

## ***Interactive comment on “Dissolved Inorganic Nutrients in the Western Mediterranean Sea (2004–2017)” by Malek Belgacem et al.***

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General comments: This paper addresses the important issue of providing quality controlled datasets of biogeochemical parameters, based on 24 cruises carried out between 2004 – 2017 in the Western Mediterranean by the Italian National Research Council. The objective is relevant, since good quality biogeochemical data are fundamental to study temporal and spatial variability of oceanographic processes and the possible effects of global changes. In its current form, however, the paper presents several issues which need to be addressed in order to allow publication.

Concerning data availability, it is useful to get access to both the original dataset and the adjusted dataset, to allow users to reprocess the original data with different ref-

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erences, for example. The dataset is complete, with most required metadata, and provided in a user-friendly format. However, the adjusted dataset does not follow exactly WOCE QC flags: missing values are not flagged, while they should be flagged 9 (no data).

The dataset can provide a valuable contribution to the main European initiative in charge of assembling and giving access to marine data of the European seas, namely the European Marine Observation and Data network (EMODnet) (see Giorgetti et al., 2018). Surprisingly, there is no reference to the large availability of data in the Western Mediterranean provided by European data infrastructures such as SeaDataNet (<https://www.seadatanet.org/>) and EMODnet Chemistry (<https://www.emodnet-chemistry.eu/>).

The general approach for data Quality Control has already been used for a World Ocean dataset to achieve internal consistency of data and it is a solid method. However, I am concerned with the choice of the 5 cruises as reference to perform the secondary quality control and the adjustments, given the well known mesoscale dynamics of the Western Mediterranean, the seasonal variability detected also in the deep layers and the changes observed in the deep waters reported in the same period (Manca et al., 2004; Schroeder et al., 2008; Schroeder et al., 2016). It is recommended to compare the profiles of the reference cruises with the outcomes of the extensive analysis of over 40 years of biogeochemical data collected in the Mediterranean and the resulting climatological vertical profiles (Manca et al., 2004) and the full set of spatially averaged vertical profiles available to download at <http://nettuno.ogs.trieste.it/medar/climatologies/medz.html>), provided for different Mediterranean regions defined according to general circulation patterns.

Giorgetti et al., 2018 EMODnet Chemistry Spatial Data Infrastructure for marine observations and related information. *Ocean and Coastal Management* 166 (2018) 9–17

Manca et al., 2004 Physical and biochemical averaged vertical profiles in the Mediter-

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anean regions: an important tool to trace the climatology of water masses and to validate incoming data from operational oceanography; *Journal of Marine Systems* 48, 83–116

Schroeder et al. (2008) An extensive western Mediterranean deep water renewal between 2004 and 2006, *Geophys. Res. Lett.*, 35, L18605, doi:10.1029/2008GL035146.

Specific comments:

To improve the logical sequence of the information, some sections should be reorganized.

The Introduction is not logically organized, there are several citations which are listed, but the connections are not clear. Many important concepts are introduced (eg. Biological pump, N:P ratio) but not introduced and some sentences are not clear or vague (eg. Lines 57- 60). Reference should also be made to the Mediterranean Sea – Eutrophication and Ocean Acidification aggregated datasets 1911/2017 v2018 provided by EMODnet Chemistry (<https://doi.org/10.6092/89576629-66d0-4b76-8382-5ee6c7820c7f> (line 71)

The use of citations should be revised: some citations do not seem to be appropriate or are not correctly inserted in the text as there are cases of quite vague statements linked to citations (eg. line 57 Boyd; Line 171: Muniz et al 2001)

Reference to published climatologies of biogeochemical properties available for the Mediterranean is missing (eg. Manca et al., 2004; MEDAR/MEDATLAS Climatology)

Section 2.2 should be moved after 4.1.

Section 3 should follow 2.1, after the description of sampling protocols for nutrient measurements.

Line 47: the latter: do you mean validation? Can you please explain what you mean?

Lines 83-88: there is a not correct comparison among different terms: datasets,

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databases and large European data infrastructures such as SeaDataNet and EMODnet Chemistry are different things.

Throughout the manuscript: check the consistency between the terms dataset and data set.

Is the description at lines 123-130 innovative? If not, the citation to the already consolidated method is enough and the whole part can be removed. On the other hand, a table summarising the laboratories, the instruments, the respective detection limits, together with sample storage and freezing duration used for the different cruises would facilitate the understanding.

Section 4: deals with Quality Assurance rather than QC

Section 4.1 should be reorganized to clearly explain how primary QC has been carried out; lines 169 – 172: please explain how were QF assigned to data and the relationships between flagging and CV

Lines 176-179: this sentence is not very clear. Please rephrase it.

Lines: 187-206: As shown in fig. 9, most cruises (even cruises #1, 5 and 16) cover different parts of the West Mediterranean basin, which are influenced by heterogeneous physical and biogeochemical processes, different water masses, which are characterised by different nutrient concentrations. The relationship between standard deviation of data collected in different water masses and data precision is not so straightforward. Therefore, the assessment of “precision of each cruise measurements” based on cruise CV is questionable.

The authors use 5 reference cruises carried out in different seasons between 2001 and 2016 to adjust data obtained during a total of 24 cruises carried out between 2004 and 2017. Reference cruises cover a large area but sometimes with just 1 station per sub-area. The use of single stations, sampled during a specific season as reference is questionable. Even though only data below 1000 m are involved in the Secondary QC

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and deep waters are less variable than upper and intermediate waters, seasonal as well as long term variability in nutrient concentrations in deep waters cannot be ruled out, as also stated by the authors. It is not clear how this is taken into account (lines 226-230).

Section 5.4: why only a sub-set of cruises is described?

Line 373: Apart from old MEDAR/MEDATLAS database, reference should be made to the harmonized, aggregated and validated Mediterranean regional dataset of parameters related to eutrophication provided by EMODnet Chemistry (<https://doi.org/10.6092/89576629-66d0-4b76-8382-5ee6c7820c7f>)

Line 326-327: r2 do not match those in the figures

Line 577: N:P does not match those in the figures A plot showing temporal distribution of cruises and of reference cruises could be appreciated

Fig.1 Map: difficult to identify the different (Blue and red) cruises. The use of larger and filled/open symbols may help.

Fig.3: Numbers in figures do not match with captions.

Fig. 4: What are the codes "C1" and "C2"?

Fig. 8: Numbers in figures do not match with captions. Has the adjustment been done on the whole profile or only to data > 1000m? This is not clearly described in the paper.

References:

The first reference is not complete (journal? Pages?)

Line 427-429: check punctuation

Line 491-494: check punctuation

Finally, a careful language editing is required.

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Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2019-136>, 2019.

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