

Interactive comment on “Short-term temporal variations of heterotrophic bacterial” by G. Mével et al.

G. Mével et al.

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Answer to Anonymous Referee #1

Answers to referee #1 are reported point by point. Changes in the text are located by the number of the corresponding line in the revised version of manuscript (together with number of the corresponding line in the original manuscript (BG numbers), when necessary):

Answer to general comments

1. The title has been changed into: “Seasonal to hour variation scales in abundance and production of total and particle-attached bacteria from the open NW Mediterranean Sea (0-1000 m)”
2. P index has been defined and the way to find the information about calculation

S1064

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of this index has been improved in the Materials and methods section: Page 6, lines 16-22 (BG page1903, ligne15): “Low salinity water masses (LSW) percentage in the water column was depicted by the P index, based on average salinity S in the 40-70 m water layer, according to the following formula: $P \text{ index} = (S_{\text{max}} - S_{\text{sta}}) / (S_{\text{max}} - S_{\text{min}})$; S(sta) is the average salinity in the 40-70 m layer, Smin is that of the water taken as reference for dessalted water (coastal waters in our case), Smax is that of the salinity waters without anomaly (see <http://www.obs-vlfr.fr/proof/vt/op/ec/peche/pec.htm> - data DYNAPROC log & basic files - for more detailed explanation).”

3. We agree with reviewer#1 that the nominal size of the filters cannot be considered as an absolute standard, and a fraction of free-living bacteria may be retained on these filters, even in oligotrophic waters (Gasol et al., 1999). Free-living bacteria also can be retained as a consequence of clogging and it is generally assumed that the fraction of retained free-living bacteria increases with the amount of filtered water (Lee et al. 1995). Special care has been taken about this aspect, as depicted:

-in the “Material and Methods” section on Page 8, lines 18-25 (BG page 1905, lines 9-13): “The microscopic observations have shown a good dispersion of bacteria and tolerance to sonication process and confirmed that bacterial cells on 0.8 μm pore-size filters were mostly particle-attached (>95%). In addition, results obtained by the two methods showed no significant difference (mean=5.9 \pm 1.8 and 6.8 \pm 1.3 x 10⁵ cells ml⁻¹ by epifluorescence and flow cytometry, respectively. n=44) and were closely correlated (R=+0.68, p<0.01, n=44) that confirmed the validity of using sonication before flow cytometric enumerations as shown previously (Riemann and Winding, 2001; Worm et al. 2001).”

-in the “Discussion” section on Page 24, lines 7-16 (BG Page 1918, line 8): “However, these filters have a smaller pore-size than commonly used but our choice of a 0.8 μm filter was based on the assumption that bacteria from oligotrophic Mediterranean waters are generally small cells (Van Wambeke, pers. com.). The microscopic observations as described in Material and Methods section, confirmed that free-living bacteria re-

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tained on the 0.8 μm filters represented less than 5% of the 0.8 μm fraction. So, the over-estimation of attached bacteria was very low in the upper layers (<1% and <2% for BA and BP, respectively) and negligible in mesopelagic layers. In addition, to minimize the bacteria-particles dislodging and consequently the under-estimation of attached-bacteria, all filtrations were performed at a very low vacuum pressure. As a consequence, the size fractionation process used in our study can be considered as a clear-cut distinction between free-living and particle-attached bacteria.”

About the comment “In addition, is not a clear difference between the terms total bacterial production (centrifugation method) and bacterial production by free-living bacteria (filtration method). Are these two methods reporting similar results.”, a sentence has been added in the text on Page 10, lines 17-20 (BG Page 1906, line 26) : “The TBP measured in 84 subsurface samples by using the both methods showed no significant difference (mean TBP=22.5 \pm 5.5 and 20.0 \pm 4.9 ngC l⁻¹ h⁻¹ with centrifugation and filtration method, respectively).”

4. “Euphotic layer” has been changed into “0-150 m upper layer” in the whole text, Table 1 legend and Figure legends.

Answer to Specific comments

1. Page 13, line 13 (Page 1908, line 20): “6.4” has been changed into “4.6”

2. Here, we are referring to production of phytoplankton growth (exudates and phytodetritus). Page 19, lines 16-17 (Page 1914, lines 17-19): “nutrient releases by primary producers” has been changed into “C-compounds derived from phytoplankton activity”

3. Abundance of nanoflagellates and ciliates has been previously measured throughout the water column of the DYFAMED site by Tanaka and Rassoulzadegan (2002). A sentence has been added: Page 19, line 21-23 (Page 1914, lines 21-23): “Indeed, nanoflagellate and ciliate populations have been previously observed in our study site and predation over bacterioplankton considered (Tanaka and Rassoulzadegan, 2002).”

Answer to technical corrections

- Page 2, line 6 (Page 1900, lines 6 and 11): “fall” has been changed into “autumn”
- Page 3, line 22 (Page 1901, line 9.): “Ducklow, 1993” has been changed into “Ducklow et al. 1993”
- Page 9, line 2 (Page 1905, line 15.): “Fuduka” has been changed into “Fukuda”
- Page 27, Lines 7-9 (Page 1919, line 27): Reference “Billen et al., 1990” has been added
- Page 28, line 7 (Page 1920, line 23): “Fuduka” has been changed into “Fukuda”
- Page 30, line 25 (Page 1922, Line 22): “1963-1964” has been added in the reference.

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Interactive
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Discussion Paper

S1067

