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Discussions

Interactive comment on "Singularity-sensitive gauge-based radar rainfall adjustment methods for urban hydrological applications" *by* L.-P. Wang et al.

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GENERAL COMMENTS The authors present a technique for merging weather radar and raingauge data that is suitable for application in small urban catchments. Validation of the proposed technique is performed through the comparison between estimated rainfall, raingauges and alternative merging techniques. Finally, results from urban flow simulations are compared. The paper is well written, concepts and application are clearly described, results are presented in a straightforward way. The subject of rainfall data merging is not original or unexplored, but the paper has the advantage of providing an example of coupling data merging and urban flow simulations. One of

the week points in the paper is the fact that, raingauge precipitation estimates are assumed to be a better representation of the "true" rainfall field and used as a reference to evaluate the performances of the different areal gridded rainfall estimates. In this way, rainfall data merging that gets the better results is the one that better represents raingauge estimates, which in fact is not the true rainfall field, because of the 1) raingauge point measurement errors and 2) the extrapolation technique used to extend the point measurement to the grid average. Although raingauge density is an important factor in assessing performances of rainfall estimates, it is not the only one and in general, the availability of a dense raingauge network is a necessary, but not sufficient condition to provide a good approximation of the actual rainfall field, particularly during intense events. Moreover, raingauge point measurements are affected by errors, particularly due to wind, which tend to introduce a negative bias. A small discussion on how to deal with this issue would be of interest, particularly for the high intensities of short duration rainstorms that affect urban environment. Regarding the urban flow model, I think it is a valuable tool, but results must be evaluated carefully. In general it is not a good idea to evaluate the performances of the rain field estimates downstream an additional model, because it involves calibration and introduces additional uncertainty elements. The model was calibrated using raingauge data, therefore it has been "instructed" to provide the best results with that type of input information. No wonder that it provides the best results using outputs from the merging technique that was better reproducing raingauges, but still this is not a valid prof that the technique is also the most appropriate to conveniently represent the true rainfall field. As a paradox we might get worse results using the true rainfall field as input to the urban flow model, than the ones obtained using the raingauges based estimate utilized for calibrating the model. Moreover using a urban flow model to evaluate performances of rainfall merging introduces more modelling uncertainty (model approximation, parameter calibrated values, initial and boundary conditions,etc) into the process making it difficult to distinguish rainfall "errors" from model "errors". It can be acknowledged that is difficult to find a way out to the problem of "true" rainfall (unless via extensive simulation with synthetic data) and

HESSD

12, C1012–C1014, 2015

the authors clearly indicate the limits of their assumptions in the paper. For this reason I think the paper can be published.

SPECIFIC COMMENTS Pag 1868 lines 7 It could be interesting using radar estimates with higher spatial resolution, for example provided by an X-band RADAR. Pag 1870 lines 17-22 Density and coverage of rain-gauges it not the only factor to be considered. Rain-gauges may have errors themselves. Pag 1873 lines 13-15 Radar should in principle be better than raingauge network in capturing rainfall dynamics. If not, I would investigate also if it might depend on space or time resolution, type of radar, type of corrections.

TECHNICAL CORRECTIONS Fig. 7 I would suggest to find a better representation for hydrographs. Different signs and colors are not enough to distinguish different lines, even if you improve quality of the picture. Maybe you should consider to make a different figure for each hydrograph.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 1855, 2015.