

Manuscript: Chapter 6: Hydro-Climatic Conditions and Patterns

Name of Reviewer: Paul Whitfield

1. Are the objectives of the work clearly stated? **1.5**
 - Clearly stated in section 6.1.1

2. Are the methods employed valid, appropriate and sufficient to address the questions, hypotheses or the problem? **4?**
 - This chapter is a summary, and it is pretty difficult to assess at this level the adequacy of the methods. Having previously review two key pieces this gives me great concern; one paper I reviewed was well prepared and state of the art and also quite thorough, but the second was unacceptable. These papers both seem to be summarized within this chapter. Further to this, the project summaries in Part 3 indicate that many of the projects related and supporting this chapter have not been completed, nor are recommendations yet available.

3. Are the observations, conclusions and recommendations supported by the material presented in the manuscript (e.g., data, model and analyses)? **4?**
 - This chapter is a summary, and it is pretty difficult to assess at this level the adequacy of the methods. Having previously reviewed two key pieces this gives me great concern, as one paper reviewed was excellent state of the art and quite thorough, but the second was unacceptable. These papers both seem to be summarized within this chapter. Further to that, the project summaries in Part 3 indicate that many of the projects related and supporting this chapter have not been completed, nor are recommendations yet available.
 - Some additional details are provided in General/Specific Comments below.

4. Are the assumptions used valid and are the mathematics presented correct? **2**
 - The assumptions and mathematics within section 6.2.2 appear to be valid as the methods include those generally accepted for this type of work.

5. Is the manuscript well organized, material precise and to the point, and clearly written using correct grammar and syntax? **4**
 - While generally well written, in many places it jumps around and there seem to be important pieces missing. See General/Specific Comments below.

6. Are all of the figures and tables useful, clear, and necessary? **3**
 - Suggested improvemtn are provided in Specific Comments below.

7. What is the quality of the overall work? **3**

Recommendation

C - acceptable if adequately revised

Rating
65

A handwritten signature in blue ink, appearing to read "S. C. King, Jr.", written in a cursive style.

Signature:
Date: August 20, 2009

Comments for Transmission to Authors

General Comments:

The chapter addresses the question “How has climate affected the change in lake level relationship between Lake Michigan-Huron and Lake Erie” but the underlying question is whether the magnitude in changes to the connecting channels and those of isostatic rebound have had an important effect. Using an approach involving comparative and statistical hydrologic data analysis, the conclusion is reached that climate has played a dominant role, while channel conveyance and glacial isostatic adjustment have had a smaller effect. The study purports to be integrated, but rather it seems to have been rolled up from a large number of sources. The report itself focuses on the importance of climate in the in lake levels it does not adequately link those changes to the climate system – i.e. changes in precipitation are noted that parallel changes in lake level, but these are not linked to the NAO or the AMO, or ENSO so the climate link is not as well established as it could potentially be.

It is unwise to presume that because the climate system has a large role that the other factors have been adequately eliminated. I read this report looking for an analysis that tried to separate out the other sources of change in some way, but did not find such. Since in this time period, changes in channels have taken place and also changes in landuse, the issue is very confounded. Given that it is difficult to follow the methodologies and logic in the report, and that it is generally an extensive summary of the climate analysis, these other effects have not been adequately addressed.

The report is often disconnected and does not always flow well. In my mind there are gaps where there should be connecting the pieces of text from original sources. While I found the text to be generally well written, it is these jumps and gaps that need to be improved to more clearly convey the methodologies, results, and conclusions. I have pointed out a only a few of them in the comments below.

To make a suggestion for how this report might be improved, consider building a time line figure that shows when changes in the climate system features changed [NAO, AMO, ENSO]; when conveyance might have been affected [dredging, ice jams, floods], and isostatic rebound; and also major landuse changes; then relate the observed and detected changes to that. This is a very complex problem, and the clarity of the presentation is critical.

Specific Comments:

1. page 149 paragraph 2 this presupposes that the other potential factors are less important than climate.
2. Page 149, paragraph 3, line 3: There should be some explanation as to why there is a greater focus on the period 1996 to 2005 and what impact this has on the conclusions of the chapter (if any). I would have expected to see some analysis that used a time line

based on events, dredging, ice jams etc. that would directly affect conveyance. Also, some plan to assess the magnitude of isostatic rebound.

3. section 6.1. The science question is 'how has climate affected the lake level...?' addressing that question does not rule out other effects.
4. Page 151, paragraph 4, last sentence: What is the magnitude of the differences between different data revisions? What impacts do the studies using different data revisions have on the conclusions of this study? Do the sources differ in their recommendations because of different data inputs?
5. Page 154, Figure 6-2: Is this figure from Quinn's report? Was this report corrected and updated to correct the many shortcomings? The two panels use the same y axis scaling but are presented with different lengths, making the "trend" on the left much greater than the one on the right. Is the reader to infer that the line is a statistically important trend or has someone simply used Excel to draw a straight line through the data. Is there a real difference? Certainly this figure shows a series of phases and not an independent IID type process.
6. Page 153 onwards. Following the section describing Quinn's multiple reports the text becomes inadequately linked to the reports from which the figures and text has been extracted. I found it odd that the citations were to original literature like Mann, 1945 and not to the specific UGLS Project Reports. The text appears to be pieces pulled from those reports and not always well connected logically.
7. Page 156, Figure 6-3. It is most interesting that these two series are so similar yet one shows no change point and the other does. Perhaps these should be considered as covariates and reanalyzed:
8. Page 156, paragraph 2, line 3: Here is another case where the logic doesn't flow well. The text indicates that the change-points due to climate removed so that the hydraulics could be studied, but it doesn't indicate how any of this was done nor does it inform the reader about what the result was. Adding a plot of the hydraulic component would be most illustrative.
9. Page 156, Figure 6-4. Again, it is most interesting that these two series are so similar yet one shows 2 change points and the other only one. Perhaps these should be considered as covariates and reanalyzed?
10. page 157 "Connecting Channel Flows" - this paragraph is inadequate, and it is inappropriate to not fully address these changes. Trend analysis does not lead to a statement like "revealed no long-term trend"
11. Page 162 paragraphs beginning "the first metric" is an example of one of the key issues with the report – it gives a loose description of the metrics and their precision, but does not indicate whether that is important or how the reader might use the information.

12. page 164 paragraph beginning “As noted earlier...” Needs to be rewritten –as you can not have this both ways. Choose either the description [which is an opinion] or the analytical result.
13. page 164 “To assess climate and conveyance ..” The last sentence in the paragraph needs to be rewritten using better wording, as the present wording is not clear.
14. page 165 Figure 6-9 - replace with an adequate figure. This could be in a textbook of how not to prepare a figure.
15. page 167 Figure 6-11 –pie charts are inappropriate to display this type of data.
16. words and phrases that don't belong in the report include “only a slight”, “reasonably”, ‘in part’. During a rewrite the author should consider using precise words when they are appropriate and avoiding words that imply precision when they are not appropriate.