

## ***Interactive comment on “Biogeochemical controls on the bacterial population in the eastern Atlantic Ocean” by S. B. Neogi et al.***

**Anonymous Referee #1**

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**GENERAL COMMENTS:** This paper provides abundance measurements of total, cultivable, and *Vibrio* spp. Bacteria in ocean waters across a large latitudinal gradient in the Atlantic Ocean. Effort is made to provide correlations of bacterial abundances with the *in situ* physical and biogeochemical fields, e.g. temperature, particulate organic matter (POM), dissolved organic matter (DOM), dissolved nutrients, etc. Although the finding that bacterial abundances correlate positively with temperature is not new, the positive correlation found between *Vibrio* spp. and dissolved organic carbon and nitrogen (DOC, DON) in open ocean surface waters, and the lack of a correlation with POM, represents an advance with regards to the ecological niche and survival of *Vibrio* spp. in the nutrient-poor, oligotrophic ocean.

In general the use of the English language is satisfactory and the structure of the paper

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is congruent, however a few statements are unclear and certain measurements presented in the methods and results sections lack sufficient justification of their inclusion in the introduction and discussion sections. In addition, the authors fail to acknowledge a likely cause of the large scale variability observed in their study, that is the offshore export of organic material by the numerous upwelling filaments affecting the study region, which I draw their attention to below. The role of the upwelling filaments in delivering “fresh” organic material and its relation to the biogeochemical and bacterial variability observed in this study needs to be developed further. The paper is not ready for publication in its current form and needs further revisions pertaining to the unclear statements, omitted justifications, and causative explanations of the observed variability.

**SPECIFIC COMMENTS:** Further justification is needed for why the cultivable population and specifically the *Vibrio* spp. were targeted for this study encompassing the open ocean. It remains unclear if the finding that *Vibrio* positively correlates with DOM holds for other more quantitatively important Bacteria members found in open ocean environments such as the alphaproteobacteria. Does the total bacterial population (represented by DAPI counts) positively correlate with DOM? This can be addressed with this dataset and should be included with a plot in Figure 4.

Why were measurements of presumptive enterobacteriaceae included in the methods and results sections? No discussion of enterobacteriaceae was provided in the Introduction and a justification of its inclusion in this study is lacking.

The far eastern sector of the North Atlantic is affected by cross-shelf export of recently fixed organic matter to the offshore ocean environment via the numerous upwelling filaments that extend from the west coasts of the Iberian peninsula and African continent along  $\sim 15\text{--}45^\circ\text{N}$ . These filaments can extend up to 1000 km offshore and carry elevated concentrations of DOM and POM in the surface waters. The transit times within the filaments to the offshore system is rapid and it is likely that the elevated concentrations of DOM and bacterial abundance including *Vibrio* that the authors find in

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the offshore stations could be explained by entrainment of filament waters into those sampled in this study. It would be possible to assess the degree of impact of the filament waters on the sampled stations using the available measurements of temperature, salinity, chlorophyll, and/or satellite observations of ocean color at the time of sample collection. The overall significance that the entrainment of upwelling filaments waters has on the observed biogeochemical and bacterial variability needs to be assessed. For a description of the physical nature of these upwelling filaments I refer the authors to Barton et al., 1998, 2004; Knoll et al., 2002 and for description of biogeochemical dynamics within the filaments to Gabric et al., 1993; Arístegui et al., 2004; García-Muñoz et al., 2004; Álvarez-Salgado et al., 2007; and Alonso-González et al., 2009 among others.

Pg. 7804, lines 5-22. The cruise track crossed a large gradient in biogeochemical gradients from temperate to oligotrophic to eutrophic systems. Taking an average of nutrient concentrations found in surface waters across this productivity gradient in order to describe the average nutrient regime across the whole study area is misleading. It would serve the reader better to provide a range of nutrient concentrations found in the surface waters of each biogeochemical regime instead of averaged data.

The data presented in Figure 5 are ill-served by a box and whiskers plot. I suggest removal of the boxes and replace with a line graph, leaving the standard deviation bars. Also, depth should be moved to the y-axis, oriented so that the surface is at the top of the plot with increasing depth moving towards the bottom of the plot. The current presentation is confusing to the reader.

#### TECHNICAL COMMENTS:

Pg. 7794, line 27. Statement beginning with “In a recent study...”, this statement is unclear as to meaning; verb tense incorrect.

Pg. 7800, line 14. “The N/P ratio of DIN was mostly below...”, this statement is missing a mention of dissolved inorganic phosphorus (DIP) or soluble reactive phosphorus

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(SRP) so that it reads, “The N/P ratio of DIN to DIP was mostly...”.

Throughout the text, special characters such as  $\pm$ ,  $>$ ,  $<$ ,  $^\circ$ , are missing from the current PDF.

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