Anonymous Referee #1

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

**1. The authors explain vertical distributions of some biological parameters (such as BSi, Chl a, Fuco) and discuss the potential formation mechanisms, but they don't mention the basic hydrological conditions, for example how about the light distribution, which are very important for the distributions of DSM, DCM . . . . . . ?**

In this study, we do not talk about light penetration because we do have measurements only for few stations during BOUM. For the two cruise, we observe the formation of those deep maxima, in late summer/early autumn 1999 and summer 2008, suggesting that despite different light conditions deep maxima are found. On the other hand, it is well-known those deep maxima release on the equilibrium between light and nutrients availabilities and are often found at the basis of the euphotic zone, where light penetration is about 1% (Cullen et al., 1981; 1982; Letelier et al., 2004). To check this, we recalucated the depth of the euphotic zone Zeu from Chla vertical profiles. This approach is based on a bio-optical model for light propagation designed by Morel and Maritorena (2001) where Zeu is calculated from Chla and Kd (downward irradiance). The depth of the euphotic zone will be integrated to the ODV section relative to the particulate matter distributions (Fig 5-9)

Cullen, J. J., and Eppley, R. W.: Chlorophyll maximum layers in the southern california bight and possible mechanisms of their formation, Oceanol. Acta, 4, 23-32, 1981.

Cullen, J. J.: The deep chlorophyll maximum: Comparing vertical profiles of chlorophyll a Canadian Journal of Fisheries and Aquatic Sciences, 39, 791-803, 1982.

Morel, A., Maritorena, S., Bio-optical properties of oceanic waters: A reappraisal, J. Geophys. Res., 106, C4, 7163–7180, 2001.

Letelier, R. M., Karl D. M., Abott M. R., Bidigare R. R., Light driven seasonal patterns of chlorophyll and nitrate in the lower euphotic zone of the North Pacific Subtropical Gyre, Limnol. Oceanogr., 49(2), 508–519, 2004

**2. As for orthosilicic acid ($H_4SiO_4$), seawater was filtered onto 0.2 µm polycarbonate**

**filters, and for particulate biogenic and lithogenic silica (BSi and LSi) analyses, seawater was filtered onto 47mm 0.6 µm pore size polycarbonate filters.**
**How about the middle part between 0.2 µm to 0.6 µm pore size? They are not important for the study of the availability of dissolved Si and siliceous phytoplankton distribution patterns?**

Orthosilicic acid samples were filtered onto 0.2 µm and stored at 4°C to stop all further bacterial mineralization of particulate matter and prevent biogenic silica dissolution, both processes leading to increased orthosilicic acid concentrations. Siliceous phytoplankton (diatoms and silicoflagellates) and zooplankton (radiolarians) cells however are always superior to the 2 µm fraction, so filtering BSi onto 0.6 µm is usually considered appropriate and allows quicker filtration of large volumes (up to 2L) than using 0.2 µm filters which tend to clog rapidly. The use of these two type of filters is common in most studies concerning the silicon cycle.

**3. Some confused presentation: in 1999 during late summer-early autumn (4 September to 4 October); during fall 1999; during summer, from May to September**

P6790 Line 1 “fall” replaced by late summer/early autumn1999.
P6792 Line 5, “summer”, replaced by late spring/summer
P6801 Line 25 “fall”, replaced by late summer/early autumn 1999

**4. Are the water samples of nitrate and phosphate filtered?**

P6794 Line 23. insertion of the following text: “Nitrate ($NO_3$) and phosphate ($PO_4$) were determined with standard automated colorimetric method on a Bran&Luebbe Technicon autoanalyzer (Tréguer and Le Corre, 1975) without filtration (nutrients analysis detailed in Pujo-pay et al., this issue).”

**5. POC was determined using the wet oxydation procedure for the PROSOPE samples, and on an elemental CHN analyser Perkin Elmer 2400 for the BOUM samples.**
**The results from these two different methods are consistent?**

Yes, direct comparisons between CHN and wet oxidizing techniques were assessed by Raimbault et al (1999) and by Sharp et al. (2004) who both demonstrated the consistency of results obtained using these two methods.

-Raimbault, P., Diaz, F., Pouvesle, W., and Boudjellal, B.: Simultaneous determination of particulate organic carbon, nitrogen and phosphorus collected on filters, using a semi-automatic wet-oxidation method, Mar. Ecol. Prog. Ser., 180, 289-295, 10.3354/meps180289, 1999.
-Sharp, J. H., Beauregard, A. Y., Burdige, D., Cauwet, G., Curless, S. E., Lauck, R., Nagel, K., Ogawa, H., Parker, A. E., Primm, O., Pujo-Pay, M., Savidge, W. B., Seitzinger, S., Spyres, G., and Styles, R.: A direct instrument comparison for measurement of total dissolved nitrogen in seawater, Mar. Chem., 84, 181-193, 2004.

**6. Please explain in detail why the maximum of Fuco did not match BSi increase?**

Fucoxanthin is not exclusively found in diatoms but can also be found in prymnesiophycea and chrysophycea.
6799 Line6 insertion of the following text: “. This discrepancy could be related to the presence of other non-siliceous algae containing fucoxanthin such as prymnesiophycea or chrysophycea

7**. The western basin of the MS is ever indicated to be station 27 to 17. How about the eastern basin for the two cruises and the western basin for the PROSOPE cruise?**

For clarity, we added P6794 line 4: “Seawater samples were collected during two cruises conducted in the western and eastern basins separated by the Sicily Strait (Fig. 1).”
Hence from Figure 1, the locations of all stations in the western or eastern basin can be deduced from this statement. For the BOUM cruise, the western basin comprises stations 17 to 27, and the eastern basin stations18 to site C. For the PROSOPE cruise, stations 1, 2, 3, 4, 8, 9 and DYF are

located in the western basin; while stations 5, 6, 7 and MIO are in the eastern basin.

**8. Please indicate all the important names mentioned in the manuscript. For example, I am not familiar with the MS and don't know where the Tunisian continental shelf is?**

P6791 Line 18. MS is introduced for Mediterranean Sea.
P6804 Line 28 insertion of "across the Sicily strait".

**9. If the P deficit is more intense than the N deficit, why assess the Si deficiency only based on the Si:N ratio?**

In surface waters, P deficiency was extremely strong and accurate P determinations become difficult. Hence, the Si:N ratio seems more accurate to assess the Si deficit when P is closer to the detection limit. Si:N=1 also refers to the "Brzezinski ratio", which is an empirical measurement of Si:N optimal uptake ratios by diatoms (P6804 line 29, P6805 line 1). Deviation from 1 is commonly used in publications as a markor for Si depletion.

**10. How to assess the oligotrophic degree in the MS? Why the authors mentioned that late summer/fall is the highest oligotrophic degree, monthly results are compared?**

As any other oceanic system, olygotrophy in the MS is characterised by the balance between nutrients inputs/availability and ecosystem productivity. Many studies demonstrated that both basins of the Mediterranean sea were nutrients depleted during an important part of the year. For the productivity, Moutin and Raimbault (2002) measured during the MINOS cruise in early summer a very low integrated primary productivity, among the world's lowest.

P6791 line 18: « The Mediterranean Sea (MS) is one of the most oligotrophic oceanic systems of the World Ocean (Ryan, 1966; Dugdale, 1976) and is characterised by a longitudinal gradi- ent of oligotrophy increasing eastwards (Azov, 1991) and a near complete P depletion20 in the stratified layer during summer and fall, comparable to that obser ved in open ocean oligotrophic gyres. »

Then, the use of satellite analysis and ocean color allowed scientist to understand phtypolankton dynamics and trophic regime of the Mediterranean sea. Many studies demonstrated that summer xas the most oligotrophic period in the MS with lowest biomass values. (Morel and André, 1991; Antoine et al., 1995; Bosc et al., 2004, D'ortenzio and Ribera d'Alcala, 2009). This is mentionned in the introduction (p6791 line 29).

Finally, the strong oligotrophy occuring during the stratification period in the Mediterranean sea is described in the introduction (P6792 line 1-18).

Moutin, T., and Raimbault, P.: Primary production, carbon export and nutrients availability in western and eastern mediterranean sea in early summer 1996 (minos cruise), J. Mar. Sys., 33-34, 273-288, 2002.

Morel, A. and André, J. M.: Pigment distribution and primary production in the western Mediterranean as derived from CZCS observations, J. Geophys. Res., 96, 12685-12691, 1991.

Antoine, D., Morel, A., and Andr´e, J. M.: Algal pigment distribution and primary production in the eastern Mediterranean as derived from CZCS observations, J. Geophys. Res., 100, 16193– 16210, 1995.

Bosc, E., Bricaud, A., and Antoine, D.: Seasonal and interannual variability in algal biomass and primary production in the Mediterranean Sea, as derived from four years of Sea-WiFS observations, Glob. Biogeochem. Cy., 18, GB1005, doi:10.1029/2003GB002034, 2004.

D'Ortenzio, F., and Ribera d'Alcala, M.: On the trophic regimes of the mediterranean sea: A satellite analysis, Biogeosciences, 6, 139-148, 2009.