Hydrol. Earth Syst. Sci. Discuss., 10, C6400–C6402, 2013
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Hydrology and Earth System Sciences Discussions
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HESSD
10, C6400–C6402, 2013

Interactive Comment

Interactive comment on "Hydrological appraisal of operational weather radar rainfall estimates in the context of different modelling structures" *by* D. Zhu et al.

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Received and published: 19 November 2013

Thank you very much for the comments. The corresponding reply and discussion are listed as follows and would be included in the revised paper:

1.The inclusion of PRTF model in this study is because it represents a unit-hydrograph type of hydrological modelling, which transfer the precipitation information to streamflow by replicating the nonlinear and time variant nature of the rainfall-runoff process and matching the model response as closely as possible to the catchment response. It provides a powerful alternative to conventional linear systems theory as applies within

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hydrology. Additionally, the PRTF model has been used operationally for flood forecasting by Environment Agency in South West of England. Therefore it is interesting and worthwhile to include PRTF model to serve the aim of this study.

I agree that the PRTF is possibly unsuited for a chalk catchment with a strong baseflow influence. However, another important reason for the poor performance of PRTF model in most of the simulations in this study is that PRTF is an event-based unit hydrograph model, which performs better for single flood peak event simulations or multiple flood peaks events with real-time adjustment. However, most of the flood events in this study are continuing multiple flood peaks events, except the period C (Figure 11). Therefore, without the assist of real-time update, the PRTF performed relatively poor, compared to MIKE SHE and PDM model.

2.It is ideal to calibrate the model using multi-year period of data to ensure the models are trained to include seasonal baseflow cycle and long-term water balance. However, in reality, due to the data availability, it is difficult to implement that in this study, which I agree, may cause the error in model calibration and the following simulations. Nevertheless, the scenario of this study is to minimise the interference from model structure when evaluating the impact from different rainfall sources, thus the potential impact from model error has not been fully discussed in the paper. More importantly, the poor performance of raingauge and radar in convective extreme storm event with high heterogeneity of rainfall distribution would take more account to the performance in those models.

3.The first half of last bullet in Section 6 is justified based on the analysis of a localised convective storm event in this paper. The second half (last sentence) can be regarded as a suggestion and a potential method to account for the uncertainty inherent in radar rainfall applications.

I agree and realised that the bullets 2-4 in Section 7 require more thoughtful and nuanced discussion of the findings in this study, on how they are affected by the choice of catchment and model structures, and to what extent they may be generalisable to other situations. Therefore, the limitation and the importance of the conclusion based on this preliminary study has been explained in the last paragraph in Section 7. However, more discussion will be added in this paragraph regarding this comment.

Minor points:

p 10502 line 25: MIKE SHE is difficult to apply automatic calibration due to the complex model structure. The trail-and-error method focus on the limited number of sensitive parameters that affect the peak flow and base flow in MIKE SHE. All the calibration methods aim to achieve the perfect fit between observation and simulation flow, thus the different calibration methods used to calibrate the different models in this study should not affect the conclusions.

Section 5: I agree that the consistent differences between raingauge and radar forecast distributions may partially due to the model is calibrated using raingauge data. And it would be interesting to make a comparison using radar data for model calibration. But this is could be done in another paper in the future.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 10495, 2013.