Hydrol. Earth Syst. Sci. Discuss., 9, C5191–C5195, 2012
www.hydrol-earth-syst-sci-discuss.net/9/C5191/2012/
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Hydrology and Earth System Sciences Discussions

Interactive comment on "A framework for global river flood risk assessments" *by* H. C. Winsemius et al.

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Received and published: 7 November 2012

We thank Dr. Schumann for his valuable comments. We also appreciate that he understands that we have followed one trajectory through the framework rather than stating that we have the perfect solution to global flood risk estimation. Below we reply to the concerns raised by Dr. Schumann.

The paper is relatively long but I'm aware that it might be difficult to put all of it in a more concise form; however I feel the paper would benefit from this.

We realize that the paper is quite lengthy. We have tried to structure the paper in such a way that it is still manageable to read. We feel that each component described is

important for the comprehension of the framework and its application. We therefore propose to keep the structure as is and not to shorten it.

1 km seems still quite coarse, although that might be the highest resolution available for most data required at the moment. Is there any indication about what would be the desirable resolution (100-150 m???).

The desirable resolution is strongly dependent on the end user. If the end-user is interested in the accessibility of roads during a flood event, a resolution even much higher than 100 meter would be required. For our envisioned end-users and applications, we feel that the 1km resolution is appropriate and pragmatic. The main applications are, for example, estimating the large scale annual expected damages at country level, which could be useful for estimating insurance covers, or for adaptation planning at the international scale. We have discussed the approach already with representatives of World Bank, Red Cross, and several re-insurance companies, who were all very receptive of the approach and resolution. Moreover, given the coarse resolution of some of the global scale datasets used (e.g. GCM data), downscaling to a finer scale may lead to perceived higher accuracy than the model results can actually provide. Given the comments of the other referees about this point, we will clarify this in the revised manuscript.

In general, I'm wondering whether there could be a brief paragraph on the accuracy of each component - are these assessed in anyway? How good are some of the different elements/models compared to field data?

We have tried to give a first indication of this in the validation. It is difficult to assess the accuracy over the full globe, as this would require extensive amounts of data and very exhaustive validation across the globe. We foresee that such validation is performed in due time by applying the global framework more in the coming future. Naturally, some validation of the individual components has been done in past contributions. As mentioned in our reply to mr. Neal, we will include some references to validation of

the individual components in the revised manuscript in particular on PCR-GLOBWB discharge validation (Van Beek et al., 2011), GRACE validation (Wada et al., 2012), and variable inundation extent (Petrescu et al., 2009). On the impact side we will refer to Jongman et al. (2012a) and Jongman et al. (2012b), that provides a recent comparison of several European damage assessment methods.

Following on from the above comment, is it possible to use data from a real flood event and simulate this using the proposed framework in order to assess the accuracy?

This was also requested by referee 1 and referee Neal. We refer to our replies to these referees for further details.

How much difference can be expected from the use of other GCMs/scenarios?

As we previously explained in our response to referee Mr. Neal, we have so far only run 2 different GCM projections. Therefore, this should be seen as a demonstration of the framework's possibilities rather than a real case study. We expect large differences from the use of other climate projection results. A full multi GCM/scenario ensemble run will be subject of a future study.

In the Bangladesh validation case especially, the simulated area looks underestimated by a substantial amount. Can the authors explain this?

We identified as possible causes the fact that:

- the 1998 flood was a 50-year return period event, while we are showing a 30-year return period event
- we assume the main cause of flooding is flooding from major rivers. In Bangladesh also local impeded drainage and coastal storm surges are causing flooding.

We have replied to referee 1 in what way we will attempt further validation.

Do the authors expect end-users of this product or is the main target the research community?

We have identified a number of targeted end users being international financing institutes, intra-national institutes, and (re)-insurers. These were mentioned in the introduction of the paper. We have already spoken extensively to representatives of many of these institutes, who have expressed their interest in the methods and results, and have provided comments that have been fully considered during the development of our methods.

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