

## ***Interactive comment on “Mediterranean Sea climatic indices: monitoring long term variability and climate changes” by Athanasia Iona et al.***

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### General comments

The article presents a new set of products, i.e. thermohaline climatic indices, from 1950 to 2015, in the Mediterranean Sea, based on temperature and salinity anomalies and ocean heat and salt content estimates at discrete depth layers. The products are based on a high-resolution temperature and salinity regular grid ( $1/8^\circ \times 1/8^\circ$ ), derived by historical in situ observations that was published recently by Iona et al., 2018 in “Earth System Science Data” (<https://doi.org/10.5194/essd-2018-9>).

The methodology applied is sound and presented comprehensively, whereas some example-products exhibit interesting results. However, a number of issues need to be

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addressed and discussed in more detail. First of all, since ESSD is a journal for the publication of articles on original research datasets and not for publishing scientific results, I would recommend that the authors reduce to a minimal the purely scientific information that appears in the Results section which is rather long. This is not the scope of the article, as it is also mentioned by the authors (Page 7, Lines 24-25). Below, a list of specific comments is given, addressing various points that need to be further elaborated. Although I am not a native English speaker, I tried to correct obvious syntax and spelling errors that appear in an annotated pdf that is uploaded together with the general and specific comments. However, language editing by a native English speaker is recommended.

### Specific comments

The Mediterranean Sea's sensitivity to climate change is adequately presented in the Introduction section, as well as its role in influencing the global thermohaline circulation (and not calculation, as it appears in Page 2, Line 10). However, the latter may be an overestimation, since the volume of the saltier Mediterranean water flowing into the Atlantic Ocean is rather small.

There is a confusion with respect to Ocean Salt Content (OSC) units: in Page 4, Line 6 OSC is given in m3, in Page 9, Line 2 in ppt m3, and in Page 10, all 4 Figure 2 panels and the caption, in m. The authors should carefully check and correct accordingly throughout the document.

The comparison of two distinct periods (1950 to 1979 and 1980 to 2015), reveals a climatic shift in the Mediterranean concerning the heat and salt contents which show increasing trends and spatial differences. The results are of high value for the study of long term climatic change. Some clarification regarding the selection of those time slots would be helpful.

Page 7, Line 1: Since the authors know the T, S and depths of each layer, why don't they calculate  $\rho_{\sigma_t}$  and  $\rho_{\sigma_s}$  separately for each layer? That is partly answered at the Con-

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clusions section but should be also mentioned here.

Page 7, Line 2: dx varies with latitude roughly with the equation  $dx = dy \cdot \cos(\text{lat})$ . The estimation here corresponds to latitude  $\sim 38^\circ\text{N}$ . Does this simplification provide valid results?

Page 8, Line 9: it should be “warming” not “cooling”. At this point the authors could provide estimates of temperature in  $^\circ\text{C}$  that correspond to the OSC difference shown in the panels of Figure 2 (please correct 19802015-19501979 to e.g. [1980-2015]-[1950-1979] or use "1980/2015 - 1950/1979" and add one space before m to all panels of Figures 1 and 2).

Page 9, Lines 1-5: Such estimates must be handled with caution because of their paramount oceanographic implications. I'm not sure if they should be mentioned or removed completely and would like to have the Editor's opinion on that because it relates to the policy of the journal.

Page 10, lines 4-5: Rephrase sentence, it is difficult to follow and understand.

Page 11, Figure 3c: Correct OHS to OSC and add space before m.

Page 12, Line 20: The role of S.S. is not mentioned and S.F., S.I. do not exist.

Please also note the supplement to this comment:

<https://www.earth-syst-sci-data-discuss.net/essd-2018-51/essd-2018-51-RC1-supplement.pdf>

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Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2018-51>, 2018.

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