

Interactive comment on “Assessment of impacts of climate change on water resources – a case study of the Great Lakes of North America” by E. McBean and H. Motiee

J. Balek (Referee)

jerrybalek@volny.cz

Received and published: 16 October 2006

General observation:

In your e-mail from October 11, 2006 the name of co-author was given as M. Homayoun. However, in the paper found on Web the name of the co-author is H. Motlee.

Please, look into that matter.

1. **Does the paper address relevant scientific questions within the scope of HESS?**

Considering that among other disciplines HESS is concerned with the hydrological sciences, therefore the reviewed paper clearly belongs under the umbrella of HESS.

2. Does the paper present novel concepts, tools and data?

The climate change and its role in various ecologic disciplines belong to the hottest scientific topics of our time. At the same time the climate change theme belongs to the best selling scientific, commercial and even political commodities. Most often the attention is paid to presumably alarming impact of the surface temperature rise elsewhere.

However, considering the role of temperature, the above paper is different and therefore very novel. This is because it proves beyond any doubt that for the drainage area of 770 000 km² accommodating some 20% of the global fresh water resources the surface temperature for last 60 years or so remains stable. On the contrary, the precipitation and streamflow in the major river basins of the same region are slowly but steadily rising. This fact itself is surprising and alarming. It will require some more in depth investigation, which of course is beyond the scope of present paper.

3. Are substantial conclusions reached?

Considering that more than fifty millions of Canadians and Americans depend on the Great Lakes water provision in eastern North America, the conclusions presented in the paper are very substantial but also rather surprising. They also challenge the scientific community concerned with the climate change with a number of alarming questions. As such, the paper contributes to the advance of general knowledge.

4. Are the scientific methods and assumptions valid and clearly outlined?

In the attempt to test the presence of trends in the sequences of temperature, precipitation and flow the authors applied simple linear regression model. Such model is applicable under the presumption of the normality of residuals, constant variance and linearity of each particular relationship. Providing the trends hidden in the sequences may not be linear the authors applied another powerful tool, so called non-parametric Mann-Kendall test. The test is useful when the trend direction (not magnitude) should be proved or rejected.

Applied statistical methods are efficient when various components need to be searched in the natural sequences, such as in the mean annual temperature, annual precipitation or average annual streamflow.

5. Are the results sufficient to support the interpretations and conclusions?

Numerous attempts have been made elsewhere to predict trends and periodicities in various climatic and hydrologic sequences. Most of the attention has been focused on the surface air temperature. In general, various models have predicted the temperature rise in next fifty years between 1 - 4.5°C and 3 - 15 % increase for the precipitation.

The authors briefly but adequately discussed some of the achieved results, particularly those supplied by the renowned GCMs.

For instance, by using such a type of the model the temperature rise 2.6°C has been forecasted for the Great Lakes basin in 2050. However, in the reviewed paper only 0.63°C of the mean temperature rise has been predicted. On the contrary, very significant change, between 5.2 and 30.6 %, has been obtained for the annual precipitation, and 11.4 – 34.4 % for the annual streamflow.

Authors' conclusions have been based on the data submitted by the Great Lakes Environmental Research Laboratory, operating under NOAA. The temperature data have been available for the period 1948-2000, the precipitation and flow data for the period 1930-1992. The length of the records can be considered by

some hydrometeorologists as rather short for more definite conclusions; however, further extension of the sequences would be possible only by using indirect methods and/or the paleoclimatological approach with speculative, rather uncertain results. Under such circumstance we can consider the actually applied data as realistic.

6. Is the description of experiments and calculation sufficiently complete and replicable?

Yes, to repeat the statistical calculus would not be a problem, however, revising the data at the source would be a sheer work. Beside that, in this study there was no sensible reason to modify the data in any attempt to obtain somehow “better” results.

7. Do the authors give proper credit to related work and clearly indicate their own original contribution?

The results achieved by the application of other models are separated from the authors’ results and clearly visible and comparable in respective tables.

8. Does the title clearly reflect the contents of the paper?

Yes.

9. Does the abstract provide a concise and complete summary?

Yes.

10. Is the overall presentation well structured and clear?

The text clearly refers to the respective tables and figures. The tables are well structured and self-explanatory.

11. Is the language fluent and precise?

English is not my mother tongue, so I cannot make any comments in that direction.

12. Are mathematical formulas, symbols, abbreviations and units correctly used?

Perhaps a short legend to the symbols used in Figs. 2, 3, 4 would be helpful.

13. Should any parts of the paper be clarified?

Figs. 2, 3, 4, 5 are too small and not readable. Regarding their importance in the text, I suggest to magnify them – if possible.

14. Number and quality of the references?

I found the list of references adequate and useful when reading the text.

15. Amount and quality of supplementary material?

I am not sure what can be considered as supplementary material. I found the paper as being sufficiently complete.

16. Technical comment.

Page 3191, row 5: Instead “Temperature” should be “temperature”.

October 15, 2006 Jaroslav (Jerry) Balek

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 3183, 2006.

HESSD

3, S1191–S1195, 2006

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper