Hydrol. Earth Syst. Sci. Discuss., 11, C2390–C2393, 2014
www.hydrol-earth-syst-sci-discuss.net/11/C2390/2014/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "A pan-African Flood Forecasting System" *by* V. Thiemig et al.

Anonymous Referee #2

Received and published: 13 July 2014

GENERAL COMMENTS This m/s evaluates the performance of a flood forecasting system over Africa. In itself, describing a new forecasting system and evaluating its performance without comparison with existing approaches or systems in my view does not merit publication in HESS. However, I do think there are good opportunities in this m/s to answer some important questions, e.g. to what extent (ECMWF) forecasts can increase forecasting skill, and whether a forecasting systems like this can add value to alternative early warning approaches. Currently it does not address such important questions yet, but with some additional analysis it could.

I have the following main criticisms with the m/s as it stands:

1) The analysis presented does not consider the source of forecast skill. Previous studies have established that much of the skill in streamflow forecasts comes from initial catchment conditions rather than weather forecasts, so an evaluation like this should

tease those two apart. A simple way of doing that would be to compared the forecasts derived with ECMWF forecasts to those derived with a 'traditional' ensemble approach where forcings are drawn from the historic record. That would also be a more appropriate benchmark than the seasonal mean – indeed a simple persistence assumption would probably already be a more appropriate assumption than the seasonal mean.

2) Another (related) problem with interpreting the results for longer rivers and justifying the conclusion that ''lead-time could easily be extended up to 15 days by using the ECMWF-ENS" (5579-4) is that there is no analysis of what part of skill and lead time derives from the delay from river routing (i.e. the early warning provided by the time it takes for a flood pulse to travel downstream) versus the real contribution from ECMWF forecasts.

3) Limiting the evaluation to the 'flood-intense year 2003' (p 5562 l 28) could potentially skew the verification metrics. Ideally, evaluation would be extended to a more representative time period but I appreciate that there may be logistical challenges with that. Nonetheless it is a potentially important caveat that needs some discussion.

4) There should be more discussion of the 'optimization' of the model (5564-11) and the extent to which this may have compromised independent forecast verification. For example, did you produce 1 universal parameter set or 36 different ones (5568-14)? How did you obtain parameters for other catchments and what are the implications for the forecasts? If I understand Section 5.1 correctly, the calibration and validation were not at all independent.

SPECIFIC COMMENTS

Abstract: I could not initially work out what "Save flooding" referred to. Suggest 'case study for flooding in the Save River' (if you keep this part of the m/s)

L 21) What is the H for?

L 26) Table 1 includes at least one system that is not a HEPS (the Bureau of Mete-

orology system, which uses a Bayesian approach). Overall this information would be more valuable if characterised or categorised and discussed in the text. For example, which systems use weather forecasts and which take a (conditional) sample from the historic record; how is initial state considered in the different systems; which consider river routing. This sort of context is necessary to explain the innovation in this m/s.

5564-18) How did you separate flash floods from medium- to large-scale floods? (i.e., what criterion, what method, what data)

Section 3.2) Please provide a table with all model input and forcing data sources and URL download links, so that future researchers might attempt to (more or less) replicate your experiment.

5570-15) In the discussion, please address how changing characteristics of the GPCP and forecast data over time (e.g. analysis uncertainty and forecast quality resp.) may influence the performance of your system. In particular, how representative is the ECMWF forecast skill for 2003 for the skill in 2014?

5573-8) How were these areas delineated? They look like they were done by hand, which makes me wonder about interpretation bias.

5573-16) That is a very ad hoc interpretation. If you knew that was true for those data and not for other data, you should not have used them in the first place?

5574-25) The opposite of what?

5575-5) Why can it not be filtered out? You could simply run a conventional EPS as well. See main comment 1.

5575-11) The relationship between historic model performance, theoretical skill and actual skill was analysed by Van Dijk et al. (doi:10.1002/wrcr.20251). Their conceptual framework can help improve your discussion.

5576-8) Sounds very ad hoc, does it not cut both ways? Equally, there may be cases

where you did not predict a flood while one occurred but was not reported.

5576-14) For these metrics to be interpretable they need to be compared to the performance of alternative methods, or is there an agreed 'standard'?

5576-17) How do I know that you are not cherry picking one of the more favourable examples? Include a few more (randomly selected) examples or leave this example out altogether.

5577-21) I accept that, but floods of this size and duration are also more likely to lead to a phone call to authorities downstream, I would imagine, and might also be more likely picked up by remote sensing. You might counter argue that these early warning systems do not currently work well, but it is technically feasible to fix that. Pls discuss.

5578-2) Pls elaborate on the 'well in advance' aspect.

5578-7) As mentioned, presumably that cuts both ways.

5578-8 to 11) I appreciate that, but in that case why did you not consider that in your verification approach?

5578-15) First time this is raised, pls explain.

5578-18) It would seem to me that a satellite rainfall based flood forecasting system (e.g. http://pmm.nasa.gov/node/187) can deal with this, although of course with very short (if any) lead time?

5579-17) I don't think you have demonstrated this. You would have to first provide evidence that this system could/would lead to early warning beyond existing warning networks and improved upstream-downstream communication.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 5559, 2014.