Hydrol. Earth Syst. Sci. Discuss., 12, C545–C547, 2015
www.hydrol-earth-syst-sci-discuss.net/12/C545/2015/

Hydrology and Earth System Sciences
Discussions

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

S. Sinclair (Referee)

sinclaird@ukzn.ac.za

Received and published: 12 March 2015

1 General comments

The authors present a technique for merging weather radar and rain gauge data which aims to preserve the spatially variable character of the radar rainfall while simultaneously reducing the bias between radar and gauges. They assess the technique by evaluating the estimated rainfall against alternative merging/adjustment methods. In addition they evaluate modelled flows from a small urban catchment.

My overall impression is that the paper is well written and presents an interesting and useful method of rainfall data merging which is new to me (although it builds on ideas of separating scales of variability in radar rainfall that have been explored previously). I think that the paper can be published essentially as is, subject to some clarifications in the description of the singularity extraction and recovery procedure in sections 2.2 and 2.3.

There are two aspects of the singularity analysis which I struggled to follow:

1. It's unclear to me how the initial unknown constant value $c(x)$ and singularity index $\alpha(x)$ are computed from eqn 3 before applying the iterative procedure described. The authors discuss a spatial-scale range on page 11 (line 6 and following), so I assume that the two unknowns are fitted based on data from "a small number of data samples" from radar grid cells in the neighbourhood of each target grid cell? I think this requires clarification.

2. Is the singularity map simply the difference between the original radar field and the computed c*(x) field? I think that it should be more explicit if this is the case and would appreciate more detail on how it is proportionally applied back to the NS-BAY field.

2 Detailed and editorial comments

* Page 8, line 24 - References error in my version of the PDF.

* Page 9, line 5 - Agterberg, 2017?

* Figure 2 - Circled flow gauges FM * don't match the caption text, missing section number at end of caption.

* Page 14, line 19 - Only one of the 4 storms chosen in the analysis were not used for calibration of the flow model. Discussion in section 3.3.2 should proceed with this in

mind.

* Page 16, line 20 - How is the areal rain gauge estimate calculated? Is it different from the block-kriged gauge estimate?

* Page 17, lines 8-10 - Is the regression forced to pass through zero?

* Fig 7 - It's tough to read the hydrographs, too small, too busy

* Page 30, line 18 - In addition to Wavelets consider data driven techniques like Empirical Mode Decomposition, PCA etc.

* What are the BAY merging artifacts in fig 3 (c1) (e1) from the supplement? Very sharp discontinuities in regular blocks.

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