Thank you very much to the reviewer for their thoughtful review and commentary. It has lead to several substantial improvements to the manuscript. We have responded to each of your comments in bold below.

Reviewer 2:

Page 2, Ln 25-27: Please double check this calculation. The total area of the eight East Africa Great Lakes is ~ 152410 km^2. The water volume increase associated with 1 meter of water level increase is ~ 152 km^3.

We have double checked this calculation and found it to be correct. The line states that "water levels in the eight East African Great Lakes went up by more than 1 m." The actual increases are listed below:

Lake Tanganyika: Surface area (32000 km2) * Water level increase (1.7 m) = 54.4 km3
Lake Victoria: Surface area (69000 km2) * Water level increase (1.4 m) = 96.6 km3
Lake Mweru: Surface area (4500 km2) * Water level increase (2.6 m) = 11.7 km3
Lake Kyoga: Surface area (1700 km2) * Water level increase (1.9 m) = 3.23 km3
Lake Turkana: Surface area (6750 km2) * Water level increase (3.8 m) = 25.65 km3
Lake Rukwa: Surface area (3050 km2) * Water level increase (2.4 m) = 7.32 km3
Lake Malawi: Surface area (30000 km2) * Water level increase (1.2 m) = 36.0 km3
Lake Kariba: Surface area (5200 km2) * Water level increase (5.9 m) = 30.68 km3

Total = 265.58 km3

This total is in agreement with the total offered in the manuscript.

Page 4, Ln 34: "Collinear" is a too strong word here. I would use "correlated".

Thanks for this clarifying suggestion. We have replaced the word "collinear" with "correlated."

Page 5, Ln 30-32: Altimeter observed water level changes for global major lakes are also available from the CNES Hydroweb (http://hydroweb.theia-land.fr/). There are notably large differences between the G-REALM and Hydroweb solutions. The G-REALM solutions appear to show larger biases (based on preliminary comparisons in Caspian Sea and Lake Victoria). This is not to ask the authors to redo the analysis using the Hydroweb solutions, but to remind them the potential issues with the G-REALM solutions.

Thanks for this reminder of the potential issues with the G-REALM solutions. Despite the trade-offs as mentioned by the reviewer, we decided to use G-REALM data because it covers more lakes over longer time periods.

It will be helpful to show a distribution map of the 117 lakes. The current Figure 3 does not really suit the purpose.

Thanks to the reviewer for this suggestion. We are not sure what a distribution map would show which is not already shown in Figure 3 but would be happy to include one regardless in the supplement to our revision.

Page 6, Ln 6: water level altimetry -> altimetry water level observations

Thanks for this suggestion. It has been changed as requested by the reviewer.

Page 6, Ln 29-33: The authors claimed that they calculated a complete correlation matrix between each PC and all of the 37 major climate indices recognized by NOAA's Earth System Research Laboratory. Some of the indices (e.g., EA/WR and TPI/IPO) from the ESRL (https://www.esrl.noaa.gov/psd/data/climateindices/list/) do not cover the recent time spans. How did the authors deal with those indices?

For the indices that were not calculated continuously to the present, we calculated correlation coefficients over the longest timespan that was available for each PC and its paired index. This has now been clarified in the methods section with the following text:

"For indices that aren't updated to the present, we calculated the correlation over the longest time period over which each major climate index was available."