall, it would be nice to see if these broad predictions hold up in a local area.

We have already mentioned in the text the tendency to the decrease of the C/N ratio in nutrient–rich high latitude waters by comparison with warmer oligotrophic or upwelling areas, according to Martiny et al. (2013) (line 22-26 P8290). We present the evolution of elemental ratios in the part "Seasonal evolution of Si, C and N cycles at the southeast plateau bloom" but we did not discuss of C/N ratios at A3 in the late summer. In the new revised version we have added (line 9 P8292): "The C:N ratios of particulate matter were higher than in November, and increased with depth, ranging from 6.7 at the surface to 8.7 at 129 m (Trull et al., 2008). This was attributed to the increase of POC concentrations with depth, likely induced by settling of the increasingly senescent diatom bloom over the plateau (Mosseri et al., 2008; Trull et al., 2008)." As you predict, C/N ratios were higher at A3-2 later in the season.

Answer to comments of the Anonymous referee #2

- *P 8261 line 16-19: Except for EIFEX, as discussed later. Maybe write here "A major difference from MOST previous artificial..."*
  We have corrected this sentence: "A major difference from most previous artificial iron fertilization studies was the observation of much higher Si : C, Si : N, and Si : P ratios (respectively 0.31 ± 0.16, 1.6 ± 0.7 and 20.5 ± 7.9) in the iron-fertilized areas compared to the iron-limited reference station (respectively 0.13, 1.1, 5.8) ".

- *P 8262 line 16: I would mention the study by Smetacek et al 2012 in Nature here. Even though there are still considerable uncertainties, this longer term study showed for the first time that at least some parts of the iron induced bloom sank to the deep sea floor.*
  We have added a comment about the study by Smetacek et al. 2012: "All these studies confirmed that addition of Fe stimulated phytoplankton growth but only one postulated an enhanced C sequestration on the sea floor (Smetacek et al., 2012)."

- *P 8271 lines 3-6. From your description it sounds like the depth distribution of the chlorophyll concentrations are fairly similar over the transect. I think you should describe more clearly that this is not the case and that elevated chl concentrations only go down to about 80 m at station TNS 2 and down to about 180 m at station TNS 10, possibly due to changes in mixing depth over the transect I guess.*
  We have detailed the description of Chl *a* distribution along the TNS transect "At the beginning of the bloom, Chl *a* concentrations ranged from 0.5 to 1.5 mg m^{-3} in the upper 100 m from TNS3 to TNS6 and in the upper 180 m from TNS7 to TNS10 following the mixed layer depth (Fig. 3). North of the PF, Chl *a* concentrations were lower reaching 0.6 mg m^{-3} in the upper 60 m at TNS2 and 0.3 mg m^{-3} over 200 m depth at TNS1. TNS1 was very different from the rest of the transect with higher contributions of nanophytoplankton over 150 m (20 to 50 % contribution to total biomass depending on depth; Fig. 5)."

- *P 8273 line 23-25: Are you sure about this? To me it seems like this BSi maximum is only driven by one outlier at 250m depth at station TEW5 (or are there more datapoints and the dots are just not visible in the figure?). Sometimes Ocean Data View makes these things look much bigger than they are and one has to be careful not to over-interpret it, especially when the trend does not show up in other datasets like Chl and POC in this case. How would you explain higher BSi concentrations than POC concentrations which were obviously under the detection limit at this data point.*
  We don't think that the BSi maximum found at 300 m is an outlier considering the values at 250 m and 400 m depths. However, we cannot confirm this maximum with other parameters studied during the cruise. The fact that we observed high BSi concentrations with low

particulate organic matter was already explained in the discussion (P8281 line25-29, P8282 line1-8). We proposed three explanations : (1) Given the low Si biomass at the surface, the presence of large and non-living diatoms at depth could reflect the sedimentation of an early bloom that could have been quickly driven to an end due to adverse hydrodynamic conditions, as discussed above. A vertical net haul down to 100 m depth at TEW-5 revealed the dominance of the heavily silicified diatoms *Fragilariopsis kerguelensis* as well as *Corethron pennatum* (Armand L., pers. comm., 2013). However no sediment sample was collected at this station to evidence their eventual influence on vertical export. (2) Mesoscale activity could also have favored the transfer and the accumulation of biogenic silica at depth in the central meander area which is characterized as a region of general downwelling (Zhou et al., this volume). (3) Finally, the northward circulation from the KP could have advected large and non-living diatoms already sedimenting at depth coming from productive southern waters.

- *P 8274 line 24: It is confusing to talk about "stations" here when really you mean one station visited at different times. Maybe it would be easier for the reader if you would name it station Et1-5 or just add the date (station E visited on the. . .)*
  It is at the request of the editors of this special volume that this nomenclature is used. Therefore, we cannot change it.

- *P 8280 lines 11-16; P 8282 lines 1-2; P8283 line 18; P 8287 lines 19 and 26; P 8288 line6: Species names should be in italic*
  We have already put species names in italic, and they appear in italic in the online pdf. Maybe there has been a problem in the file you uploaded? We will make sure this stays in italic in the final stages of proof reading.

- *General comment about the discussion: I miss cross references to the figures. I would help to mention the respective figure when you discuss e.g. the Si:C ratios.*
  We have added references to the figures in the discussion for a better understanding.

- *P 8287 line 4: Change "pourcent" to "percent", P 8294 line 13: Change "eolian" to "aeolian"*
  Corrections have been made.

- *P 8320 Figure 11 Why did you chose these 4 stations, what makes then "typical"?*
  We chose these four stations because they represent typical vertical profiles of 4 stations types. We have already justified this choice in the text (P8274 line 5-17). We now have added comments in the figure caption: "Vertical profiles of BSi concentrations for two size fractions (> 20 µm in black and between 0.8 and 20 µm in grey) at TEW-4 (a), F-L (b), R2 (c) and TEW-5 (d). These four stations were chosen to illustrate the four typical vertical profiles observed over the study area: TEW-4 represents typical profile of the stations A3-2 and E (from E-1 to E-5), F-L represents typical profile of stations E-4W and those located in the PFZ, R2 represents typical profile of the low productive stations (R2, TNS-1, TNS-2, TEW-2, TEW-3, TEW-5 and TEW-6) and TEW-5 is the only station showing such a vertical profile."

- *P 8321 Figure 12 Why was there no size fractionation at some stations/times? At least mention this in the figure caption.*
  At some stations, size-fractionation was not performed because of logistical problems on board. We have mentioned it in the figure caption.

- *P 8324 figure caption figure 15: It should be "< 0.8µm" not "> 0.8µm"*
  In Figure 15, there is no mistake about the sign: 0.8 µm filter allows to collect the BSi fraction superior to 0.8 µm.