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Interactive comment on "Integrated survey of elemental stoichiometry (C, N, P) from the Western to Eastern Mediterranean Sea" *by* M. Pujo-Pay et al.

Anonymous Referee #2

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This paper aims : (1) to provide an extensive vertical and longitudinal description of biogeochemical parameters (di-oxygen, nutrients, dissolved and particulate matter) during summer 2008 in "the whole Mediterranean Sea", although it does not document the western basin, from Gibraltar to the Gulf of Lion (a key area because of the importance of the exchanges of matter and water between the Mediterranean Sea and the Atlantic Ocean), (2) to exhibit variations of the C/N/P ratios in reference to Redfield's in three layers (surface waters, intermediate waters, deep waters), (3) to discuss these variations in relation with the cycling of N and P in different layers of the water column.

This study starts with is a nice piece of work. It presents a unique data set gather-

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ing high-quality data as regards nutrients (nitrate, nitrite, ammonium, phosphate), total inorganic carbon, dissolved organic matter (carbon, nitrogen, phosphorus) and particulate organic matter (carbon, nitrogen, phosphorus) determined in the same samples in the two basins of the Mediterranean Sea. In particular, the many DOC, DON and DOP data are unique and very valuable for further estimates of the Mediterranean Sea evolution during the 21st century.

However, I think that both Sections 3 and 4 need improvements.

As regards Section 3, I am not enthusiastic with the choice made by the authors to distinguish between three different layers taken into account di-oxygen criteria (Figure 7). I understand that the sampling vertical resolution is very likely not sufficient to catch physical extrema from the sampled depths, but I suspect that continuous CTD profiles of T, S and sigmat-t are available at the studied stations providing physical data usable by Pujo-Pay et al. to distinguish between already well identified water masses, thus helping for comparison with previous studies related to the chemical characteristics of those data masses.

In my opinion Section 4 ("Discussion") should be reorganised around a few scientific questions, like: "what explain the biogeochemical differences and similarities of the western and eastern basin in the different water masses?", " what are the proximal limiting factors of primary production in the surface waters of the western and eastern basin"?, "what are the rate of recycling of N and P in the intermediate and deep waters?", . . . Surprisingly, Arrigo's paper (Arrigo, K.R., Marine microorganisms and global nutrient cycles, *Nature*, Vol 437, pp. 349-355, 2005), a key one to discuss about Redfield – Richards ratios and stoichiometry is not cited by Pujo-Pay's et al., although this paper could help for the Discussion section.

A conclusive section should be separated from the discussion.

Thus, this manuscript shows excellent data and is good-science based. Thus it should deserve publication in BG. However major corrections are recommended before the

editor gives the green light to this paper.

Minor points:

-line 20-21 (see above): this study takes into consideration only a part of the Med. Sea, not the whole Med. Sea.

-line 19 and following: ammonium should be preferred to "ammonia".

-Throughout the text and figures the notation NO3+2 is very ambiguous, N+N should be preferred.

-Throughout the text the authors mention measured concentration "below the detection the limit". By definition any data below this limit does not make sense and any data of this kind should be given a "zero" value.

Interactive comment on Biogeosciences Discuss., 7, 7315, 2010.

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