

Review of the manuscript HESS-2011-386:
"Extreme runoff response to short-duration
convective rainfall in South-West Germany"
by V. Ruiz-Villanueva, M. Borga, D. Zocatelli,
L. Marchi, E. Gaume, U. Ehret and E. Zehe

Evaluation

The manuscript presents a detailed study of a flash flood that occurred in South-West Germany. The hydrometeorological and hydrological aspects are considered, from rain rate estimation to runoff and discharge modeling. The paper is pleasant to read and well structured. But the methods used are not original (and have already been proposed/used by some of the authors), and the main conclusions neither (for example, the fact that storm motion has an influence on the discharge is not new...). The main issue from my point of view is that this is more a technical report for a local water authority than an original scientific contribution to the hydrological community. So the authors must (thoroughly) modify the manuscript to focus on what is innovative. Given the time needed to perform such changes, I recommend to reject this manuscript and encourage the authors to resubmit a more focused and scientifically relevant paper.

General comments

1. I find the title misleading: it deals with "extreme runoff" and it turns out in the paper that the runoff is limited (p.10757, l.22). I think the title should reflect more accurately the content of the paper.
2. As highlighted in the evaluation section, I do not see what are the original and innovative contributions in this manuscript. The introduction is not clear about the scientific objectives of the paper.

3. Sections 4-5-6: what are the main messages/results? The paper sounds very descriptive to me and lacks in-depth analyses. In addition, the processing of weather radar data presented is not new (see for instance *Bouilloud et al.*, 2009); the use of high water marks to estimate the peak discharge has been described in previous studies by some of the authors; idem for the hydrological model. So what is the new information that the hydrological community should get from this manuscript?
4. Section 7: here also, what are the main results? This section is very descriptive, but there is no general (and transferable) message conveyed! The conclusion about the influence of storm motion has already been proposed in the past (*Singh*, 1997; *Morin et al.*, 2006, to list a few). In addition, the last statement about the influence of topography is not supported by any analysis/plot in the text.

Specific comments

1. P.10740, l.14: “small runoff ratios”: this is in contradiction with the title!
2. P.10742, l.5-6: please provide a reference to strengthen the statement.
3. P.10743, l. 22: what are the units mm a^{-1} ?
4. P.10743, l.25 and p.10744, l.25: I think the units of the specific discharge should be $\text{m}^3 \text{s}^{-1} \text{km}^{-2}$.
5. P.10746, l. 18: what are these “extremely high rain rates”? No values are provided... What make the authors think they are extreme?
6. P.10747, l.1-2: how do you take into account hail occurrence in the employed attenuation correction?
7. P.10747, l.10-15: the rain gauges that are used to calibrate the radar rain rate estimates should not be used for their evaluation. The text is not clear about this issue...
8. P.10750, Eq.2: The definition of T is not clear to me. The time is not a random variable, so its variance has no meaning...
9. P. 10751, l.20-22: the shift to the headwaters also corresponds to a strong decrease in the rain rate, so this is simply the rain system going out of the catchment, no?

10. P.10751, l. 27: “the spatial distribution of rain depth and intensities”: storm motion is controlling the spatial distribution of rainfall intensities (in time), so this sentence is not clear to me.
11. P.10756, Eq.3: shouldn't it be A_s ?
12. P.10756, l.23: more details are needed concerning the calibration of the model parameters.
13. Table 2: the units for the area should be added (km^2 I guess). The units for the unit peak discharge are strangely written...
14. Figure 3: the exponent for s in the units is not correct.
15. Figure 8: barely readable...

References

- Bouilloud, L., B. Boudevillain, G. Delrieu, B. Galabertier, L. Bonnifait, P.-E. Kirstetter, and M.-L. Mosini (2009), Radar rainfall estimation for the post-event analysis of a Slovenian flash-flood case: application of the Mountain Reference Technique at C-band frequency, *Hydrol. Earth Syst. Sci.*, *13*(7), 1349–1360.
- Morin, E., D. C. Goodrich, R. A. Maddox, X. G. Gao, H. V. Gupta, and S. Sorooshian (2006), Spatial patterns in thunderstorm rainfall events and their coupling with watershed hydrological response, *Adv. Water Resour.*, *29*(6), 843–860, doi:10.1016/j.advwatres.2005.07.014.
- Singh, V. P. (1997), Effect of spatial and temporal variability in rainfall and watershed characteristics on stream flow hydrograph, *Hydrol. Processes*, *11*(12), 1649–1669.