

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2  
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## **Review of hess-2022-131 by Rolf Hut**

Rolf Hut (Referee)

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Referee comment on "First implementation of a new cross-disciplinary observation strategy for heavy precipitation events from formation to flooding" by Andreas Wieser et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-131-RC2>, 2022

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The authors present the results of an extensive field work campaign intended to capture data on heavy precipitation events (HPE). The document describes many aspects of this campaign and this is directly my top concern with the document: it lacks focus. I have identified three major topics in the manuscript which are all independently more than worthy enough of their own manuscript, but together create a manuscript where it is unclear for the readership what they can take away from reading it.

The three topics I have identified are (and let it be said that maybe the authors would have come to a different list)

- 'an elaborated event-triggered observation concept' (line 46)
- 'closing the catchment water balance at the HPE scale' (line 58)
- 'new measurement system based on terrestrial gravimetry' (line 106)

I would suggest to chose one of these topics and focus the paper on that and write two seperate (short) papers on the other two topics. This gives the readership a better choice in what to read (amids the never ending mountain of literature to read and keep up with). I fully understand this is not something the authors are happy to hear given the amount of work involved, but I trully believe it will lead to a better collection of papers. If the choice is made to stick with all of this information in one paper, I would strongly suggest to organize the paper along the lines of the three topics mentioned above. I will leave, as standard, the decision on how to proceed with the editor.

Regarding the three different subject I do have some comments that the authors might want to address when rewriting the paper.

### **on 'an elaborated event-triggered observation concept'**

I really like the idea of the multi tier observations where based on forecasts the team switches to 'intensive monitoring'. It would really help the readership if the 'pre-defined environmental; parameters' (line 144) used to make that decision was shared and even more: if the design process to come up with these parameters was shared for others to use in their own campaigns. I believe that this is a vital part of the innovation of this part of the manuscript and should be elaborated on. Related to this is that the colors in table 1 need explanation: when and how is the final decision for an IOP made based on the inputs?

The observation methods chosen cover a wide range of atmospheric and hydrologic interesting parameters that relate to HPE and the water balance in general. However, it is unclear what the selection of instruments is based on. Line 170 states that "To determine the water balance components according to Fig. 1 microwave radiometers, Doppler lidar and radio soundings provide information on the state of the atmosphere as well as changes in water vapor distribution..." Fig. 1 contains many more processes, so the authors need to present a justification on how the instruments used in the campaign were chosen. And honestly: "we had these amazing things and wanted to use them" would be justification enough in my book, but that has to be acknowledged.

### **On 'closing the catchment water balance at the HPE scale'**

I first and foremost want to stress that I 'm strongly against 'closing the water balance' as a goal in and of itself. Given the point based nature of most of our measurements, as well as the impossibility to measure a lot of the processes that transport water into and out of catchments, I don't see how we can ever 'close' the balance. However, as a thinking concept it can still serve its purpose. Having said that, I was surprised to see ERA5 used as part of the precipitable water calculation. If a re-analyses data source, based on both model and observations, is used in this part, why not also in determining rainfall? Or ET? I think it makes the analyses stronger if the authors either totally rely on their own observations, or use all the available (satellite / re-analyses) data in all aspects of the water balance study.

Finally, I see that this is beyond the control of the authors, but it would, of course, be so much more interesting if an actual HPE was recorded. If the campaign still continues and the authors do agree to split the manuscript, I would wait with publishing the water balance study until an HPE has been recorded.

### **on the new gravimetry method**

section 3.5 on the gravimetric sensor should report on the usability of this setup for hydrology in general. It is currently presented with the results, but mainly describes the sensor and setup, so should be in methods. I'm keen to see this device and what it can do!

### **concluding**

I hope the authors find these suggestions helpful in restructuring the manuscript and would like to restate that the work done is very interesting in and of itself and with restructuring of the paper (into separate papers if possible) will be of great interest to the hydrological community.

Rolf Hut