

Interactive  
Comment

## ***Interactive comment on “Ultraplankton distribution and upper ocean dynamics in the eastern Mediterranean during winter” by M. Denis et al.***

**M. Denis et al.**

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Referee 1

General comments The referee is asking if a mechanistic relationship can be established between environmental variables and ultraplankton. Though the study was conducted at the basin scale, the density of the sampling should be far larger and above all, involve time series with appropriate frequency to be able to derive potential mechanisms. For instance, we could observe the response of phytoplankton distribution to wind events by automated in situ flow cytometry run at high frequency (every 30 min; Thyssen M., Mathieu D., Garcia N., Denis M. (2008) Short-term variation of phy-

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toplankton assemblages in Mediterranean coastal waters recorded with an automated submerged flow cytometer. *Journal of Plankton Research* 30: 1027-1040). The referee highly recommends that nutrient data were also considered in the study (figures were joined). We have added the distribution of nitrate, phosphate and silicate and provided evidence of regressions between them and salinity and density below 50 m. There is no correlation between nutrients and pico- or nanoeukaryotes above 50 m. The identification of the eastern Mediterranean Sea as ultraoligotrophic is not derived from our study but from previously published work.

**Specific comments** Introduction Corrections were made as indicated Materials and methods The flow rate has been added for the sample and sheath fluid. The analysis time would require more technical details since the fluidic is controlled by syringes driven by stepping motors. Analysis time is thus different from the acquisition time. The relationship of Verity et al. needs the bio-volume of the cells. We estimated a mean equivalent cell diameter for the clusters from the mean forward scatter signal compare to that of the beads. This is rough estimate but remains realistic. The C/Chl a ratio may vary over a large range depending on several factors, even considering a defined geographic area or a given period of the year. The origin of the reference is therefore of less importance.

**Results** Nutrient data were added to the result section. Correlation changed to regression

**Discussion** Pg 6862 l. 1: “species” changed to “group” Pg 6862 l. 27-29: the sentence was transferred to the Materials and Methods section Pg 6863 : for sure, light, nutrients and temperature are at the root of phytoplankton development. This does not prevent other factors to affect its distribution and in the present study we show that hydrodynamism plays such a role. It is important to note that the correlations established between the studied hydrodynamic features and phytoplankton distribution are effective from 50 to more than 120 m depth, and not at surface, where light nutrients and temperature are expected to have their strongest impact on phytoplankton distri-

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bution.. We must also point out that a hydrodynamic structure such as a thermohaline front involves temperature and therefore its impact on phytoplankton distribution might not be fully indirect.

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Interactive comment on Biogeosciences Discuss., 6, 6839, 2009.

**BGD**

6, C3614–C3619, 2009

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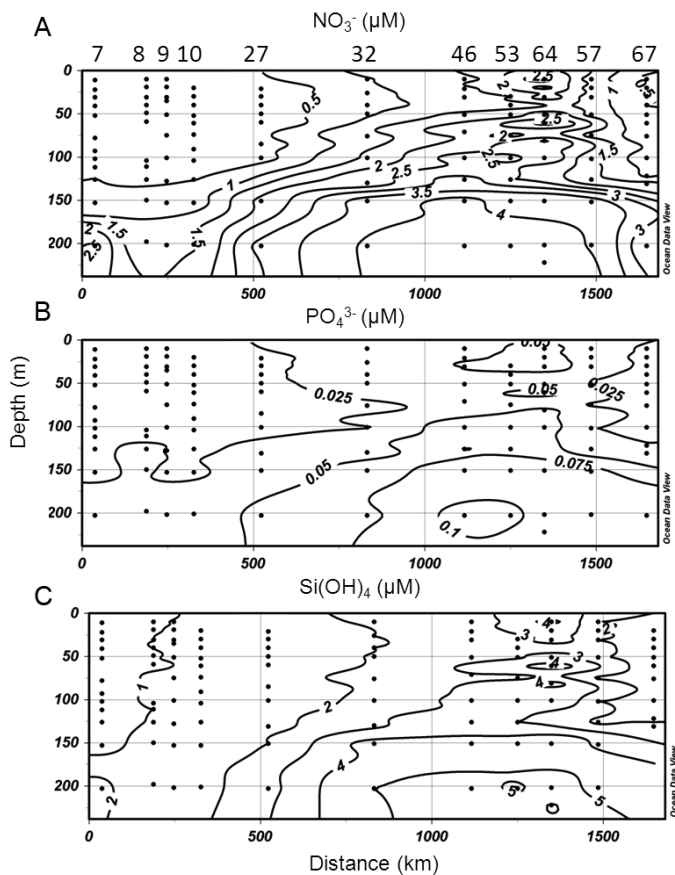
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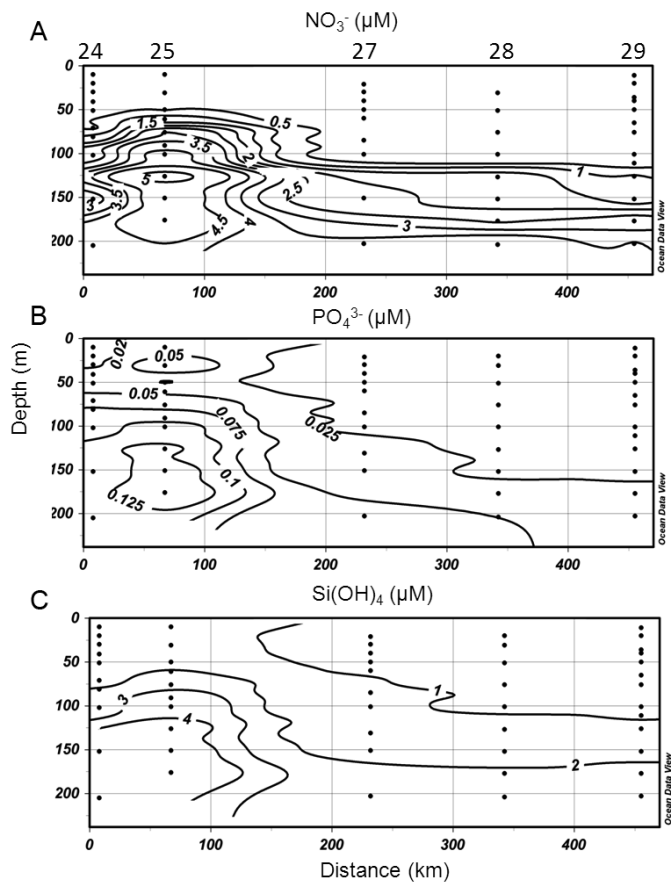
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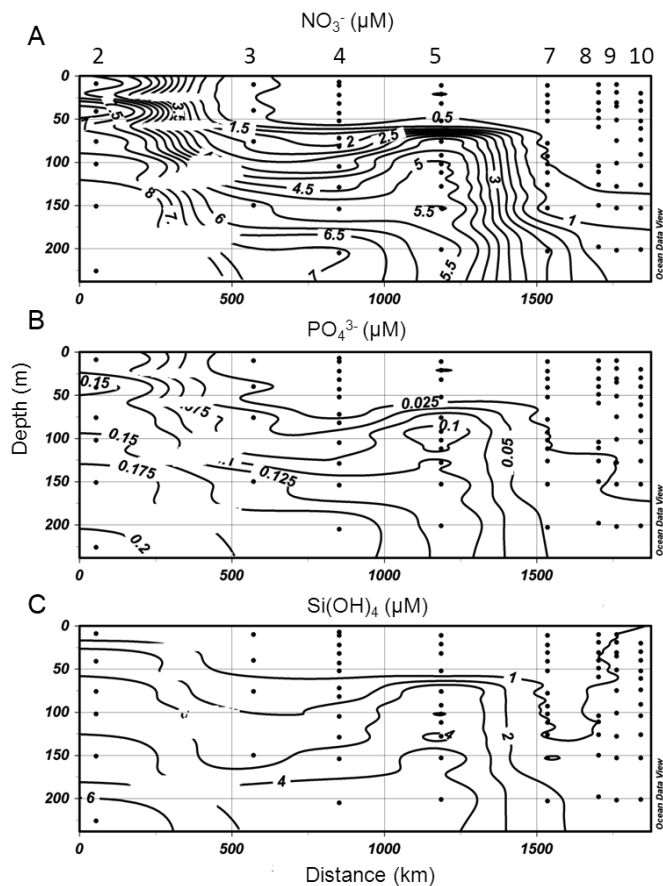




**Fig. 1.** Vertical distribution of (a) nitrate ( $\text{NO}_3^-$ ), (b) phosphate ( $\text{PO}_4^{3-}$ ) and (c) Silicate ( $\text{Si(OH)}_4$ ) down to 200 m along the cross section through the eastern Mediterranean Sea (similar to Fig. 4)



**Fig. 2.** Vertical distribution of (a) nitrate ( $\text{NO}_3^-$ ), (b) phosphate ( $\text{PO}_4^{3-}$ ) and (c) Silicate ( $\text{Si(OH)}_4$ ) down to 200 m along the north-south transect defined by stations 24 to 29.



**Fig. 3.** Vertical distribution of (a) nitrate ( $\text{NO}_3^-$ ), (b) phosphate ( $\text{PO}_4^{3-}$ ) and (c) Silicate ( $\text{Si(OH)}_4$ ) down to 200 m across the western Mediterranean Sea and the western part of the Ionian Sea.