Nat. Hazards Earth Syst. Sci. Discuss., 2, C377–C379, 2014
www.nat-hazards-earth-syst-sci-discuss.net/2/C377/2014/

Natural Hazards and Earth System Sciences
Open Access
Discussions

Interactive comment on "Floods and climate: emerging perspectives for flood risk assessment and management" *by* B. Merz et al.

P. Willems (Referee)

patrick.willems@bwk.kuleuven.be

Received and published: 11 April 2014

This is a very good paper that provides interesting broad perspectives on flood frequency and risk assessment and management. I very much enjoyed reading this paper; it is well written and I agree with most if not all perspectives put forward. The paper therefore deserves publication in NHESS (as it is, or with minor revision if the authors find some of the reviewers' comments useful).

Some comments/suggestions:

On the statement that process-based approaches may improve flood frequency estimation: this might be true, but I suggest the authors also consider/mention the disadvantage of reduced sample sizes when extreme value distributions are calibrated per

process or climatic cause class. It is unclear whether the advantage of the process based approach prevails over the disadvantage of the reduced samples sizes. Note that if different processes affect the resulting flows in a product-wise way, a lognormal probability distribution is expected to hold for the flow, independent on the underlying process-based distributions (after some assumptions), which highly simplifies the distribution analysis. Similar considerations can be made for extreme value distributions based on extreme value theory.

Page 1576 – lines 19-22: "discontinuities in the slope": I see what is meant (the slope of the distribution when shown in a quantile plot), but this needs clarification. Is "step changes" properly formulated, given that changes in the slope are meant?

Page 1577 – lines 2-4. Personal experience learns that such downward curvature is often the result of the effect of river flooding (water storage on the river banks or in the floodplains).

Page 1577 – line 6: ". . . the trend continues as one extrapolates to higher return periods": Personal experience learns that this is not always the case: Making reference to my previous comment, when the spatial floodplain boundaries are reached above higher return periods, the slope may increase again.

Making reference to previous two comments: one can make a distinction between the extreme value distribution of catchment runoff discharges (no discontinuities in the slope) and river flow discharges (discontinuities due to river hydraulic effects).

Page 1579 – lines 3-4 and 27-30: "It is not recommended to infer future changes directly from the GCM produced rainfall": I am not convinced of that. Absolute rainfall intensities from GCMs may indeed be biased, but relative changes may be unbiased (this is the basis of any delta change or perturbation approach). It has been shown by some authors that weather typing based statistical downscaling approaches do not always outperform perturbation approaches (e.g. quantile perturbation).

There is a lot of redundancy in the paper (statements are often repeated), but it is acceptable.

May I suggest to the authors to consider some of my own recent research:

On the topic of long-term non-stationarity: multi-decadal oscillations in extreme rainfall across Europe, together with north-south spatial correlations, and explained by multidecadal oscillations in atmospheric circulation in the North-Atlantic, have been identified in:

Willems P. (2013), 'Multidecadal oscillatory behaviour of rainfall extremes in Europe', Climatic Change, 120(4), 931–944

That such multi-decadal climate oscillations bias extreme value statistics (rainfall, river flows) from their longer-term statistics when based on short records, and how bias corrections can be implemented, have been demonstrated in:

Willems, P. (2013). 'Adjustment of extreme rainfall statistics accounting for multidecadal climate oscillations', Journal of Hydrology, 490, 126-133

Taye, M.T., Willems, P. (2011). 'Influence of climate variability on representative QDF predictions of the upper Blue Nile Basin', Journal of Hydrology, 411, 355-365

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 1559, 2014.