**Hydrology and
Earth System
Sciences**

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Discussions

Interactive comment on "Can assimilation of crowdsourced streamflow observations in hydrological modelling improve flood prediction?" *by* M. Mazzoleni et al.

Anonymous Referee #1

Received and published: 13 December 2015

This contribution deals with the question how crowdsourced observations could be utilized in hydrological modeling. The approach used here is to use such observations to update models used for forecasting runoff. The challenge is that the observations might come at irregular times and with varying accuracy. This is an interesting and timely issue and I was excited when I started reading the manuscript. In the end, however, I have to admit, I was not fully convinced, and feel that a major revision is needed.

My major is the selection of catchments/models and limited event data being used here. Two catchments were chosen (the selections seems a bit random, but ok) and

two different models were used for the two catchments. The latter seems to make little sense, as it makes results hardly comparable. It should be noted that also issues like calibration largely varied: in the Brue case, calibration was based on one event only (p11381,l12), whereas in the Bacchiglione catchment ten years were used for calibration (p11383,l20). In the first case some form of effective precipitation must have been used, as only the so called direct runoff is simulated (but it is unclear how this was determined), whereas in the second case the entire runoff has been simulated.

The discussion of the models, especially the second one, largely ignores recent findings on runoff generation processes. For instance, the statement on residence time (P11383,l10) should be reformulated with the recent paper of Beven and McDonnell in mind. In the end, for this study the physical correctness of the models is probably less important, but I still find the uncritical description of the models with their partly unrealistic assumptions a bit troublesome.

Most importantly, however, I find the small number of tested events problematic (2 in Brue, 1 in Bacchiglione). Obviously the results depend largely on the characteristics of the event and the quality of the precipitation data. I am afraid that this extremely small number of events makes results rather 'random'. Honestly, I find it therefore difficult to see what this study contributes beyond that the additional information improves simulation somewhat (which one would have expected anyway). The more interesting questions of how big the improvement is, how many observations are needed, at which accuracy, ... all are too heavily influenced by the choice of the one or two event(s) to be of a more general value.

Minor issues:

The language could be improved, there are several small language mistakes, which make reading more difficult.

The graphs could be improved, they are in general quite hard to read (and not be too 'nice' to be honest)

Use mathematically correct terms in your equations! ET (Eq.2), for instance, is not correct as it strictly mathematically means E times T (note that you actually use this in the directly following equation, where CS(t) actually means C times S(t))

Please separate results and discussion; this would make reading the text so much easier. Be careful with your references, some are missing in the reference list (e.g. Krouse) other are misspelled (e.g. Bergström)

Reference to recent work could be improved. The work could be better linked to recent work on the value of (limited) data in hydrological modeling. Also, the recent review on citizen science in hydrology by Buytaert et al. (2014) should be referred to.

McDonnell, J. J., and K. Beven (2014), Debates—The future of hydrological sciences: A (common) path forward? A call to action aimed at understanding velocities, celerities, and residence time distributions of the headwater hydrograph,Water Resour. Res., 50, 5342–5350, doi:10.1002/2013WR015141

Buytaert, W., Zulkafli, Z., Grainger, S., Acosta, L., Bastiaensen, J., Bhusal, J., Clark, J., Dewulf, A., Foggin, M., Hannah, D.M., Hergarten, C., Isaeva, A., Pandey, B., Paudel, D., Sharma, K., Steenhuis, T., Tilahun, S., Van Hecken, G., Zhumanova, M., 2014. Citizen science in hydrology and water resources: opportunities for knowledge generation , ecosystem service management , and sustainable development. Front. Earth Sci. doi:10.3389/feart.2014.00026

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 11371, 2015.