

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

Anonymous Referee #3

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This paper is well written in the main and examines the potential effects of climate change (through new simulations from the PRUDENCE RCM model set) on hydrology in two Belgian catchments.

A minor comment is that the authors should get a native english speaker to check the paper as there are a few typos/mistakes throughout that could be improved. They should also check for other studies of climate change impacts on hydrology in belgian catchments - I have come across one recently that has been missed - Godineaux et al. 2009.

More majorly, however, there are a few fundamental flaws to the methodology used in the paper that need to be addressed, or at least examined:

1. It is not clear, without returning to the TAC paper, how the climate change scenarios used in this paper were constructed. This should be made clear as the method used is very simple and can be clearly explained in a concise way. 2. In the comparison of the baseline and observed flows section - is there any reason why a shorter validation period cannot be used for the Gete? That way you can properly compare the time series and whether the model is able to reproduce the observations correctly. This must be established before it can be used predictively. 3. The most major flaw in this paper is the use of the very simple delta change method in downscaling the climate change projections from the RCMs. The use of the PRUDENCE RCM set is to be commended but, if you are interested in examining changes to hydrological extremes, the delta method is not the right downscaling method to use as it changes only the mean of the monthly distribution (shifting the distribution upwards/downwards). It is therefore fairly simple to then calculate the impacts on the hydrological response - especially the mean response - therefore the fact that you find such little differences between your methods towards the end of the paper does not surprise me. Using the delta method, you end up throwing away much of the information you could gain from the RCM dynamical downscaling step. At the very least, I would expect a comparison of whether the outputs from the RCMs show only a shift in the mean of the distribution between the control and future time periods for precipitation, temperature, PET. But it would be better to compare a more sophisticated downscaling method - such as bias correction of the RCM outputs - and see what different results you get for changes to extremes. Changing the mean only is fatally flawed if you are interested in changes to the extremes: at the least you must show that only the mean changes in the RCM data. 4. Why is gamma used as a distribution to describe the extremes - this is not normal. Gamma is commonly used as a distribution to describe daily rainfall properties - but not it's extremes? I would like to see some objective goodness of fits done and one distribution chosen. Which fitted best to the observations - you cannot tell from your figures. 5.p5047: this study is very limited by the downscaling method is has chosen. 6. p5050: it is not clear how the different methods are used. How, for example, is the

control climate 61-90 produced if you are using the delta change method - surely this is just observations? What are you comparing? - this is not obvious. When you use a "mean" scenario does this just lump all the A2 and B2 emission scenarios together? if so, this is flawed as there are many more A2 than B2? Does this then mean anything? 7. p5054/5055: The climate change signal of the RCMs should be discussed - this would be extremely simple to do - especially as you have already calculated the deltas for each month. This is needed to try to explain your results. 8. YOU need to talk about downscaling methods in your discussion section as this is critical to your results.

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