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Ocean Science Discussions

Interactive comment on "Regional circulation patterns of Mediterranean Outflow Water near the Iberian and African continental slopes" *by* Álvaro de Pascual-Collar et al.

Anonymous Referee #2

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Review of the paper entitle:

"Regional circulation patterns of Mediterranean Outflow Water near the Iberian and African continental slopes" by Álvaro de Pascual-Collar, Marcos García-Sotillo, Bruno Levier, Roland Aznar, Pablo Lorente, Arancha Amo, Enrique Fanjul.

The manuscript tackle an important and relevant scientific issue dealing with the analysis of the spreading processes of MOW in the East North Atlantic using a high resolution (1/12°, about 8 Km) CMEMS IBI ocean regional reanalysis. Focusing their analysis for the intermediate layers (500-2000m depth) in the Tagus, Horseshoe and Seine basins respectively.

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This study is very interesting because increase understanding on several circulation features that reveals the important role of bathymetry in the spreading of MOW when its leave the Gulf of Cadiz. Moreover, the temporal coverage of the IBI reanalysis (1992-2016) permitted the analysis of the temporal variability resulting in the description of the mid-term variability of MOW in the region.

The manuscript is also relevant for ocean climate variability studies and in particular for research and simulation of the interaction between Mediterranean Sea and North Atlantic ocean that have to be considered as a unique ocean/climate system (Artale et al., 2006).

For all these reasons that the results of this paper are very interesting for the oceanographic communities and in particular for those scientists more implicated on the Mediterranean-Atlantic interaction. However the present version still have a lot of a weak points and therefore is not ready to be published for the following reason.

General comments and Major revision:

The scientific matter of the manuscript isn't a really new augment; actually in the literature there are many example on this, either in the modelling field or in the analysis of the in situ observations. But the manuscript has many strong/weak points and many novelty elements the most relevant one are the following:

âĂć The manuscript encompassing a comprehensive introduction, but the role of the Gibraltar Strait (and tide) is completely missed (this can explain the seasonal signal (20%) of the overall interannual variability as discussed by the authors) even if this region is resolved and included in the IBI model domain;

âĂć Very interesting the discussion on the concept of (salt) reservoir (tipping point) that resolves many problems for understand the role of the MOW in the Atlantic THC variability;

âĂć Good the use of the CMEMS IBI, but also could be useful other model of CMEMS

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for example the Mediterranean Sea Model or using the entire IBI domain that include almost the entire Western Mediterranean Sea;

âĂć Very interesting the updated vision (Figure 8) redistribution of the salt due to the circulation, but unfortunately the dependence of these features from the variability of the source water at Gibraltar Strait is again missed; but is very interesting the role of the bathymetry on this redistribution and specifically the role as salt reservoir of the Tagus Abyssal Plain.

Among the weak points the following one is the most relevant:

âĂć The authors do not exploit the potential of the data available to study the impact of the Gibraltar Strait on the interannual variability of the salt anomaly into the North Atlantic (MOW) due more likely to the non-linear interaction among the hydraulic control modulated by the tide and to the reservoir of MDW downstream of Gibraltar Strait and the Bernoulli suction as a mechanism of transport of this anomaly amount of salt upstream of the Gibraltar Strait.

âĂć Is matter of fact that the inflow/outflow is regulated by the physic of the Strait of Gibraltar and that the properties of the source water of the MW that will be later observed in the North Atlantic still maintaining the memory of the originated Mediterranean water, in fact, following Fig. 4 of Fusco et al, 2008 or Bozec et al., 2011, is very evident the impact on the MOW hydrological value of the quasi-periodical extraction and evacuation of WMDW from the Mediterranean into the Atlantic. Therefore, should be very interesting to verify the hydrological characteristic of MOW in the Gulf of Cadiz and its interannual variability in relation of those observed in Mediterranean Sea Deep Water.

Minor revision:

âĂć There are many typos, please check with the English dictionary;

âĂć In the text at page 9 the figure 3b is 4b;

âĂć At page 9 line 16-23 the sentences aren't supported by the analysis, please clarify;

âĂć In the T/S diagram the value of density curve is completely missed and please put in the T/S mean value that characterize the water types AAIW and NADW, this should be very useful to evaluate at least graphically the mixing of the MOW with these water types/water masses.

References.

1. Fusco, G., Artale V., Cotroneo Y.; Thermohaline variability of Mediterranean Water in the Gulf of Cadiz over the last decades (1948-1999), Deep Sea Research Part I: Oceanographic Research Papers, Volume 55, Issue 12, Pages 1624-1638, 2008;
2. . Artale, V., S. Calmanti, P. MalanotteâĂŘRizzoli, G. Pisacane, V. Rupolo, and M. Tsimplis (2006), The Atlantic and Mediterranean Sea as connected systems, in Mediterranean Climate Variability, edited by P. Lionello, P. MalanotteâĂŘRizzoli, and R. Boscolo, pp. 283–322, Elsevier, Oxford, U. K..

Please also note the supplement to this comment:
https://www.ocean-sci-discuss.net/os-2018-143/os-2018-143-RC2-supplement.pdf

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