

Authors response to the comments by anonymous referee #2 to the manuscript 'Seasonal and inter-annual temperature variability in the bottom waters over the Black Sea shelf'.

We thank the reviewer for reading the manuscript, providing his/her comments, and supporting our main findings. Below we give point by point responses to the critical comments.

1. The title does not reflect that the study is provided for the wide western Black Sea shelf. This is important, because the shelf areas in other parts of the Black Sea are narrow and well ventilated due to cross-shelf exchanges. Thus, it is difficult to identify any original BSW at the Black Sea shelf except its western part. So the title should include the combination of words "western shelf".

Amended as advised.

2. The abstract does not provide enough concise and complete summary. It should be rewritten in more strict way. The speculative sentences like that: "The effects of atmospheric processes at the surface on the BSW are hence suppressed as well as the action of "biological pump" should be excluded.

Amended as advised.

3. The section 2.2 "Mixing depth" seems to be a most problematic part of the manuscript. The basic aim of this paragraph is to provide scientific reasoning of the selection of the isopycnal surface $\sigma_\theta = 14.2$ as an upper boundary of BSW. It is provided by the calculation of the amount of mechanical energy required to mix the pre-winter stratification down to the specified density level. This procedure is not relevant from physical point of view. The real winter convective cooling from above is expressed more in permanent loosening of the buoyancy by the initially stratified water column than by its mechanical stirring. So depth of convective overturning should be determined from the balance between the pre-winter capacity of buoyancy in water column and the total winter losses of the buoyancy due to the ocean-atmosphere heat fluxes. The possible suggestion is to exclude this section. It's enough to make a reference to the paper by Ivanov et al., 2000 where such a criteria ($\sigma_\theta = 14.2$) was used. In that case Fig.2b also could be excluded from the manuscript.

Both reviewers are not comfortable with how we explain the energy based considerations, and now both section 'Mixing Depth' and Fig.2 are removed. Instead a reference is made to the paper by Ivanov as advised.

4. At Fig.4 dashed lines are not identified in the legend (are they the isobaths, the same as at Fig.3?)

Yes, they are. Clarification is given in the legend.

5. Section 3.2, first paragraph: "... density range of BSW (from $\sigma_\theta = 14.2$ to a depth 150 m)". Of course, this is not a "density range".
The phrase re-worded as advised (page 11, line 4 in the revised MS)