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Hydrology and Earth System Sciences Discussions

Interactive comment on "The benefit of high-resolution operational weather forecasts for flash flood warning" *by* J. Younis et al.

J. Younis et al.

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1. p.347 l.10. I think you need to present some evidence (references) that show that vulnerability to flash floods is probably going to increase under climate change.

We added several references that specify possible relationship between changing climate and flash-floods, for example a recent one from Martin Parry, Osvaldo Canziani, Jean Palutikof, Paul van der Linden and Clair Hanson (Eds) 2007, and also Milly and Palmer (2002) and Palmer and Raissanen (2002)

2. p.348 l.16. These are two types of OVERLAND FLOW. Runoff processes is a much wider term that incorporates subsurface runoff etc. i.e. I think you should be specific that saturation excess and infiltration excess processes are two types of overland flow.

Agreed, changed.

3. p.350 l.15 Can these specific discharges be given alongside actual expected discharges?

The authors apologise for the confusion in figure numbers. The whole paragraph refers to figure 3 and not figure 4 as indicated, which created confusion! This should now be clearer.

4. Threshold exceedance approach. I think this is a useful approach to use, especially for ungauged basins. However, you do need to be more specific about the limitations of this approach. In addition, what are the sensitivities? Have you done any sensitivity analysis? How can you tell that your modelled discharge increases in the same type of way as real discharge - they could be potentially totally unrelated. [You have included a useful paragraph already on the problems with different time and space resolutions and the issue of too low thresholds. More like this needed.]

We thank the referee for pointing out the imbalance in the discussion of the threshold exceedance approach. The limitation of the approach is that EFAS may produce reasonable results in terms of threshold exceedance while being seriously offset from the observed hydrographs. The forecasting results could therefore not be used in any quantitative way. Such quantitative discrepancies need to be identified and reduced over time to ensure that the system remains credible.

Sufficient data were not available for a detailed sensitivity analysis for this case study. A general sensitivity analysis for LISFLOOD, however, has been performed by Feyen et al. and is already referred to in the paper. Regarding the dynamics of the discharge curves, we have compared the simulated discharges against observations both for the long term simulations as well as the forecasts for the 12 stations listed in Table 1. Examples are given in Fig 4 and Fig 8. It has been established that the model reproduces the dynamics of the hydrological process in particular at the onset of flooding whereas the recession curve is comparatively long. In terms of early warning, however, this is

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less important.

5. p.355 l.15. Why have you not shown this statistical comparison? I think this is important to demonstrate.

A figure has now been added that shows a cumulative curve of threshold exceedance for the four representative stations referred to later. One can see that for all stations the number of exceedances for both observed and simulated are close after the 12 year period. This is not that surprising since the criteria for choosing the thresholds are the same for the observed as for the simulated discharges and should therefore yield statistically similar results if the time period is sufficiently long.

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