

## Anonymous Referee #1

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 your comments point-by-point:

### SPECIFIC COMMENTS:

#### INTRODUCTION

1. The state of the art is adequately described in the Introduction. However, there are at least two recent works that should be included. These are the works of Carracedo et al. (2014) and Izquierdo and Mikolajewicz (2019) (the latter is just published, so it is clear that authors could not be aware of it).

Carracedo et al. (2014) described the circulation in the Azores-Gibraltar strait-Canary region by means of climatological data. Their box analysis shows the relative importance of the MOW northward and westward advective branches and their seasonality, as well as the interplay between the different water masses present in the region (including mixing). Izquierdo and Mikolajewicz (2019) present a process study based on a high-resolution (similar to the presented here) model output. They also show mesoscale features of MOW circulation in the region and stress the importance of topography (through tide-topography interaction) in MOW spreading. These all are very relevant topics for this study and taking them into account in the discussion of the obtained results will improve the manuscript.

The authors thank the suggestion, we found these studies very interesting and strongly related to the topic. We have introduced several references to this works in the text. Especially to Carracedo et al.

#### SECTION 4:

2. How are volume transports computed? I have not found indication about it, nor about the upper and lower limits for the vertical integration. In the Conclusion (page 11, line 22) there is a mention of 500-2000 m depth, but clearly it must be explicitly indicated before.

We agree with the reviewer, the information of the layer where the transports were calculated was missing, this information has been included in section 3.

The transports are computed from 500 m to 1500 m depth at the lateral faces of each grid cell. The lateral surface of grid cells is computed from the distance between cell corners and the layer thickness.

3. Please, provide confidence intervals for the calculated mean quantities.

We have included the transports and confidence intervals in figures 4a, and 5a. The confidence intervals have been computed by bootstrapping.

#### SECTION 5:

4. The interannual variability in the Horseshoe Basin is discussed without taking into consideration the possible variability of MW outflow rate and properties at the Strait of Gibraltar. A plot showing the temporal evolution of the MW outflow at the Strait, and the salinity anomalies would provide arguments to neglect this potentially relevant factor.

Several works have analyzed the variability of properties in the MOW reservoir (Lozier and Sindlinger, 2009; and Bozec et al., 2011), they conclude that the hydrographic properties in the MOW reservoir are not strongly linked with the variability of Mediterranean Water in the Strait of Gibraltar. Actually according to Bozec et al. (2011): *"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 an interesting discussion point, therefore, following the reviewer suggestion, we have included a new meridional section in the work (See section CVS in figure 1), analyzing the statistical

relationship of salinity anomalies between the CVS section and Horseshoe Basin. See figures 6a, and 7.

5. I would add a figure showing the salinity distribution at the maximum salinity depth for the mean state and the positive and negative anomalies (for example, salinity colorcoded and maximum salinity depth with overlaid contours).

The proposed result has been included (Figure 9) and discussed in section 5. Some interesting results have arisen as a result of this suggestion.

#### SECTION 6:

6. In general, I personally prefer a separate section dealing with the discussion of the results. However, I understand that other options are possible. In any case here or in a corresponding previous section, I suggest authors to discuss the circulation features, the net volume transports and mixing processes details taking into account the results from Carracedo et al. (2014) and Izquierdo and Mikolajewicz (2019) where possible.

While the transports estimated in this work correspond to the net transport between two fixed levels (500-1500), the transports computed in Carracedo et al. correspond to specific water masses. Moreover, the sections where the transports are computed in each work are often quite distant. Therefore, the direct comparison of results between both works becomes difficult and must be carefully done. However, we have included a paragraph where we compare some features described in Carracedo et al. with the results provided by IBI reanalysis (See section 4.1).

The interest of this work is focused on the spreading of MOW beyond the Gulf of Cadiz. Therefore, despite Izquierdo and Mikolajewicz is very interesting, we have not found many connection points between both works. However, we have included this reference in the introduction.

#### TECHNICAL CORRECTIONS:

The list is not exhaustive. Please, check spelling and grammar carefully.

P1L9: Strait of Gibraltar instead of Gibraltar Straight P1L11: remove "depth" P1L11: plays a key role instead of is a key role P1L13: Remove "of this" P1L13: do instead of does P1L19: reveal i.o. reveals P2L3: Danieault i.o. Denieault (and elsewhere). P2L28: Iorga i.o. iorga P3L18. reveal i.o. reveals P3L28: shelf i.o. self P3L31: "exceeding the 500 m depth" is wrong sense. Reword it P4L7: 1999b i.o. 199b P7L5-7: Use . i.o. , P7L8: Please, homogenise the writing of Cape St-Vincent (see line 19) P7L21 mass i.o. masses (or change the verb third person) P9L8: Figure 4b i.o. Figure 3b P9L20: south i.o. South P10L16: This statement is redundant, tautological. P10L32: delete 0.75. I do not appreciate such difference in Fig. 6

We sincerely apologize for all these mistakes and typos. We have put an extra effort to improve the English.

References: Carracedo, L., Gilcoto, M., Mercier, H. Pérez F. (2014) Seasonal dynamics in the Azores-Gibraltar Strait region: A climatologically-based study. *Progress in Oceanography* 122, 116-130.

Izquierdo, A. , Mikolajewicz U. (2019) The role of tides In the spreading of Mediterranean Outflow Waters along the Southwestern Iberian Margin, *Ocean Modelling* 133, 27-43.