Anonymous Referee #2

We gratefully thank your comments and suggestions, we have found some of them very interesting and constructive.

Taking into consideration all the comments received, a new version of the paper has been drafted.

Following we respond to the comments point-by-point:

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: 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; 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; Good the use of the CMEMS IBI, but also could be useful other model of CMEMS for example the Mediterranean Sea Model or using the entire IBI domain that include almost the entire Western Mediterranean Sea; 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: 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. 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.

> Unfortunately, the in-depth analysis of the influence of hydrological properties of the source water in the Strait of Gibraltar over the MOW reservoir is out of the scope of this work. Additionally, several previous studies stated that the variability of properties in the MOW reservoir is not dominated by the changes in the Gibraltar Strait (Lozier and Sindlinger, 2009; and Bozec et al., 2011). Paraphrasing conclusions in Bozec et al.:
>
> *"In an observational analysis, Lozier and Sindlinger [2009] showed that the variability of MSW and NACW is too weak to explain the observed MOW variability. ...*
>
> *… Thus, our work has shown that the observed salinity changes in the MOW reservoir can be explained solely by circulation-induced shifts in the salinity field in the eastern North Atlantic basin".*
>
> However, we consider this hypothesis an interesting point of discussion. Therefore we have included an analysis of the statistical relationships between salinity anomalies averaged in Horseshoes Basin and south of the Cape St. Vincent (section CVS in figure 1). The results are discussed in section 5. Obviously, the analysis presented does not explore the non-linear dependencies. However, the complexity of analysing non-linear dependencies makes this issue the objective of a future study.
>
> Additionally, part of the results seen in section 5 (figure 9) implies the influence of the North Atlantic circulation over the water properties of the Gulf of Cadiz and Cape St. Vincent.

Minor revision:

-There are many typos, please check with the English dictionary.

We apologize for the typos. An extra effort has been put to check spelling and grammar.

-In the text at page 9 the figure 3b is 4b.

This typo has been corrected, the rest of the figure references has been checked.

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

Since the reviewer does not point to any specific issue, we have included some minor changes to clarify the paragraph. However, we find it clear and supported by the results shown in figures 2, 3, and 4.

From our point of view:

1. The distribution of velocities and transport in the shared boundary of boxes GBB and ABB entails the mixing of water masses from south to north and vice versa (Figure 4a).
2. The T/S profiles shown in figure 4b implies the existence of different water properties (especially affecting the intermediate layers up to 1200m) in GBB and ABB.
3. The modified water masses exiting the Horseshoe Basin through Eastern-ABB boundary can be seen in figure 4b.
4. The existence of two circulation centres in the basin is evidenced in figures 2 and 3.

We would be open to discuss and modify the paragraph in case the reviewer provides some specific arguments that may neglect the results described.

-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.

We thank the suggestion, it has been applied in figures 4b, 5b, and 6b.

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. Malanotteâ ˘A ˇRRizzoli, 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. Malanotteâ ˘A ˇRRizzoli, and R. Boscolo, pp. 283–322, Elsevier, Oxford, U. K..

Both references have been included in the text.