Review: **On the Use of Measurements from a Commercial Microwave Link for Evaluation of Flash Floods in Arid Regions**

The paper by Eshel et al proposes an integration of commercial microwave links and weather radar data to improve understanding of flash flood generation and potentially use for flash flood warning. The authors suggest an innovative approach to consider kurtosis of radar rainfall along a link together with the CML-estimated rain rate (representing the mean along the link). The former represents the spottiness of rainfall that is an important property for desert flash flood generation, together with the mean rain rate.

In general, a "smart" integration of rainfall data from different sensors, to better understand and predict flash floods should be scientifically encouraged. But, the underline assumption in these approaches is to build on the larger strength of each sensor. Knowing the large sensitivity of flash floods (and in particular desert flash floods) to rainfall spatial variability it is hard to understand why the proposed integration approach does not utilize the radar rainfall spatial distribution over the catchment and use the more accurate CML rainfall estimate to correct the mean rainfall bias? The main advantage of the radar rainfall is their spatial distribution and full coverage of the catchment while the main advantage of the CML rainfall is its accuracy and its mean areal nature (as opposed to point data from gauges). So, correcting the radar bias with the CML data seem as the most reasonable way to go. The authors should explain why did they choose the specific approach presented.

In addition, the scientific message of the main result of the paper, i.e., the k-CMLR relations (Figure 8), is not clear. Is the main point here the negative high correlation exists between mean areal rainfall and kurtosis for flood producing storms? or is it the envelope curve suggesting that for a given mean rain intensity (CMLR) one can identify a threshold kurtosis that supports flash flood generation? These are two different things. If the first one is the main message – this is a nice result (but must be more carefully checked and especially understand the kurtosis nature), but it is not related to flood prediction. If the second – then the high correlation is not an issue. Also, looking at figure 8 it seems that most of the circles are right to 1 mm/h (there are some points without circles with larger rain intensity but also there are quite few such points above the envelope curve), so – does the information about the kurtosis really improve prediction?

Specific comments:

Sources of errors in CML rainfall estimates: it would be beneficial to give the reader the sources of errors in the introduction section (1.1). Also, if possible please provide some quantitative information about the typical errors. For example, "CMLs can provide a fair ground truth for rain in populated areas, where the networks are denser." – it would be good to give the values of errors from this analysis.

P. 3 line 21-26: The authors write that "The approach is a complementary integration, using the advantages of each rain monitoring instrument to compensate the weaknesses of the other, with respect to the hydrological responses measured…". I tend not to agree. The weakness of the CML is that it does not cover the entire catchment and also provides too coarse resolution data; its advantage is the higher accuracy. The opposite for the radar data. How does the suggested approach use the advantages of each method to compensate the weaknesses of the other? To me it is not clear.

P. 4 L 10: “This implies that most of the annual rainfall is recorded by gauges located in the western part of the basin, as is the studied CML.”. But not necessarily most of the flood producing rainfall is upstream, because of the lower infiltration rates at the downstream part.

P. 4 L 27: Discharge estimation: it is not clear how from two velocity measurements one can derive the discharge of the full hydrograph for the five events. Please clarify.

Figure 5: seems not to be referred in the text.

P. 5 L 13: how are the parameters given (a and b) different from the published parameter values for this configuration (wave length, etc.)? are you sure the only cause of these different parameter values is the use of min and max data rather than continuous data?

Kurtosis: rain rates have typically very skewed distributions. How well does the kurtosis parameter describe the heaviness of the tail for skewed distributions (as opposed to normal distributions)? Is it independent of skewness? What other parameters were proposed in the literature to describe tail thickness?

Section 5: this section is not clear - why is classification needed? Classification of what? Please clarify what is the goal of the methodology described in this section and its rational.

P. 7 L. 18: the velocity given is the wave celerity rather than the water velocity.

P. 7 L. 9: this is an approximation of discharge derivative.

P. 7 L. 30: why to consider discharge derivative? Please provide the rational.

P. 8 L. 18: rain gauges are used to check the storm spottiness, but this can suffer from all the problems related to point representation of the storm that are well known. Why not use the radar data instead?

Figure 8 presents red and blue points indicating different wetness conditions. I would expect the author to check if these two data sets present any (statistically significant) different behavior. Such a difference is not clear from the visual inspection of the figure.

What is the message in Figure 8 (see my major comment above)? The authors must better clarify it.

Discussion section: reading this section I feel it should be the continuation of the previous section showing figure 8. The text in section 7 refers mainly to the results shown in this figure. This is not a standard discussion section where more general issues are raised and the results of the present study are discussed with relation to other studies. I suggest to combine this part into Section 6.

Minor comments:

P. 2 L8 – state the typical spatial resolution of radar

P. 2 L11 – “Despite”

P. 3 L. 10: “Rainfall events, which occur several times a year, frequently generate flash floods in the region” – it is unclear what this sentence actually states.

P. 3 L. 30: Soils should also be described.

P. 4 L. 2: No need of a minus sign if you write “below sea level”.

P. L. 26: I Suggest to change the sign for wetted flow area. The “f” looks like a power.

P. 5 L. 27: The word “rural” seems not appropriate here.

P. 6 L. 6: Why using Marshal-Palmer relations? They are more appropriate to stratiform rain.

P. 6 L. 8: The height given is for the study area.

P. 7 L. 16: The second station should be mentioned earlier in the study area description.

P. 9 L. 26: Please provide a reference to the saturated hydraulic conductivity of 2 mm/h.