

Interactive comment on “Definitive evidence of the Mediterranean Outflow heterogeneity. Part 1: at the Strait of Gibraltar entrance” by Claude Millot

Anonymous Referee #1

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General comments The presence in the Gulf of Cadiz and further downstream, of Mediterranean Water lying at different depths and constituting distinct well identified cores, has been focus of discussion since the years 1970's. Most authors attribute the formation of these veins to bathymetric effects in the Gulf but a few authors sustain the existence of this heterogeneity already in the Strait of Gibraltar. The fact is that the lack of appropriate data has maintained this uncertainty until now. The present manuscript, which is the first part of a sequence of three, is grounded on a set of data collected in the western side (entrance) of the Strait. The main objective is to show that the Mediterranean Outflow is already heterogeneous in the Strait itself. The importance of the manuscript, which is based on detailed CTD data, is not only the evidence of the heterogeneity of the outflow in the Strait but also the suggestions about the way data

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collection in the region should be undertaken in the future.

Specific comments In general, the written text is difficult to follow because it is not always clear and straightforward and would benefit from strong simplification/clarification in some places. The figures (maybe too many) illustrate the main conclusions of the manuscript, but some of them could be simplified/clarified, together with the respective captions. Maybe a figure with the bathymetric features of the whole area (entrance, exit and within the Strait) with the respective names, would help the readers not familiarized with the region. Page 11, Fig. 2: the light gray lines of the yo-yo time series are almost invisible; the boxes with information within the figure make it too heavy so, in fact, as most of that information is also in the figure caption, they could be discarded. Line 73: what is the meaning of “northern Ocean”? Lines 142-145: clarify the sentence contained in these lines Lines 295-297: clarify the sentence contained in these lines Line 339: from the observation of Fig. 1, it seems that the mixing lines are converging Line 350-352: clarify the sentence “Just because...” Lines 512-514: clarify the sentence contained in these lines Fig. 6a: confusing figure with theta-S diagrams mixed with the density profiles; does the size of the coloured dots in the theta-S diagrams mean something? The figure caption is also very confusing and does not explain some of the things that appear in the figure (e.g., the green dot, the n_{3-5} , the numbers 23, 10). As the following figures 6b-6f depend on fig. 6a’ caption, this caption should be very clear. Line 669-670: clarify the sentence “this periodicity...bottom depth” Line 782: clarify the sentence “These two passages...through them”. Lines 798-800: clarify the sentence “let us fill ...Mediterranean Sea” Line 825: explain why “with a nearly null speed” Line 924: explain “a $D_{\theta}/DS = 10^{\circ}C$ scale” Line 991: explain the sentence “double diffusivity ...Strait entrance”

Technical corrections In the whole text, there are several cases of wrong letterings (normal instead of symbol) for the potential temperature (q instead of θ) and potential density anomaly (S_q instead of σ_{θ}) Abstract: define “entrance” and “exit” of the Strait Line 84: to the Strait, where... Line 106: cut the “Now,” Line 118: analyze

in detail Line 157: lower part Line 165: were the only components Page 6, Table 1 legend: a deep water from... Line 206: Gasser et al.2017 is not included in the References Line 247: clarify the definition of the layers (bottom-250 m-200 m-170 m?) Page 11, Fig. 2 caption: there is no reference to the enclosed graphic with lat.-long. values Line 335: The fact that Line 356: a few hours Fig. 3 caption: Since latitudes and longitudes in the figure' axes are in decimal format, there should be a correspondence when lat. or long. values are referred in the caption, e.g., 5o 40'W (- 5.66 oW); HYDROCHANGES CTDs (green) Line 521: ...and red groups in Fig. 5 Line 524: larger than that Line 559: at profile #1 Line 561: a general feature of Line 622: difference from previous Line 639: more to the south or more to the center? Lines 661, 677, 704 and 973: reference is made to Supplementary Information figures which do not seem to be available. Lines 685-688: the "marked irregularity" mentioned in this paragraph is hard to observe in the figure (Fig. 9a) because the coloured dots in the theta-S diagram are too big. Line 745: leading to the Line 756: Millot (1987) is not in the references Line 758: a role that is much more (?) important Line 1038: heterogeneity leads Line 1087: much more unbiased Line 1127: García-Lafuente et al., 2011 does not appear referred in the text Line 1139: Gasser, 2017 is missing (although it is referred in the text) Line 1150: Millot, 1987 is missing (although it is referred in the text) Line 1185: the title of the paper Peliz et al., 2009 is missing

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