

## ***Interactive comment on “Hydrographic situation during cruise M84/3 and P414 (spring 2011) in the Mediterranean Sea” by D. Hainbucher et al.***

**Anonymous Referee #2**

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The Mediterranean has been subject to major changes in its hydrographic properties primarily of the deep waters, starting in the WMed in 2005 (the so-called WMT) and 1992 in the EMed (the EMT). The manuscript analyzes the status reached by 2011 using data from two cruises that provide a west-to-east section all along the sea and coverage of the northern Ionian and the Adriatic. The study thus represents a very welcome snapshot of the ongoing evolution of the water properties. The employed methods are TS diagrams with interpretation, multidimensional water mass analysis (OMP) and a comparison of geostrophic currents and ADCP runs. This is a useful exercise but I have several items that must be addressed before the manuscript can be accepted. A snapshot is presented, but the aspect of evolution of the hydrography under the post-EMT and WMT conditions is under-developed. Chapter 2 is organized appropriately, but I find Chapter 3 confusing; the paper would gain by a certain reorga-

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nization of this section.

Basic items: It is stated that only a fraction of the AW passes the Sicilian Channel (page/line 2401/8). Surely part of it is converted into WMDW, but to my knowledge, the Sicilian Channel flux is of similar magnitude as the Gibraltar inflow. This must mean that the former flux is amplified by returning LIW or the like; reword or clarify. - The LIW is associated with a salinity maximum in 50 to 600 m (2401/17), but is not the lower part of that range either CIW (which is mentioned somewhat further down) or transitional EMDW? - It is stated that the near-bottom T and S values are distinctly lower in the WMed than in the EMed (2408/25 and ff.) but this fact as such is no different to prior to the transients and also well known. The more interesting aspect would be the changes relative to previous years. Same for LIW in discussion of Fig. 3.

Various T-S maxima and minima are mentioned occurring in different places at different depths (p. 2410). The cause certainly is that the Aegean continued to produce smaller amounts of CDW, which reached to variable depths upward of about 2000 m. The text notes (2410/20) restricted ranges between T-S maxima and minima compared to earlier, but this is of course a natural consequence of ongoing mixing.

OMP in Chapter 2. The assumption that the water mass characteristics represent climatological means, rests on shaky ground in view of the transient behavior of the deep waters (2406/24). A remark on that is in order. - The weight of oxygen in the OMP is so much lower than those of the other properties ((2406/16) that I suspect that, in effect, you have not four, but rather only three constraints. Can you defend your approach? - I dispute the statement that oxygen is a quasi-conservative property (2405/15 ff.), considering that the replenishment of the deep waters is on the order of 50 to 100 yrs (cf. Roether and Well, DSR I, 48, 1535 (2001)). - The sentence beginning at (2406/13) is very unspecific.

OMP in Chapter 3. A statement is made that the EMDW in the Levantine still contains a high amount of AdDW (2412/29). I believe that this due to the fact that the AdDW

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properties (Table 1) are ok for 2011, but that salinity and temperature are too high for the period prior to the EMT when the bulk of replenishment of the deep Levantine occurred.

ADCP currents are strictly local while geostrophic ones are averages between stations. Given the presence of small eddies (s. 2408/7) it is wrong to call their difference “ageostrophic”.

IT would be useful to study the circulation in the northern Ionian trying to determine the actual BiOS phase during the Poseidon cruise.

Technical items. p. 2400, line 9: “recently observed variability” I presume refers to the EMT and WMT. You should be more explicit about that. Lines 9-11: I find nothing in the text further down related to “velocities . . . seeming far from the pre-EMT situation”, as is mentioned here. Second half of Abstract: The observational means appear distributed over the text and partly are mentioned twice. This must be rectified. p. 2400, line 24: The sentence beginning here should be reworded. p. 2491, line 1: evidence has no plural. p. 2401, line 27: surrounding means all around them, you better say “shallower”. p. 2402, line 1: change to “the basin\*s long-term stability”. line 3: change “before” to “earlier”. Line 25: change “are shown” to “have been reported”. p. 2404, line 1 ff.: The equipment of the Poseidon cruise is missing. line 21: The first time you introduce “DO” it must be spelled out. p. 2408, line 11: There is no “transformation of water mass properties” during the two cruises, but certainly one relative to previous years or the pre-EMT/WMT situation. This aspect is, unfortunately, widely ignored. – Line 15: no comma after Notice. Line 24: remove “comprise”. p. 2409, line 20: I believe you mean something like “is not massive enough nor reaching high enough to cross the (Kasos Strait) ridge. p. 2411, line 3: A reference to Fig. 5c is missing. - Line 12: replace “like” by “as”. Line 23: when, not while. p- 2412 line11: replace “considered as well” by “also considered”. p. 2414, line 2: you probably mean “CDW”, not “AdDW”. Line 9: What is an “increase in property distribution”? Do you mean a wider range?? p. 2415, line 6: replace “salinity decreases” by “lower salinity”. –Line 10: “Likely”, I guess you better

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say “evidently”. Line 13: “for some time”; could you not be more specific? Line 19: by a grant, not from a grant. Fig. 1: The depth values of the depth contours should be indicated. Caption Fig. 2a: name cruises and year. Fig. 5: The easternmost Levantine stations are located south of the Hellenic Trench. Caption Fig. 8, third last line: Left, rather than Right. Caption Fig. 9 should note depth range. Line 3: Reword to “. . . across the section between adjoining CTD stations”

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Interactive comment on Ocean Sci. Discuss., 10, 2399, 2013.

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