

Interactive comment on “The hydrological response of the Ourthe catchment to climate change as modelled by the HBV model” by T. L. A. Driessen et al.

Anonymous Referee #2

Received and published: 15 January 2010

This manuscript evaluated the impact of climate change on stream flow in the Ourthe catchment (~1600km²). The authors used HBV model (a lumped distributed rainfall-runoff model) with bias corrected precipitation/climate information estimated by ECHAM5 (downscaled with a RCM). Four different bias correction methods were tested before their application. Even though I recognize the importance of this kind of challenge for local water management under climate change, I did not find any particular new method is proposed nor is any new surprising finding presented. Mainly following three major issues are pointed out after careful reviewing.

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1: The study catchment has only one gauging station and meteorological station. Because of this limitation, a critical assumption had to be made in terms of the spatial variability: i.e. precipitation increase by 10% with every increase of 100m, without any detail discussion on the validity of this assumption. This must be critical because the spatial distributions are highly related to the structural errors in the RCM downscaling. Furthermore, there are still many debates about the minimum spatial scales for the direct application of GCM output (even if they are downscaled with a RCM). It is well known that as a study area becomes smaller, the error in the output of GCM tends to be larger. Of course, I agree that we eventually should be able to use GCM/RCM output for future streamflow assessment under climate change, but it is still necessary to discuss in detail potential uncertainty associated to the smaller scale application. Overall, I did not see clear reason why the author needed to choose this relatively small catchment which does not have much measurement information.

2: Related to the above comment on the uncertainty, one of the ways to validate the applicability of GCM/RCM output for hydrologic simulation is to use the current climate condition outputs. Authors could simulate streamflow regimes with the output information during 1979 - 2003 to evaluate the uncertainty in the estimated variables. Especially, the ability to simulate extreme values (flood peaks and draught discharges) must be assessed first with the current climate condition. In addition, to reproduce flood peaks at this catchment scale, the simulation time step seems to be an important factor, but there is no information about the simulation time step.

3: According to Figure 3, relatively large errors were introduced after the bias corrections, especially during winter time period. The authors should evaluate how significant this is with compared to the climate change. Figure 6 (2062-2100) showed certain increases in winter streamflow compared to the reference values. I am afraid that some part of this predicted change is associated to the bias correction. I wonder what happens if the authors just inputted the original GCM (RCM) output without any bias correction.

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