

Interactive comment on “Response of heterotrophic and autotrophic microbial plankton to inorganic and organic inputs along a latitudinal transect in the Atlantic Ocean” by S. Martínez-García et al.

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Response to referee 2

Specific comments:

We are grateful for the comments made by referee 2. We agree with referee 1 and 2 that we placed too much emphasis on atmospheric deposition in our previous version so we have deleted a great part of the introduction referred to it (see response to C635

referee 1). We have also deleted one introductory sentence in the abstract.

We now clearly explain the nutrient amendments performed both in the abstract (“We studied the effects of potentially limiting inorganic (nitrate, ammonium, phosphate, silica) and organic nutrient (glucose, aminoacids) inputs added separately as well as jointly”) and in the introduction (“Specifically, we tested the differential effect of inorganic (N, P and Si) versus organic (N and C) nutrients inputs added separately as well as jointly”).

- Page 468: We have introduced information about the type of light source during incubations and its spectral characteristics (cool white light from fluorescent tubes). In addition, we now specify that we simulated the “mean irradiance intensity”, given that the spectral characteristics of the fluorescent tubes differ from those of natural sun-light.

- Section 3: We have considerably reduced the results section in this new version as we agree it was too long and repetitive.

- Page 479, Section 4.2. We are aware that the pre-filtration protocol used in this investigation could potentially increase the grazing pressure on phytoplankton by removing some of the predation pressure on microzooplankton, however, the sampling procedure itself (15 L niskin bottles) is not adequate for big zooplankton ($>150\ \mu\text{m}$), given its low abundance. The main reason for the pre-filtration was to ensure a good replication, given the difficulty to homogeneously sample these organisms in 12 L bottles. It is true that some of the experiments which we included to compare with our results did not use pre-filtration; however they used 1-2 L experimental bottles where the representation of big zooplankton would be also minor (thus, also reducing microzooplankton grazing pressure). Other addition experiments that used incubation volumes similar to ours also applied a pre-filtration protocol (Paytan et al 2009, Herut et al, 2005; Davidson et al 2007, Zohary et al 2005 DSR II 3011-3023). In relation to the mentioned potential sampling artifacts, Zohary et al (2005) compared the results of a microcosm

scale experiment with those of a concurrent in situ ocean-scale experiment conducted using the same water. The results obtained were similar in both cases suggesting that sampling artifacts were not important. Therefore we do not believe that the pre-filtration is a potential explanation for contrasting result among different nutrient addition experiments.

- Page 481, line 7 and elsewhere. We agree that the use of the term limitation may be ambiguous to the reader as we can not provide information about which are the nutrients that are actually limiting the biomasses and rates in our experiments. Therefore, we have corrected this statement avoiding the use of term limitation ("Bacterial biomass and production were stimulated by organic nutrients in all the experiments but only responded to the mixed addition of inorganic and organic nutrients at 26°N").

- Page 481, line 17 (and Page 482, line 5). The two quoted papers state that the high N:P ratios (Fanning 1992) and the utilization of the dissolved organic phosphorous pool to maintain production (Mather et al 2008) suggest phosphate limitation in the North Atlantic gyre. However, it is well known that N is the primary nutrient limiting production in the central Atlantic, so we agree that the absolute term limitation may again result inappropriate in this context. We have consequently followed the referee advice and have replaced 'limitation' by "low availability".

- Page 482, line 10. The aim of our experiments was not to simulate the effects of atmospheric inputs. We wanted to test the differential effect of inorganic and organic nutrient addition on phytoplankton and bacteria as it has been recently demonstrated that not only inorganic nutrients but also organic nutrients may be entering the upper Atlantic Ocean via atmospheric deposition (Cornell et al 1995, Duce et al 2008 and references therein). We believe that the objective of our experiments, as well as the rationale behind the experimental design is now clearly explained in the introduction.

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