Hydrology and
Earth System
Sciences
Discussions

Interactive comment on "Areal rainfall estimation using moving cars – computer experiments including hydrological modeling" *by* E. Rabiei et al.

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Review hess-2016-17 Rabiei et al.

I was drawn to this paper by what seemed to me to be an interesting topic, but was disappointed by what I found to be a rather naïve desktop experiment, using some unsupported assumptions and severe simplifications. The paper seems to be the second or third in a series on the topic by the first two authors and I'm not sure that there is much originality in this one. Sadly, I came away underwhelmed by the conclusions and the usefulness of the procedures suggested and am not convinced that the idea is do-able, nor practical. For one thing, I find it difficult to imagine that enough car/lorry owners would install and maintain the sensor and transponder in their vehicles

to make the density of the instruments useful. Do many vehicles have variable speed wipers? Does vehicle speed and shape not have an effect? In addition, seasonality and diurnal variations were not considered - what do you do with snow? - how do you measure at night when traffic density is low? - what about spray from cars ahead on wet roads when it is not raining? what about wind? how do you use the RC data when a car travelling at 120 k/h moves 10 km within 5 minutes between radar scans? These practical problems would seem to overwhelm the conclusions drawn from the laboratory/computer experiments.

My opinion is that the paper has been exposed in HESSD but do not think it is good enough to be published in HESS. My remarks on a few individual issues follow below.

Geoff Pegram 02 March 2016

5: 14 I argue with the unjustified assumption that "Due to the long period of time considered in this study, the day-night variation in traffic count is considered insignificant."

6: 27 as written, the error epsilon being multiplicative could cause negative and zero rainfall values; replace by $(1 + epsilon)$ - also if left as is, equ (6) is likely to attempt to compute the logarithm of a negative number

7: 10 The assumptions of the relationships are not supported by 'data' nor curves. How does one know that the formulation in Eq (6) is valid? How do you differentiate between rain and snow?

7: 15 ff how skew are the data - OK assumes Gaussianity, so some transform might be required

8: 4 "An exponential variogram is considered as the theoretical variogram model:" there is no justification for this choice based on data

10:27 explain the combination of degree and kilometre as a radar-based spatial measure

15: 13 "As seen in the study area and data section," what does this mean?

15: 24 Why not include a discussion of Fig 8 in this section? It's the same subject as Fig 7 and the referencing of these figures is scattered in this and the next section

19:19 poorLY

19: 20 "By increasing the uncertainties, i.e. enlarging sigma-squared , the overestimation of rainfall amount affects the model performance as well." What do you mean by this last sentence? Surely one does not just 'enlarge' sigma? What is a realistic value? how is the model performance affected? what is being emphasised by the blue ovals magnified in Figure 9?

20: 10 quality of MODELLED areal

20: 15 can't you find a suitable transform?

20: 24 possibly try a Gaussian transform of the data ?

21: 1 remove 'and' and add 'snow, night/day variations . . .' ?