

Interactive comment on “Role of environmental factors for the vertical distribution (0–1000 m) of marine bacterial communities in the NW Mediterranean Sea” by J. F. Ghiglione et al.

J. F. Ghiglione et al.

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Answer to U. Stingl (Referee)

Answers to the referee are reported point by point. Changes in the text are located by the number of the corresponding line in the original manuscript.

While we think that the reviewer is right in that other studies analyze microbial community profiles using multivariate statistical methods, our study is unique because we analyze a very complex biogeochemical dataset (i.e. here the number of environmental parameters of our study) using direct rather than indirect multivariate gradient analysis. The difference is that the first gives an ordination with an optimal environmental basis showing only those patterns in the species data that can be explained by the available

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environmental data (being the ordination axes aggregates of the environmental variables that best explain the species data). In order to best explain this in our manuscript we propose the following changes: -We propose to remove the last sentence of the abstract (page 2133, lines 24-26: “This study is probably the first example of an analysis employing a complex environmental dataset in combination with microbial community profiles to unravel the mechanisms underneath bacterial assemblages in marine systems.”) that may overestimate the originality of our study compared to the existing literature. -We also propose the following modifications throughout the manuscript: Page 2133, line 4: Here we show the explanatory power of multivariate statistical analysis” will be changed into “Here we use the explanatory power of direct multivariate gradient analysis”. Page 2149, lines 5-7: the sentence “To our knowledge, however, no studies have demonstrated the direct influence of environmental parameters on the bacterial community structure of natural environmental gradients” will be removed because it is confusing as the "direct" gets lost in this context. Page 2151, line 15: “Our study is perhaps the first example of such complex biogeochemical dataset” will be changed into “Our study propose a complex biogeochemical dataset”

We already acknowledge in the original manuscript that other studies are already published using direct gradient analysis in several environments (see page 2148, lines 11-13: “from marine (Cordova-Kreylos et al., 2006; Klaus et al., 2007; Sapp et al., 2007), lake (Yannarell and Triplett, 2005) and soil (Salles et al., 2004) systems”). As proposed by referee #4, reference to Hannig et al. (2006) will be added in the manuscript (page 2148, line 11) and in the reference section (Hannig, M., Braker, G., Dippner, J., and Jürgens, K. Linking denitrifier community structure and prevalent biogeochemical parameters in the pelagial of the central Baltic Proper (Baltic Sea), *FEMS Microbiol. Ecol.*, 57, 260-271, 2006).

The referee proposes to add the reference of Roeling et al. (2001) and Edlund et al. (2006, 2008). These two studies are using indirect multivariate analysis, which is different for direct multivariate analysis. A recent review (Ramette, 2007) underlines

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that hypothesis-driven technique such as redundancy analysis, canonical correspondence analysis (CCA), or Mantel tests are rarely used by microbial ecologist, despite the fact that high-throughput molecular technologies are now available at the field. We propose to clarify this point by adding the following sentences: Page 2134, line 21: “Although indirect gradient multivariate statistical analyses have been used to link microbial community profiling to environmental parameters (Roeling et al., 2001; Edlund et al., 2006), the use of direct gradient analyses like CCA in combination with high-throughput molecular technologies is scarce in spite of the power of this method for this purpose (Ramette, 2007; Rooney-Varga et al, 2005).”

Page 2149, line 7: “Our results are consistent with Fuhrman et al. (2006) that reported high predictability and significant influence of physico-chemical parameters (temperature, oxygen, salinity, dissolved nitrite and dissolved silicate) in annually reoccurring surface marine bacterial communities. The originality of the present study is to unravel such question in spatial (0-1000 m depth) gradients and we demonstrate that physico-chemical parameters are acting in synergy with nearly equal contribution to the bacterial vertical stratification.”

References to be added in the revised version of the manuscript: Edlund, A., Soule, T., Sjöling, S., and Jansson J.K. Microbial community structure in polluted Baltic Sea sediments, *Environ. Microbiol.*, 8,223-232, 2006.

Fuhrman, J.A., Hewson, I., Schwalbach, M.S., Steele, J.A., Brown, M.V., and Naeem, S.: Annually reoccurring bacterial communities are predictable from ocean conditions, *Proc. Natl. Acad. Sci., USA*, 103, 13104-13109, 2006.

Röling, W.F.M., Breukelen, B.M., Braster, M., Lin, B., Verseveld, H.W.: Relationships between microbial community structure and hydrochemistry in a landfill leachate-polluted aquifer, *Appl. Env. Microbiol.*, 67, 4619-4629 , 2001.

Rooney-Varga, J.N., Giewat, M.W., Savin, M.C., LeGresley, M., and Martin, J.L. Links between phytoplankton and bacterial community dynamics in a coastal marine envi-

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ronment. Microb. Ecol., 49, 163-175, 2005.

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