

## ***Interactive comment on “Silicate:nitrate ratios of upwelled waters control the phytoplankton community sustained by mesoscale eddies in sub-tropical North Atlantic and Pacific” by T. S. Bibby and C. M. Moore***

**Anonymous Referee #2**

Received and published: 14 December 2010

General comments:

In this manuscript Bibby and Moore discuss factors leading to the development of different communities in cyclonic and Mode Water eddies in the Sargasso Sea (NASG and MWE, respectively) and cyclonic eddies in the North Pacific Subtropical Gyre (NPSG). Differences in community composition of the phytoplankton have been observed during previous studies with higher diatom abundances in NPSG and MWE eddies. In this manuscript the authors propose that the availability of silicic acid might explain those differences. The paper is well written and the overall arguments are presented in a

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convincing manner. My main concern with the author's argument is the use  $Si^*$  as a proxy for lower silicic acid (Si) availability in NASG eddies as compared to MWE and NPSG: from their figure 3 it seems that cyclonic eddies in the NASG should actually provide more Si to the DCM than in MWE and in the NPSG even though  $Si^*$  is lower. The higher  $Si^*$  at the DCM would therefore be the result of higher nitrate uptake in the NASG than in the MWE or NPSG eddies and not necessarily the result of lower Si uptake. Also to clear up this point it would be helpful if the authors present also the silicic acid concentrations in their figure 1.

A second drawback of the paper, related to the previous comment is that no attempt is made to quantify the supply rates of Si vs.  $NO_3$  to the DCM. This would also help clarify if silicic acid supply and uptake in the DCM is indeed lower in NASG eddies. From the gradients in figure 3, I would expect higher Si supply in NASG eddies than in MWE (the data from the NPSG would also be useful here) and overall higher nitrate than Si supply in all eddies.

Additional comments:

p. 7512, line 23: “The distribution of chlorophyll throughout each feature was dominated by a DCM. ...”. I am not sure the DCM is such a dominant feature in the NPSG eddy. From the figure it seems that most of the biomass appears to be in the upper water column. Are there differences in assemblage composition at the surface and in the area of peak biomass in the center of the eddy?

p.7516. The authors argue again that  $Si^*$  determines diatom growth. What is the evidence that  $Si^*$  is “sensed” by diatoms preventing their growth at low values? Diatoms take up silicic acid not  $Si^*$ . One might have low  $Si^*$  and still enough silicic acid for diatoms to grow. Actually the low Si concentrations north of the Polar Front in the Southern Ocean but also in surface waters of the NASG are proof that diatoms can take up all Si in waters where nitrate exceeds (low  $Si^*$ ) Si concentrations.