

Many thanks for this paper. Whilst not an 'expert' in the field of documentary analysis, I approach this paper as a potential user of the outputs and the application of the methodology as a way for testing / comparing records derived from lake sediments against an independent archive. The approach using documentary evidence from Tanzania fill an important gap in knowledge in part of the world where historical (and palaeo!) records are still few and far between. I would also, before listing my corrections, like to apologise profusely to the authors for the delay in submitting this review. I have been in and out of the office for work, and as with everyone, workloads have simply got the better of me this year.

Overall, I think this is a good paper. I have some clarifications to elements of the text. And just being a little pedantic, the authors have over-used the number of figures; many of these should be panel figures or stacked figures. As they are all on the same timeframe, it would be so much easier to compare the figures generated from different datasets if they were stacked and became (for example) Figure 1 (a,b,c). I will also point out where this could be improved. Obviously, this is not a critical element to the robustness of the science presented, but to make it accessible and easier for the reader of the journal, I would strongly suggest this change to the presentation of figures is made.

Just an aside, I wondered whether you had worked with / engaged any Tanzanian scientists in this work, given this is the country of focus? Again, not critical to whether or not this paper is accepted, but the landscape is changing, and it would be wonderful to see *Climate of the Past* publishing work that is delivered in partnership with scientists from the country that is having science done to them.

The authors acknowledge that the manuscript was prepared without collaboration with scholars in Tanzania. This is partly a result of all the documentary sources having been consulted for this article being available either in Europe or digitally. If our ideas and methodologies are to be taken forwards, however, then in-country research and collaboration will be a necessity. We alluded to this on lines 20, 95 and 541, in which we call for the integration of oral traditions for earlier periods. In the revised draft, we will be make a call for subsequent in-country research more explicit in the conclusion (line 541).

The remainder of clarifications are given by line number. Given I am not a technical expert, my comments are really directed to help users of your work (i.e., not historical / documentary analysts) to understand what you are presenting, and to provide them with data / figures that are easily comparable to other archives.

Ln25: I'm not sure I fully understand how the approach is complementary to / different from existing published methods? What issues will this cause of users of the approach used by Nicholson (for example)?

We think the reviewer means to refer to around line 167. The point is well-taken, and we addressed a similar comment in our response to the first reviewer. We intend to obliterate the word 'interoperable' from this part of the manuscript, and instead we claim that our indexed time-series is 'broadly comparable' to that of Nicholson et al. (2012). We argue

that our method is more appropriate for integrating documentary evidence with outputs from reanalysis and GCMs.

Ln175: What is the cut-off used for high uncertainty vs low uncertainty? How did you determine this (i.e., had to score 3 out of 4 criteria)? How subjective is it? How transferable is this method from one researcher to another if it were developed, for example, in another country within Africa?

We did not have a cut-off. In a revised draft, we will cite Adamson, Nash, and Grab (2022) (which we cite elsewhere) explicitly here. They argue that “variability between researchers should be considered minimal where index-based climate reconstructions are generated by trained historical climatologists working in groups of two or more.” In short, the collaborative nature of our time-series creation has minimised individual subjectivities.

Ln187(ish): Figures 2-4. This really isn't a set of 3 separate figures. Even the combined heading that has been used suggest this. Rather, this is a stacked / panel diagram on a single page, on a single timescale labelled Figure 2a, b, c. Further, the text on this diagram needs to be larger / readable. It's a big strain to see what is there. Also, on this (and all diagrams with the timescale on the x-axis). What is the notation you use? Is 01 January, 02 February etc or is it seasonal? You need to make this clear somewhere (in figure caption), so we are all on the same page. Originally, I thought it was record 1 from 1855, record 02 etc. The way the notation is at the moment is just too hard to understand and read. Try to align all x-axis scales (you can do this if you change your chart-type – it will also save the pain of the axis labels being fixed).

We will be happy to work with the editors of *Climate of the Past* to ensure that our figures are labelled and aligned optimally. In our original submission, we labelled them as 2.1, 2.2, 2.3 (rather than 2, 3, 4), but we were advised that they should be labelled only with integers. We will be happy to revert using a lettered system here instead, if that is preferred.

Ln187(ish): A follow up on the figure caption. No matter how many times I read it, I can't quite work out what you mean in the last line of the caption ('Values of +0.05...') you are going to need to spell this out in clearer language. I can't even work out where +0.05 would come from if your scale is -3 to +3 (or have I missed the point?). Can't you use a symbol or colour on the x-axis label to identify where there are no documentary data? There has to be a better way than arbitrarily adding a score. You may also want to increase the resolution of the image, my printer isn't wonderful, but the copy here is quite low res.

We will rephrase the sentences on line 189 to: “The smallest colour bars/markings on the x-axis indicate an index value of 0. Absence of any markings indicates that there was no documentary data for that period.”

Ln201: Somewhere here you start referring to 'documentary references for each line' – what's a line? Is this a bar on your graph? In which case you would refer to it by month and year (or season and year (see comment above). If this isn't what is meant here, this whole paragraph

needs a re-write to clarify exactly what you are referring to, because I can't quite follow t. Can you provide a supplementary data table that shows a; 'lines' and all data a source used in the paper. At the moment there is no transparency, just your interpretation here. Providing the underpinning data would help the reader better understand the approach you are taking, especially when the text 9as written) is quite complex to understand.

This is a good point, and one which is similar to one of the first reviewer's (their comment refers to lines 199-203). We've added several sentences to explain what comprises a line of data, by using the line with 12 references as a reference. The full paragraph will now read:

“The three time-series reflect a total of 151 lines of data: 55 for Mpwapwa; 52 for Tabora; and 44 for Ujiji. The datasets underpinning figures 2–4, including transcriptions and comments on individual references, are available by link in the section, ‘Data Availability’. Each line of data refers to climate conditions during a given period, ranging from one month to an entire rainy season. The number of documentary references for each line is between one (several) and twelve (line 31 of the Ujiji dataset). The latter example refers to November–December 1886, and includes data from a letter written by an LMS missionary based at Kavala Island and eleven separate diary entries by a White Fathers’ missionary based at Kibanga. At Kavala Island, the LMS representative reported in early January that farmers had recently gone to the mainland to cultivate, which is later than usual and could suggest a slightly delayed beginning to the rainy season (CWM/LMS/06/02/012 Lea to Thompson, 6 Jan 1887). However, the evidence from Kibanga has much more granular data, with reports of ‘clouds... gathering’ and abundant rain from the end of October (A.G.M.Afr. Daire de Kibanga, 19 Oct. 1886, 22 Oct 1886, 25 Oct. 1886, 27 Oct. 1886, 10 Nov. 1886, 22 Nov. 1886; 26 Nov. 1886, 30 Nov. 1886). That these were not just episodes of rainfall, but part of a broader trend is confirmed by reports written in December, during which heavy rainfall caused a nearby stream to overflow on 1 December, following which the missionaries were able to plant wheat on 6 December, and on 16 December there were ‘big rains... these days’ (A.G.M.Afr. Daire de Kibanga, 1 Dec. 1886, 6 Dec. 1886, 16 Dec. 1886). Read collectively, it was determined that these reports suggested slightly above average rainfall in Ujiji (index value = 1) for November–December 1886 (cf. Nash et al., 2021). However, as the reports were made outside rather than within Ujiji, this datapoint only received a confidence value of 1. In addition to published data by ‘explorers,’ which provide references for all locales, data for Mpwapwa is informed principally by documents held in the CMS archive, with documents from the White Fathers’ archive providing additional information for 1880-82; the Tabora dataset is equally informed by documents in the CMS and White Fathers’ archives, with occasional references to the LMS archive; and the Ujiji dataset is informed equally by references in the LMS and White Fathers’ archives, as well as by one reference from the AIA archive.

Note, we have provided the underpinning data in the ‘Data Availability’ section, which we’ve referred to directly in the second sentence of the paragraph. Given that this is freely available, we don’t see the need to include table with some of the underpinning data in-text.

Ln210: How do you define the ‘quality’ of the data? What were the parameters that you set? They would need to be presented here (or in a supplementary document) also.

‘Quality’ was used in this instance as a synonym for confidence. On reflection, this was an error. Thus, we will change the sentence to: “As expected, there is limited quantity of data, especially data for which we attribute high levels of confidence, for the first twenty years...”

Ln280: As previously, these are not 6 different figures. It is a single figure with multiple panels. They all need to be stacked and appear on a single page to enable the reader to make an assessment of the data you are providing. They also need to be labelled sequentially (i.e., not refer to 5, 7,9, but to 5,6,7 – or my preference would be a,b,c). Perhaps consider a different way to display these – there are lots of examples in the literature that would help you to better present these. At the minute it’s all very confusing and I don’t think will land with the audience of CoP. At a push this could be 2 figures 5a,b,c and 6a,b,c where you would have a column for each model. They are related (a-c), not independent (5-10) figures. Follow the layout for your Figure 11 – you have not labelled these as 25 different figures!

As with the earlier comment, we are happy to work with the editors to label and align the figures appropriately.

Ln312: I know it’s going to be hard, but the text size is quite small in your figure 11, is there an outside chance you can make it slightly bigger?

On reflection, this is the least important of all the figures to have in-text. Instead of making each graph bigger for clarity, which would necessitate it passing over more than one page, we suggest – if it is acceptable to the editors – including this figure as a ‘supplementary figure,’ with a link to it at the end of the article.

Ln327: Another figure. You could approach it that in any given panel figure ‘a’ is always Mpwapwa, ‘b’ is always Tabora, and ‘c’ is Ujiji. That will also make it easier for the reader to follow the story. You need to take the reader along with you, not make it overly complex for them to engage.

As with the earlier comment, we are happy to work with the editors to label and align the figures appropriately.

Ln360: Again, think of the labelling. If you do want to keep these as separate figures, they would all need separate captions (i.e. one for Fig 15, a new one for Fig 16 and another for Fig 17; they can’t be all as one. In doing so, you are suggesting to me they are related and should be presented slightly differently.

As with the earlier comment, we are happy to work with the editors to label and align the figures appropriately.