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Hydrology and Earth System Sciences Discussions

Interactive comment on "Climate change and hydrological extremes in Belgian catchments" *by* P. Baguis et al.

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We would like first to thank the Editor for his remarks and constructive suggestions. In the revised version of this paper we address all the issues that have been mentioned in the report of the Editor. This required an extensive additional work from all partners involved.

More precisely, and referring to the specific points raised:

(1) The new method of quantile perturbations is used now in both the Gete and Ourthe catchments, ensuring consistency and homogeneity of the methodology application. This provided new insight in the assessment of climate change impacts in the Ourthe

catchment. For example, while in the case of the Gete the p99 values calculated with the Gamma and the GEV distributions and the quantile perturbations technique are very close, this is not true for the Ourthe catchment.

(2) The calculation of the confidence intervals is clearly explained in section 2.3.4 (Statistical methods). On the other hand, the statistical analysis is now enriched with new material including proper statistical significance tests. In particular, using the RCM ensemble from the PRUDENCE database we calculate the probabilities of decrease for given return periods under climate change (Table 8 in the revised version). We calculate also the new return periods of the control p99 streamflow values under the conditions of the mean scenario (Table 9 in the revised version). Similarly, Tables 10 and 11 summarize the results of the siginificance tests. Like in the rest of the paper, these new calculations are carried out for both catchments, SRES scenarios, extreme value distributions and perturbation methods. Comments and interpretation of the results have been added in sections 3.3.2 (Estimations using the Gamma probability distribution), 3.3.3 (Estimations using the GEV probability distribution) and 4 (Summary and conclusions).

(3) We are well aware about the regionalization issue of the hydrological model. In the revised version of the paper: (a) we provide further details about how this issue was tackled in the model development phase, and (b) we estimate the uncertainty expected from the regionalization process by applying a bootstrap technique on the regionalization models and comparing with the spread of the climate change simulations. These contributions are added in the end of section 2.2 (Hydrological model). However, a thorough investigation of such issues exceeds the goals of the paper.

(4) The magnitude of the return period chosen, has certainly an impact in the confidence one can have about the results obtained. However, in the previous version of the manuscript there was already a measure of uncertainty associated to the return period value, and it was depicted in Figure 4. In the revised version we went one step further and we calculated the probability that the return periods of the control p99 and

p97 streamflow values will decrease under climate change (Table 8 in the revised version). By definition, these return periods under the control climate are equal to 100 and 30 years respectively. The results of Table 8 show clearly that there is no qualitative difference whatsoever between the two situations. Similar remarks apply to the results presented in Table 9, which again concern the two return periods of 100 and 30 years.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 5033, 2010.