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Interactive comment on “The Mediterranean is getting saltier” by M. Borghini et al.

Anonymous Referee #2

Received and published: 4 April 2014

General comments:

I have read the manuscript and while it was generally quite readable found it somewhat lacking in a clear structure and in clear and novel conclusions. The authors do a reasonable job describing the changes in temperature and salinity at select locations in the Western Mediterranean Sea observed over the past decade and decades. That the temperatures and salinities in the Western Mediterranean are increasing, in particular in the deep waters, has been reported for some time now. For this aspect the manuscript does not deliver a fundamental new insight. Some new information is found in the comparison of the latest profiles observed in the southern part of the Western Mediterranean. Another aspect in the manuscript, the downward fluxes of heat and salt caused by salt-fingering processes, might actually be quite relevant for the Western Mediterranean. I also found no error or uncertainty estimates at all. I nevertheless think the information contained could and should in an improved form be published.

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Specific comments:

- Reading the manuscript I was somewhat reminded of a story being told. It was a quite reasonable story, but one of the main points showed up only at the end. That the Western Med can not be in a steady state at the moment. This conclusion might well be correctly located at the end of the paper, but a description of the regular steady state should be located upfront. I.e. that downward fluxes of heat and salt require colder and less saline deep convection events for a balance. Afterwards the deviations from this state could follow and some conclusions could be drawn.

- In general the outline of the paper is not 100% clear. There is no clear hypothesis, just a detailed description of the data, some discussion, and no final conclusion. One could e.g. make the statement that the Western Med is not in a steady state (which is clear from the increasing T and S by itself, but also follows from the downward flux of salt and heat by convection) and show the reasoning with the present data.

- A more thorough analysis of the data should lead to an idea of how long this transient state will continue. Will there ever be a steady state ? Was there ever one ?

- The data used in this study is quite limited. While this has the advantage of being more coherent, it disregards the spatial variability in the Western Med. Are the same changes be visible in other parts ? Are the chosen locations representative ? What are the uncertainties of all your numbers ?

- What about the Tyrrhenian Sea ? Is there indeed a transport of deep levels into it and of deep to intermediate levels out of it and what fluxes of heat and salt do these represent ? Do you think them to be small compared to local fluxes ? Salt-fingering fluxes are even more relevant there.

- The numbers used in the manuscript are not very coherent. Sometimes it is absolute T,S differences, sometimes T,S changes per year, sometimes per decade. Maybe they can be unified.

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Technical corrections:

- many lines: 'year' or 'years' instead of 'yr'

page 2

- line 2: of the Western Mediterranean Sea

- line 20: I see no formal requirement to 'balance the buoyancy losses'.

page 3

- line 4: Western Mediterranean (capital W)

- line 21: Was the study of Skliris and Lascaratos run to a steady state everywhere in the Mediterranean. We now have 50 years after Assuan dam and it is obviously not yet in a steady state. So what does their salinity increase of 0.04 over 40 years really mean ?

page 4

- line 19: There must exist more than these 5 profiles at that location ! Are they representative ?

page 5

- line 22: I think the '0.019C' is wrong and should be 0.0039C compare to page 7 line 9 where you use the same numbers !

page 6

- line 23: Not only the deep water changed in 2011, but also the LIW. At least in your profile. Do you have any ideas why ?

page 7

- line 3: 'water formation it has become'

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- line 23: I am sure that there is more data than just until 2007 for Dyfamed.

Interactive comment on Ocean Sci. Discuss., 11, 735, 2014.

OSD

11, C184–C187, 2014

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