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Hydrology and Earth System Sciences Discussions

Interactive comment on "Correcting the radar rainfall forcing of a hydrological model with data assimilation: application to flood forecasting in the Lez Catchment in Southern France" *by* E. Harader et al.

Anonymous Referee #1

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General comments The authors use a distribute rainfall-runoff model to reconstruct flood events in a watershed of southern France (Lez Catchment). Their work focus on the correction of radar data assimilation. The paper is good in its contents, this is the reason why I would recommend publication, but, on the other side, it is in many of its parts wordy, whereas many other parts should be extended. The improvements on this side can for sure put more in evidence the good scientific content of the paper. I hope that my comments will be useful.

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Interactive Discussion
Discussion Paper

First of all, some technical issues. There seems to be a contradiction: you consider a "medium sized basin" of 114 Km2 (see Page 3532 line 23), whereas in Page 3537 line 23 you say that the simplification 0.2S is for SMALL rural watersheds and in line 10 you say that for watersheds less wide than 8 Km2. Is it because you implement the SCS-CN method in every (independent) cell (whose width is definitively smaller than 8 Km2)? Please let this point be clear in the text. You speak about the presence of a subsurface poorly known process that may intensify the flood severity (Page 3534 line 7/10), and about the Mosson tributary (Page 3533, line 1). Can the error of flood prediction in some events be also due to these factors? I think that working on independent grid cells is a strong simplification. I think that this must be acknowledged, furthermore, more references must be put to other works in Literature using independent cells. Any particular reason for the use of a linear reservoir elementary hydrograph? Can the model work also with Nash elementary hydrographs with more than one reservoirs in cascade? The whole procedure does not work very well for some events, but the reason for this are not merely due to the radar rainfall assimilation procedure, but also to the poorly known karstic system and to the rainfall-runoff model containing some important simplifications . I think that this must be acknowledged. Page 3549 line 15, why isn't the model able to reproduce multiple peaks in succession? I think that in the Summary and Conclusion section some should be said about the comparison between reanalysis and forecast modes Page 3548 line 6 to end of section. I think that you should give some explanation to the value assigned to the parameter.

General comments on the text Be careful with the (ab)use of commas. In many cases there are commas where they are not needed at all. I can do only some examples: Page 3535 line 22, after "location"; Page 3544 line 1, after "function"; Page 3546 line 7/8 after "reanalysis" and after "forecast". In general, there are too much equations in the whole manuscript, some of them are not strictly necessary, and some of them can be incorporated each other. Please, consider reducing the number of equations and write only equations that you recall in the text.

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Minor issues. Abstract: line 9 – Replace “Because it depends on geographical features and cloud structures . . .” with “Depending on geographical features and cloud structures. . .” Page 3528, consider replacing “complex” with “complicated”, see http://larrycuban.wordpress.com/2010/06/08/the-difference-between-complicated-and-complex-matters/ , physical and space explicit models are full of rules, step-by-step algorithms and of cause-effect relationships and, for this reason, complicated. Page 3531, line 6: Consider replacing “approaches to implementing the Kalman Filter algorithm” to “approaches to the implementation of the Kalman Filter Algorithm”. Page 3531, line 18: Personally I don’t like “the simplified version of the version of the Kalman Filter. . .”, please restate the sentence. Note of page 3533, insert a space after “Cretaceous” Page 3533 line 21: What reference level is +65 referred to (please, specify in the text)? Page 3533 line 21/22: Restate the sentence “Several smaller seasonal springs drain the same system; these are discussed in greater detail in . . .”, maybe in “There are several seasonal springs, described in more detail in . . ., draining the same system”. Beginning of Section 2.1.2, I think it is better to speak not only in terms of season but give also the information in terms of months. Page 3537 line 14: consider condensing the sentences “For predicting the instantaneous runoff rate during an event, a derived version of the SCS equation is necessary. The derivation of the SCS function is shown below.” In one sentence, like “For the prediction of instantaneous runoff rate during an event, we derived a version of SCS method as shown below.” Paragraph 2.2.1 Are you sure that equation (3) is necessary? I think that the section is efficient only with equation (4) and (5), the reference (Gaume et al, (2004)) is enough and the question Ia = 0.2S can be explained in the text. It is good that the time derivative of the SCS method reminds to the rational method, but in my opinion, it is not worthy to insert 3 equations for this comparison. While the comparison to Rational Method should be reduced, more words should be spent on the cumulative rainfall reservoir and the soil reservoir: (a) which is their physical meaning? (b) why ds can be calculated from the slope of the descending limb of the hydrograph? In equations (9) and (10) the dot between ds and Pb(t) and between ds and stoc(t) is too low and can

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be confused with something else. Below equation (11), after defining w, define also, with a parallel sentence, S. Page 3541 line 3/7: why do you use brackets for explaining the meanings of Im, V0 and K0. I think it would work better using commas. Page 3542 line 21: I think that the sentence would work better replacing “The” with “Such a” Below equation (19), please adjust the sentence describing the equation itself.. “ J expresses the sum between two terms: the first one is.... And the second one is....” Page 3544 line 8: put comma after xa , put “respectively” between “are” and “the”, and why do you introduce new symbols (epsilonb, epsilona, and epsilon0) if they are not used in the following? Page 3546 line 7. It is “forecast” or “pseudo-forecast”? see Page 3548 line 25. Please use a unique definition. Page 3546 line 23. Unify the style: in the text, numbers are expressed in letter or in numbers? (i.e., 2 or two)? Figure 3 is not so much clear in my opinion, formulas should be cut off and, for example, say that the line is the ground level. What is w in this figure? Please, show it .

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 3527, 2012.