

Clim. Past Discuss., referee comment RC2  
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## **Comment on cp-2021-24**

Anonymous Referee #2

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Referee comment on "Northern Hemisphere atmospheric pattern enhancing Eastern Mediterranean Transient-type events during the past 1000 years" by Aleix Cortina-Guerra et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2021-24-RC2>, 2021

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Review of the Manuscript cp-20021-24 Northern Hemisphere atmospheric pattern enhancing Eastern Mediterranean Transient-type events during the past 1000 years" by Cortina-Guerra et al.

General comment to the Authors and the Editor:

The ms presents an analysis, based on high resolution climate model simulations for the last 1000 years, of the main atmospheric patterns that might have driven past EMT-like events, which the Aegean Sea acting as an additional (or substitute) deep water mass formation area for the eastern Mediterranean Sea.

The ms is well organized, clearly written, with a logical structure that guides the reader through the author's reasoning. However, you should also say that for the identification of the past EMT-like events, you rely on a strong assumption, i.e. that every time an EMT event occurred this is seen in the difference of heat fluxes between the GoL and the Aegean. Of course, you cannot know that this is always the signature, and you cannot know that strong differences might occur, even if no EMT event occur. This is the basic assumption you do, and you should be clear about its limitations. In addition, I found that you did not mention other studies that have for instance reported an EMT-like event during the 70s, which does not appear in your study. You should mention this discrepancy, and if possible explain it (some references are at the end, see \*).

I recommend publication of the ms after moderate revision

Some more detailed comments are:

L28 should be Strait, not Straits

L29 why for the Sicily channel you indicate an average depth, and not the sill depth (which is about 500m), as you did for Gibraltar?

L34 the term MAW is no longer used, given that all Mediterranean water masses are a modification product of the water coming from the Atlantic. Use simply AW and rewrite the sentence accordingly

L34 should be surface, instead of surficial

L35 "AW is the source"

L37 should be "where Eastern Mediterranean Deep Water, EMDW, forms" and "where Western Mediterranean Deep Water, WMDW, forms". It is "Gulf of Lion" not "Lions". At the end of the sentence, add "through deep convection" for more clarity

L41 "additional" or substitute, since it mostly replaced the Aegean?

L42 should be "Transient"

L44 should be "Mixed Layer Depth (MLD)", not MDL

L44-45 do not capitalize Winter Heat Flux

L48 salinity minima at which layer? Please specify

L58 announce the aim more clearer, by saying that it is to identify past EMT-type events and to define the timing and the global atmospheric....

L93 write "the standardized heat fluxes...", and remove "after standardization" in L94

L94 which months?

L139-140 it is not clear to me, what this sentence should say in relation to the EMT like events

L165 replace "should" with "need"

L221 "studies based on PCA"....you should give the references to these studies

L226-239 Conclusions are too short

L229 is it correct to use the verb "predict" while speaking about past events=

L230 replace "eastern basin" with "Aegean" because also the Adriatic is in the eastern basin, but I guess you are talking about the EMT like events.

Figure 1 the names located near the stars, are not mentioned anywhere in the text

Figure 4, the authors should briefly evidence and explain the fact the EMT during the 80s-90s is the shortest one they detected

*\* Several papers [Lascaratatos et al., 1999; Skliris and Lascaratatos, 2004; Skliris et al., 2007; Beuvier et al., 2010; Vervatis et al., 2013; Theocharis et al., 2014] based on both observations and numerical modeling have reported a similar event taking place in the eastern part of the EMed during the 1970s.*

*Lascaratatos, A., W. Roether, K., Nittis, and B. Klein (1999), Recent changes in the deep water formation and spreading in the Eastern Mediterranean Sea, Prog. Oceanogr.,*

44(1–3), 5–36.

*Skliris, N., and A. Lascaratos (2004), Impacts of the Nile River damming on the thermohaline circulation and water mass characteristics of the Mediterranean Sea, J. Mar. Syst., 52, 121–143, doi:10.1016/j.jmarsys.2004.02.005.*

*Skliris, N., S. Sofianos, and A. Lascaratos (2007), Hydrological changes in the Mediterranean Sea in relation to changes in the freshwater budget: A numerical modelling study, J. Mar. Syst., 65, 400–416, doi:10.1016/j.jmarsys.2006.01.015.*

*Vervatis, V. D., S. S. Sofianos, N. Skliris, S. Somot, A. Lascaratos, and M. Rixen (2013), Mechanisms controlling the thermohaline circulation pattern variability in the Aegean–Levantine region, A hindcast simulation (1960–2000) with an eddy resolving model, Deep Sea Res., Part I, 74, 82–97, doi:10.1016/j.dsr.2012.12.011*

*Theocharis, A., G. Krokos, D. Velaoras and G. Korres (2014), An internal mechanism driving the alternation of the Eastern Mediterranean dense/deep water sources, In The Mediterranean Sea: Temporal Variability and Spatial Patterns, edited by G. L. E. Borzelli, et al., AGU Geophys. Monogr. Ser., 202, pp. 113–137, John Wiley, Oxford, U. K., doi:10.1002/9781118847572.ch8.*

*Beuvier, J., F. Sevault, M. Herrmann, H. Kontoyiannis, W. Ludwig, M. Rixen, E. Stanev, K. Béranger, and S. Somot (2010), Modeling the Mediterranean Sea interannual variability during 1961–2000: Focus on the Eastern Mediterranean Transient, J. Geophys. Res., 115, C08017, doi:10.1029/2009JC005950.*