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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Review Article: Atmospheric conditions inducing extreme precipitation over the Eastern and Western Mediterranean" *by* U. Dayan et al.

Anonymous Referee #2

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Review of "Review Article: Atmospheric conditions inducing extreme precipitation over the Eastern and Western Mediterranean." submitted by Uri Dayan, Katrin Nissen, and Uwe Ulbrich to Natural Hazards and Earth System Sciences.

The authors present a literature review on the atmospheric conditions causing extreme precipitation over the Mediterranean area. Due to major differences between the eastern and the western Mediterranean area, the study discusses these regions separately. The paper is a very interesting review, providing a good overview of this subject. The paper is clearly written and the structure of the paper is appropriate. After taking the below listed comments into consideration, the manuscript is clearly suited for publica-

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tion in NHESS.

Comments: Section 1, page 3688, line 22: Not every heavy rainfall event causes floods. Are you refering explicitly only to rainfall events which cause floods, or to heavy rainfall events in general?

Section 1, page 3689, lines 1-4: It would be nice to strengthen the Introduction here and give more detail on dynamic and thermodynamic processes. For instance related to the dynamic processes: there is often a quite similar large-scale circulation inducing or not inducing heavy rainfall events. Related to thermodynamic processes: according to Doswell (1987), a triad of ingredients is required for deep convection: moisture, conditional instability, and a source of lift. Doswell CA III. 1987. The distinction between large-scale and mesoscale contribution to severe convection: A case study example. Weather and Forecasting 2: 3–16.

Section 2, page 3690, lines 14-16: The Mediterranean climate regime is better characterized by the summer dryness, since (as you mention yourself a couple of lines later) the precipitation maximum does not occur for all Mediterranean regions in winter, but in some of them in spring or autumn.

Section 2, Figure4: Since the figure shows SSTs- why are there contour lines over the land surfaces?

Section 3, page 3691, line 16: please correct the typing error.

Section 3, page 3691: the references related to the moisture sources in the EM are quite old and need an update.

Section 3: the section would benefit from further studies which cover the whole Mediterranean area, for instance: Annarita Mariotti, Maria Vittoria Struglia, Ning Zeng, K-M. Lau. (2010) The Hydrological Cycle in the Mediterranean Region and Implications for the Water Budget of the Mediterranean Sea. Journal of Climate 15:13, 1674-1690.

Section 4, Figure 5: The schematic overview of TPs should be reworked to show the

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implications in the Mediterranean area.

Section 5, page 3695, line 27: The original reference to the MO is: Conte, M., S. Giuffrida, S. Tedesco (1989): The Mediterranean Oscillation: impact on precipitation and hydrology in Italy. In: Conference on climate and water, vol.1, Academy of Finland, S.121-137.

Section 5, page 3696: The NAO is only one mode of variability which plays a role for precipitation in the Mediterranean area. What about the East Atlantic Pattern, the East Atlantic/Western Russia Pattern and the Scandinavia Pattern? See for instance: Lionello, P., P. Malanotte-Rizzoli, R. Boscolo (Eds.) (2006): Mediterranean Climate Variability. Elsevier Amsterdam, 421p. Hertig, E. und J. Jacobeit (2013): A novel approach to statistical downscaling considering non-stationarities: application to daily precipitation in the Mediterranean area. J. Geophys. Res. – Atmospheres 118, 520-533.

Section 5: A lot of the references and figure 7 relate to mean precipitation and not to extreme precipitation, for instance Ziv et al (2006), Dünkeloh and Jacobeit (2003), Mariotti et al. (2002,2005). They should be removed or it should be clearly stated how this relates to extreme precipitation.

Section 5, page 3698, lines 5-9, line 22, figure 8: The 90% percentile is not really extreme- so maybe better write about "moderately extreme events".

Section 6, page 3699, lines 1-10: This fits better in the Introduction.

Section 6, page 3699, lines 23f: What role does the soil moisture play for deep convection?

Section7, page 3700, 3701: Tables indicating the relative importance of each circulation (Cyprus Lows, SL, RST, ARST, MCS in case of EM, the different circulation types/ flow directions described at page 3703/3704 for the WM) for heavy precipitation in the EM/ WM and the season of occurrence would be very interesting.

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Section 7: What is the role of the low-pressure systems forming at the Atlas Mountains of North Africa, mainly in spring?

Section 8: Can the contribution of the two mechanisms convection (thermodynamic) and advection (circulation dynamics) for heavy precipitation events in the WM and EM be quantified? Further references for this section might be: Hertig, E., Seubert, S., Paxian, A., Vogt, G., Paeth, H., Jacobeit, J. (2012): Changes of total versus extreme precipitation and dry periods until the end of the 21st century: statistical assessments for the Mediterranean area. Theor. Appl. Climatol. 111: 1-20. Hertig, E., Seubert, S., Paxian, A., Vogt, G., Paeth, H., Jacobeit, J. (2013): Statistical modeling of extreme precipitation for the Mediterranean area under future climate change. Int. J. Climatol., DOI: 10.1002/joc.3751.

Section 9, page 3708, line 11, lines 13-14: there are some regions in the MB which have considerable precipitation amounts in May- please correct extend of the main rainy season from October to May. Also there are parts of North Africa, like Tunisia which have maximum rainfall rates in the transitional seasons.

Further references which might deserve consideration: Fichaut, M., M.J. Garcia, A. Giorgetti, A. Iona, A. Kuznetsov, M. Rixen (2003): MEDAR/MEDATLAS 2002: A Mediterranean and Black Sea database for operational oceanography, In: H. Dahlin, N.C. Flemming, K. Nittis and S.E. Petersson, Editor(s), Elsevier Oceanography Series, Elsevier, 2003, Volume 69, Building the European Capacity in Operational Oceanography, Proceedings of the Third International Conference on EuroGOOS, S.645-648. Bolle, H.-J. (Ed.) (2003): Mediterranean Climate. Variability and Trends. Springer. Trigo, I. F., Davies, T. D, Bigg, G. R. (1999): Objective climatology of cyclones in the Mediterranean region. In: J. Clim. 12, S.1685-1696. Lionello, P. (Ed.) (2012): The climate of the Mediterranean Region. From the past to the future. Elsevier.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 3687, 2015.