Referee comment by Damien Cardinal

We first thank Damien Cardinal for his constructive remarks and hope that we have now sufficiently improved the manuscript for publication.

1. Results

We tried to make the results section more concise. First nutrients were described for PPROSOPE whereas we refer to Pujo-pay et al., this issue, for the BOUM cruise (P6797 Line 27).

All results concerning LSi have been deleted as we never refer to in the discussion

2. Discussion

Part concerning DSM in the World ocean at the end of section 4.2. was shortened by removing the mechanisms of DSM formation worldwide. We just recalled their existence P6806 line 14 : "Nonetheless, the DSM is a feature that has been observed in several other oceanic systems worldwide in recent years, in the oligotrophic environment of the Sargasso Sea (Brzezinski and Kosman; 1996, Krause et al., 2009a) and gyres of the Equatorial and Central North Pacific (Blain et al., 1997; Brzezinski et al., 1998; Scharek et al., 1999, Dore et al., 2008). This feature has also been recurrently observed in the Southern Ocean but with often much higher biogenic silica concentrations (Quéguiner, 2001; Leblanc et al., 2002; Quéguiner and Brzezinski, 2002; Beucher et al., 2004; Mosseri et al., 2008).

The beginning of the section 3 was synthesized, we removed the long enumeration concerning the mechanisms of DCM formation.

P6807 line 7 : "The DCM is a well known structure in the ocean, ubiquitous in stratified oligotrophic areas and notably in the entire Mediterranean Sea (Berman et al., 1984; Estrada, 1985; Estrada

et al., 1993; Ediger and Yilmaz, 1996; Abdel-Moati, 1990; Tselepides et al., 2000; Herut et al., 2000). The DCM formation depends on the equilibrium between phytoplankton accumulation mechanisms (physical gradient, physiological adaptation to light limitation, local growth at nutricline depth) and dispersion processes such as sinking, advection, or grazing. If the DCM is sustained for several weeks or months it implies that gain terms (local growth or accumulation from passive sinking at the pycnocline) are balanced with loss terms (grazing and sinking out of the euphotic layer) as described in detail by Parslow et al. (2001) for the Southern Ocean.

In section 4.4., the description of correlation between deep maxima were removed.

P6808 lines 24-29 and P6809 lines 1-3 removed.

The review of the Si cylce in the Mediterranean Sea (section 4.6.) was removed

3. Figures

By referring to Pujo-pay et al., this sissue, for the description of nitrate and phosphate distribution during the BOUM cruise, we removed the ODV sections 4b and 4c.

All figure concerning LSi (Fig. 11, Fig. 13) and table referring to the Si review (Table 1 and 2) were also thrown.

4. References

We updated or bibliography considering previous modifications.

Work by Pujo-pay et al., Tanaka et al., exposed in the special issue were also cited in this paper. (P6804 lines 10 and 25).

“The phosphacline was generally deeper than the nitracline and silicicline in particular in the eastern basin, which induced a general P limitation in the Ionian and Levantine basins (Pujo-Pay et al., this issue).”

“If nitrogen and phosphorus are usually considered as limiting in the Mediterranean Sea, silicon has been considered for a long time abundant in the euphotic zone (Jacques and Tréguer, 1986; Krom et al., 1993, Tanaka et al., this issue) …”

We now have 98 references

5. Minor/Technicals comment

The accuracy of the method for orthosilicic acid measurment is

“Silicacline” was replaced by “Silicicline” (p6796 line 18, P6797 line 20, P6804 line 8)

P6799 line 11. “Fig 7c” is replaced by “6c”.

P6799 line 20, “Fig 9” was replace by “8”.

P6804 line 14, “Fig. 14a and 16a” was replaced by “Fig. 12a and 13a”

P6804 line 29, “Fig. 14b and 16b” was replaced by “Fig. 12b and 13b”.

In the method section, we detailed the cell counting and identification :

“2.3. Phytoplankton cell counts

From each Niskin bottle, 0.5 L seawater were immediately fixed by adding Lugol solution and stored at 4 ºC in the dark until analysis. In the laboratory, subsamples of 50-100 ml were allowed to settle (48 hours) in composite chambers. The cells were identified and counted by using an inverted microscope followint the Utermöhl method (Utermöhl, 1931).”

However the result and information provided were still provided in the discussion in order to emphasize the growth occuring in the deep maxima

Here is the new figure legend:

Figure 1. Cruise tracks and sampling sites during the PROSOPE cruise in late summer/fall 1999 (red dots) and during the BOUM cruises in summer 2008 (blue dots).

Figure 2. Nutrient distributions (μM) along the transect 1 during PROSOPE the cruise (summer/fall 1999).

Figure 3. Nutrient distributions (μM) along the transect 2 during PROSOPE the cruise (summer/fall 1999).

Figure 4. Orthosilicic acid distribution (μM) during the BOUM cruise (late summer 2008).

Figure 5. Distribution of biogenic Silica (BSi) (μmol L^{-1}), fucoxanthin (Fuco) (μg L^{-1}) and total chlorophyll a (TChl *a*) (μg L^{-1}) along transect 1 during the PROSOPE cruise (summer/fall 1999).

Figure 6. Distribution of biogenic silica (BSi) (μmol L^{-1}), fucoxanthin (Fuco) (μg L^{-1}) and total chlorophyll a (TChl *a*) (μg L^{-1}) along transect 2 during the PROSOPE cruise (summer/fall 1999).

Figure 7. A. Distribution of particulate organic carbon (POC) (μmol L^{-1}), with BSi concentrations (μmol L^{-1}) isopleths as overlays in white and B. BSi:POC ratios (mol:mol) along transect 1 during the PROSOPE cruise (summer/fall 1999).

Figure 8. A. Distribution of particulate organic carbon (POC) (μmol L^{-1}), with BSi concentrations (μmol L^{-1}) isopleths as overlays in white and B. BSi:POC ratios (mol:mol) along transect 2 during the PROSOPE cruise (summer/fall 1999).

Figure 9. A. Distribution of biogenic silica (BSi) (μmol L^{-1}), B. fucoxanthin (Fuco) (μg L^{-1}) and C. total chlorophyll a (TChl *a*) (μg L^{-1}) during the BOUM cruise (summer 2008).

Figure 10. A. Distribution of particulate organic carbon (POC) (μmol L^{-1}), with BSi concentrations (μmol L^{-1}) isopleths as overlays in white and B. BSi:POC ratios (mol:mol) along the BOUM cruise (summer 2008).

Figure 11. Integrated biogenic silica stocks (mmol m^{-2}) over 0-150 m (with exceptions indicated by a red star) for the PROSOPE cruise (A) and the BOUM cruise (B) along a west-east gradient. Inte-

gration depths at PROSOPE stations 1 and 2 were 100 and 110 m respectively and are signified by a red star. Integration depths at BOUM stations 17 and 27 were 118 and 100 m respectively.

Figure 12. Integrated N:P (A) and Si:N (B) ratios (mol:mol) over 0-150 m for the PROSOPE cruise along a west-east gradient. Integration made under 150 m is signified by the red star. Integration at stations 1 and 2 was made on 100 and 110 m respectively.

Figure 13. Integrated N:P (A) and Si:N (B) ratios (mol:mol) over 0-150 m for the BOUM cruise along a west-east gradient. Integration made under 150 m is signified by the red star. Integration was made on 118 m for station 17 and 100 m for station 27.