

## ***Interactive comment on “Potential surface temperature and shallow groundwater temperature response to climate change: an example from a small forested catchment in east-central New Brunswick (Canada)” by B. L. Kurylyk et al.***

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Received and published: 25 April 2013

### General Comments

This manuscript uses the surface energy and moisture flux model ForHyM2 to investigate the impacts of atmospheric climate change on surface and subsurface water temperatures in a small catchment in New Brunswick. While the model is relatively simple and is empirically-based, the results are of general interest despite their site-specific

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nature, and provide an excellent lead-in to the anticipated ‘future physically-based’ flow and transport modelling. It is important for the authors to note that due to the empirical nature of the model the results are site specific, and while some general ideas of how groundwater and surface water temperature may be impacted by climate change can be gleaned from the results, no specific process-based conclusions can be made. Overall, the manuscript is scientifically sound, generally well-written and is reasonably easy to read. However, a significant decrease in the use of acronyms would greatly increase the readability of this manuscript. There are several scientific and grammatical issues that need to be addressed before the manuscript is finalized. These issues are addressed in the specific comments below.

### Specific Comments

P3284 L26-27: Either remove this last sentence, or give the reader information of the ecological significance. Not appropriate in an abstract to say that something ‘will be discussed’.

P3288 L6-12: Answering these questions with the methods provided are not general answers, they are specific for the site. This should be acknowledged; as it is written it appears the authors will make general assumptions from the empirical model developed for this site.

P3291 L12: Why was this future time period used as opposed to that immediately following the reference period? I have no doubt there are reasons, they should just be given to the reader.

P3282 L19-24: For a simplified empirical model, questions arise at this point as to the ability for it to represent future conditions. Stationarity is a big concern in all climate change related research, especially in those not physically-based. This is somewhat addressed at the end of the manuscript (Limitations of the approach), but perhaps a detailed explanation as to why this approach would still be suitable is appropriate here.

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P3298 L22-25: Would these errors not also arise from the expected increase in 'extreme' precipitation events due to climate change (increased intense rain events, and thus increased floods)?

P3302 L1-2: This sentence is again, quite site specific. Saturation of the subsurface can play a very important role in the distribution of energy between the atmosphere-surface-subsurface, and would be impacted by changes in precipitation patterns due to climate change.

Section 6: Emphasis on the site specific nature of these results. As it stands, it reads as though they are general conclusions.

### Technical Corrections

P3291 L22: Just EC, 2010; there is no EC 2010b in the reference list.

P3292 L9: No EC 2010b reference in reference list, perhaps EC 2011?

Figure 2: The arrow pointing up from 'Groundwater Flow' is a little confusing. Is this indicating upwards flow, or trying to show the horizon in which groundwater flow occurs?

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 3283, 2013.

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