Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2017-235-RC1, 2017

Hydrology and Earth System Sciences
Discussions
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Interactive comment on "Convective rainfall in dry climate: relations with synoptic systems and flash-flood generation in the Dead Sea region" *by* Idit Belachsen et al.

Anonymous Referee #1

Received and published: 26 May 2017

The authors present a study of the hydroclimatology of convective rainfall events and resulting flash flood responses in the Dead Sea region. The study is organized and well-written. Broadly speaking, the work is an example of the important research area of establishing links between large scale atmospheric conditions, more localized heavy and extreme rainfall characteristics including storm motion, and flood response. My criticisms are relatively minor.

The authors do not present any discussion or analysis of the numbers of storm cells per storm (average, variability), nor properties related to these cells "counts" such as mergers (i.e. collisions of cells) and cell splits. It seems that multicell storms, as well as the dynamics of these cells would be important (and indeed are in other climate

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regimes), and so the authors should at least justify omitting such analysis and, if appropriate, include it. Differences, if any exist, between the different synoptic regimes would be interesting to see.

The authors also do not analyze “partial coverage”-the fraction of the watershed area that is covered during each of the storm event. This would potentially help explain the results of figure 9. However, it may be the case that partial coverage is nearly 100% in many cases since the watersheds are quite small (however, the rain cells are small as well). I recommend that the authors at least comment on this issue, and consider including such analysis.

Figure 9 and 10 shown results for two catchments. The authors should comment on whether it is reasonable to present these results together without any way for the reader to know in which catchment each even occurred. Is there any meaningful different in the responses in the two catchments that are relevant to this study?

It appears that the authors have neglected to include the criteria that was used to distinguish between flash floods and non-flash floods. If I am correct in this, the authors will need to add these criteria or at least point the reader to some other reference.

The authors should make clear what the distinction between “lifetime” and “duration” is. I’m guessing that lifetime the length of each cell while duration is the length of the storm system. However, the reader should not need to guess at these things.

Figure 10: What is the diamond in each boxplot (I’m guessing it is the mean, but this should be made clear)? More importantly, what are the p-values that are reported? It is unclear from the figure, caption, and main text what hypothesis test is used and what is being compared (i.e. means, distributions, etc.). Also, is the cell area that is reported the average area per time step or for entire cell lifetime?

Table 2: Somehow, it should be indicated that the values in parentheses are standard deviations (well, that is I assume those values are, it needs to be clarified-probably

in the caption). Page 9 line 3: Really, Figure 10 shows more than just the "average properties"-it shows mean, median, and interquartile ranges.

Typographical errors/suggested changes: Page 1, line 16 (first instance): insert "the" before "Active Red Sea Trough" (3 instances in the abstract)

Page 2, line 25: change to "Rain cells can be represented. . ."

Page 2, line 33: change to "rain cells originating within different. . ."

Page 3, line 1: "properties distributions" is not grammatically correct. Also, change "environment" to "environments".

Page 3,line 2: change to ". . . the cell properties that dominate the formation and. . ."

Page 3 line 6: Insert "the" before "study area".

Page 3 line 23: add "the" before "cold fronts"

Section 2.2: why avoid analysis of low flows? Are there major rain events that do not cause large flood responses?

Page 4 line 23: delete "the" before "precipitation" and delete "anyway"

Page 6 line 33: the values in parentheses are skew coefficients? It isn't clear.

Page 7 line 21: change "cells area" to "cell areas"

Page 8 line 16: insert "over short durations" or something similar after "generally more intense"-assuming that is the message you are trying to convey. Just saying "more intense" is unclear, because discussing rainfall intensity without some specific or general indication of the time period is not very meaningful.

Page 8 line 17: change "increase" to "increasing"

Page 8 line 19: change "track" to "tracks"

Page 9 line 17: delete "-" in "low-velocities"

Page 10 line 15: change “rain cells” to “rain cell”

Page 11 line 25: change “north-westerly cells” to “northwesterly cell”

Page 12 line 4: change to “this study provides a climatology. . .”

Page 12 line 21: change “rain cells” to “rain cell”

Figure 8 caption (line 5 on page 29): change “figures” to “panels”

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