

## ***Interactive comment on “First reported case of Thunderstorm Asthma in Israel” by Yoav Yair et al.***

**Yoav Yair et al.**

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Response to reviewer #2

We wish to thank the reviewer for his/her insightful comments and suggestions. We accepted most of the listed comments and revised the manuscript accordingly. Our detailed responses and changes are listed below, and are marked in the new version.

Abstract Write the meaning of ER Answer: Done (\*emergency room)

Introduction Page 2, line 3. Add “human losses” (“that entail significant economic and human losses”). There is a great number of references about fatalities due to this kind of events (i.e. Petrucci, O., L.Aceto, C.Bianchi, V.Bigot, R. Brázdil, S.Pereira, A.Kahraman, Ö.KÄšIÄšÇ, V.Kotroni, M.C. Llasat, M. Llasat-Botija, K. Papagiannaki, A. A. Pasqua, J. ÅÝehoř, J. Rossello Geli, P. Salvati, F. Vinet, J.L. Zézere, 2019. Flood

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Fatalities in Europe, 1980–2018: Variability, Features, and Lessons to Learn, Water 2019, 11, 1682; doi:10.3390/w11081682) Answer: Added, as suggested.

Page 2, lines 4-5. There are numerous public health effects of thunderstorms, because they can be related with heavy rainfalls and floods, hailstorms or tornadoes. In those cases, health effects can be drowning and heart attacks -see the previous suggested reference-, impact of direct strikes, hits due to the collapse of trees or walls, or by objects transported by the wind, direct impact of severe hail, car accidents, and so on. Consequently, you should modify this sentence, perhaps including some literature references to other health effects of thunderstorms. Answer: We accept this suggestion and made a thorough re-write of the Introduction. Relevant references were added.

Page 2, lines 4-5. I would recommend a little modification of the Introduction. You start the physical explanation that relates the cycle of life of the thunderstorm with the asthma, speaking about “downdrafts during the mature and decay stages of thundercloud evolution”. In line 15 you introduce the “development stage” (that is anterior to mature and decay stages) and afterwards again the downdrafts. Taking into account that this paper is addressed to scientist from different disciplines, and some of them probably doesn’t know the cycle of life of thunderstorms, it can create some confusion. I would suggest moving line 15 to a new paragraph focused on the short explanation of this cycle of life and its relation with the causes of asthma (pollen, etc). Answer: Same as above, we re-wrote the entire Introduction.

Page 3, line 5. Add a reference on “the formation of well-known dust-wall known as “Haboob””. It is not so well-known by all the potential readers of this paper. Answer: Added (Williams et al. 2007), and the text was re-worded.

Page 4, line 7. Remind the interdisciplinary and multidisciplinary character of this paper. Some people cannot know was it a “gust front”. Explain here or in the paragraph in which you explain the phases of the thunderstorm. Taking into account that this event affected more than 8000 people it should be a big gust front, probably due to a mul-

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ticellular thunderstorm, a supercellular thunderstorm or a mesoscale system. Then, it would be better to say "induced by a thunderstorms system" Answer: The text was corrected as suggested.

Page 4, lines 9-12. Why do you speak here about lightning activity? Answer: Good comment, the text was changed and the mention of lightning omitted.

Page 4, line 23. You say "Another chemical effect of lightning activity..." but I don't find where you have introduced any chemical effect of lightning activity. Attending your expertise, I consider that it would be interesting to write a paragraph explaining the chemical effects of lightning activity that can be related with asthma. Answer: The text was revised, and in line with reviewer #1 comments, the reference to surface chemical effects of lightning was diminished. We did not study any effects of NO and O3 in the present research, so it was not justified to discuss them in depth. We added the following sentence: " This aspect of lightning activity was not considered in the present study."

Page 5, line 6. As you are starting with recommendations and warning systems, I would recommend un PUNTO Y APARTE before "A thorough review published..." Answer: Done.

Page 5, line 12. Probably some readers didn't know what WRF is. It would be better to write "which is used in the meteorological model WRF to forecast thunderstorm activity" or something like this. Answer: Done.

Meteorological Conditions Page 6, line 9. Write "upper levels" (they are not only the level of 500 hPa, usually they arrive until 300 hPa) Answer: The text was modified: "This system transported tropical air toward Egypt, Jordan, Israel, Lebanon and Cyprus in the lower-levels (850 hPa). At the upper-levels (500 hPa), a pronounced trough was situated with the axis slanted between Crete and Cyprus"

Page 6. What was the role of the mesoscale cyclone? Probably the organization of

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the flow that helped the advection of wet air form the Sea. Which factor triggered the convection? The cold front? Please, clarify. Are you sure that it was a supercell and not a multicellular system or mesoscale system? Usually supercells are related with severe weather (i.e. tornadoes) and have a mesocyclonic circulation inside. Could you check it? It would be interesting to include a satellite image showing the thunderstorm and the micro-front or squall line created by the downbursts. Answer: We added a satellite image obtained by the MODIS instrument on-board the TERRA satellite (Figure 3a) showing the multicell system above Israel. We also modified the text to better explain the role of the mesocyclone.

Page 7. You say that it "was the most powerful thunderstorm ever observed in Israel since lightning detection became operational in 1997". This fact merits to be included in the abstract and conclusions. Answer: Done, a sentence was added to the abstract.

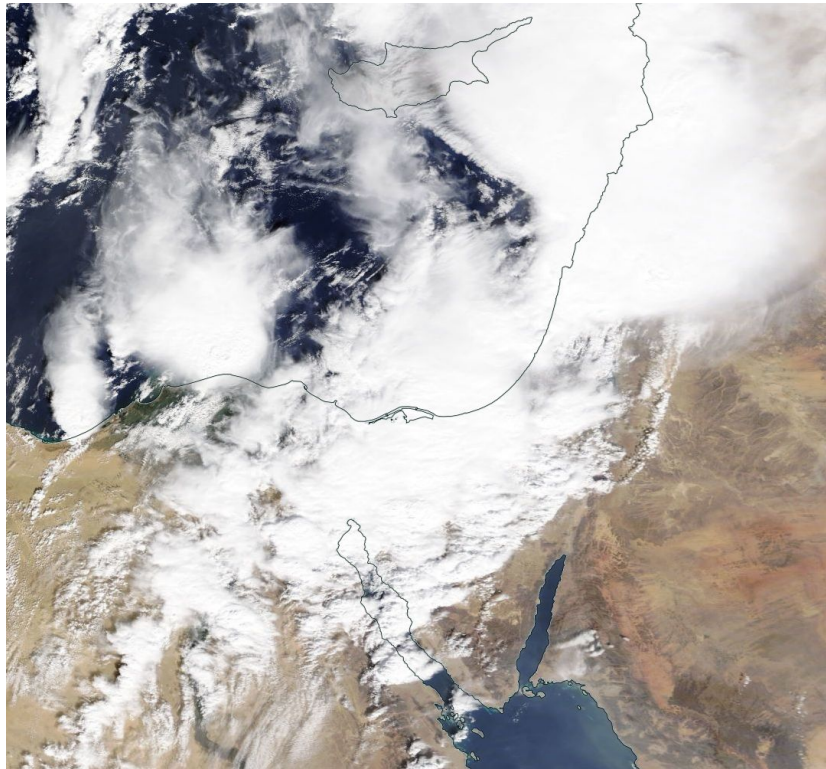
Page 7. You explain here the role of humidity and electric fields, and the fact that after the thunderstorm that results in rupture and release of allergens into the cold outflow. I think that it would be useful to comment this in the Introduction linking the cycle of life of the thunderstorm with the evolution of formation and dispersion of pollen and the other pollutants. Answer: Done as suggested. In light of earlier comments and those of Reviewer #1, the Introduction was completely re-written.

Discussion Page 12. You say that in Israel, thunderstorms and lightning occurs almost exclusively during winter months but afterwards you say that some of the most severe convective events in Israel occur during fall and spring months, and that in both cases they are associated to the RST pressure system. I would suggest to substitute "exclusively" by "mainly" and checking if RST is present in the three seasons. Answer: Done as suggested.

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2019-137>, 2019.

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**Fig. 1.** Figure 3a