

***Interactive comment on ““Everything is scorched by the burning sun”*: Missionary perspectives and experiences of 19th and early 20th century droughts in semi-arid central Namibia” by S. Grab and T. Zumthurm**

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Anonymous Referee #2 Received and published: 21 October 2019 This article provides rich detail of the drought history and associated societal consequences of central Namibia from the mid-19th to early-20th century. The detail and challenges covered in this paper will undoubtedly be useful for historical climatologists engaged in drought reconstruction methods from colonial sources. It was also nice to see such a study crossing the somewhat artificial but very real dividing line from 19th to 20th century, which I think is an important step for African climate history. One of my main overall

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comments, however, is that the paper is overly descriptive and leaves one wondering what are the meanings and implications beyond the context of Namibia.

THE NATURE OF DOCUMENTARY BASED WORK IS IN ESSENCE OFTEN VERY DESCRIPTIVE, AS IS THE CASE WITH OTHER PAPERS IN THIS SPECIAL ISSUE ON DROUGHTS. DESCRIPTIVE APPROACHES CAN BE RICH IN DETAIL, OFTEN SHARING MORE INSIGHT THAN NON-DESCRIPTIVE APPROACHES. HOWEVER, HAVING SAID THIS, WE WOULD ARGUE THAT THERE ARE IN FACT NUMERICAL (NON-DESCRIPTIVE) APPROACHES THAT WE HAVE WEAVED INTO THE MANUSCRIPT TO PROVIDE A BALANCED APPROACH.

This started to come out in the conclusion, but even then the conclusion that human experience and reporting of drought depends on social and environmental context is now fairly well-acknowledged in social scientific and humanities literature on climate. My main suggestion would therefore be to set up the paper with firmer and sharper research questions rather than the aim of simply establishing changes in influence and impact of drought over time, which could, in turn, provide for some sharper conclusions. WE HAVE NOW EXPANDED THE LAST SECTION OF THE INTRODUCTION TO MAKE IT MUCH CLEARER AS TO WHAT EXACTLY THIS PAPER AIMS TO DO. SO IT SETS A MUCH FIRMER SET OF AIMS, TO WHICH THE CONCLUSION SPEAKS.

As detailed in one of my comments below, one way this could be achieved is by grounding the paper in, and comparing it to, other missionary-derived climate histories in the region which cover changes in drought and its impacts over time - the prime example being the study by Kelso and Vogel (2015) in *Global Environmental Change*, but also studies by Nash and Endfield on the Kalahari, and Hannaford (2018) in *Global and Planetary Change* which takes an even longer view. In my view, this would be a more convincing way into the issues discussed in the paper rather than just the issue of drought definition and human engineering. It would also add something more to the growing regional body of work on historical drought-society interactions, for example

by asking whether the Namibian case is unique, or whether we see similar patterns in impacts and perceptions as elsewhere (which section 4 in particular lends itself towards).

ALTHOUGH WE WERE FAMILIAR WITH THESE PAPERS, WE HAVE NOW READ ALL THESE PAPERS AGAIN TO ADDRESS THIS CONCERN. ON HAVING READ THEM AGAIN, WE REALIZE JUST HOW DIFFERENT (AND IN OUR VIEW WE BELIEVE 'UNIQUE') OUR PAPER IS, IN TERMS OF WHAT IT PRESENTS CONCERNING HISTORICAL DROUGHTS IN SOUTHERN AFRICA. OUR PAPER DEMONSTRATES SOME IDENTIFIED TEMPORAL CONSEQUENTIAL AND HUMAN RESPONSIVE PATTERNS TO DROUGHT, WHICH NONE OF THESE OTHER PAPERS ADDRESS. ALTHOUGH ALL THE WORK FROM THESE OTHER REGIONS IS EXCEPTIONALLY INTERESTING AND VALUABLE TO US, THESE OTHER PUBLISHED WORKS ARE NOT DIRECTLY COMPARABLE TO WHAT WE PRESENT. IN FACT IT IS DIFFICULT TO MAKE ANY STRONG COMPARISONS WITH OUR PAPER BECAUSE THE WAY THESE OTHER PAPERS ARE THEORETICALLY FRAMED - ALL RATHER DIFFERENT TO THE WAY OUR PAPER IS FRAMED. HOWEVER, WE HAVE LOOKED VERY CAREFULLY WHERE WE MIGHT BE ABLE TO CITE THESE PAPERS WHERE THERE IS SOME RELEVANCE TO WHAT WE DISCUSS. THE STRONGEST LINKS WE FOUND WERE IN THE KELSO AND VOGEL (2015) WORK WHERE THESE AUTHORS ADDRESS DROUGHT AND RESILIENCE THROUGH THE 19THC IN NAMAQUALAND AND WHERE WE ARE INDEED ABLE TO MAKE SOME RELEVANT LINKS – WHICH WILL NOW BE MADE AS WE REVISE THE MANUSCRIPT. BUT EVEN HERE, MANY OF THE THINGS WE DISCUSS CONCERNING WATER AND THE ENVIRONMENT ETC ARE NOT DISCUSSION POINTS FOR NAMAQUALAND AND OTHER SUB-REGIONS OF SOUTHERN AFRICA (I.E. KALAHARI ETC).

A number of specific comments are detailed below: Line 46-47 - relating to the paragraph above in this review, what exactly are these lessons? The point about changing



definitions and the conditions that can bring about 'drought' is noted, but what are the lessons that can be learnt from the past and what is the particular relevance of the before the era of human engineering? WE HAVE REWORKED THE TEXT TO ADDRESS THESE ISSUES

Lines 128-130 - what do these characteristics mean? Presumably they are categorising the social-environmental characteristics of a drought, but the scale and characteristics of these categories are unclear. WE WILL BE CLEARER WITH THIS

Lines 142-181 - are these paragraphs 'results' as such? This is historical environmental and social context.

YES- THEY ARE RESULTS

Line 165 - 'Consequently, political and economic dominance was tangible' - this could do with some more explanation, i.e. how did the political intersect with the economic? WE HAVE ELABORATED AS FOLLOWS: Consequently, political and economic dominance was tangible. In particular, much of central Namibia's economy functioned through cattle, which was viewed to be the best option to store wealth, as it was easily transferable. Combined with smart and shifting alliance-making, large herds of cattle allowed its controller to enforce tribute-systems or to claim land and thus ensure political dominance. Such a socio-economic system was, however, easily disrupted through a variety of factors such as drought, conflict, cattle diseases and European colonization/influence. Ultimately, such an indigenous socio-economy gradually declined in significance as European influences rapidly increased through the late 19th/early 20th centuries.

Lines 183-201 - this is a point that crops up in colonial accounts in many contexts and is an interesting one. It would be valuable to know how the authors dealt with this issue for 'newcomers' to Namibia; was the word 'drought' simply discounted for these observers? WE EXPLAIN THAT THIS IS NOT A CONCERN GIVEN TRIANGULATION OF SOURCE INFORMATION AND CAREFUL SCRUTINY OF SUPPORTIVE

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EVIDENCE AS FOLLOWS: To this end, and where possible, comments on weather, climate and the environment require careful scrutiny and comparison across various sources. In most cases written texts contain valuable contextual information (e.g. dryness/wetness of river channels, poor state of shrubs and trees, comments from older indigenous inhabitants etc) which helps verify claims of drought. In addition, several missionaries resided and travelled extensively in central Namibia for many years and in some instances decades (e.g. Viehe: 26yrs; Hahn: 30yrs; Heidmann: 39yrs; Bernsmann: 42yrs; Irle: 47yrs; Diehl: 51yrs), constantly interacting with local community members. In such cases, missionaries developed excellent knowledge of the local weather patterns and climate, and were able to place contemporary climatic conditions in perspective, comparing situations with those experienced over many years prior.

Lines 259-260 - I would suggest considering reformulating this sentence (it sounds a bit more like an email than a scientific journal paper!). It would also be useful to provide some more material from Grab and Zumthurn (2018) (e.g. the drought classifications and chronology), which seems to be of fundamental importance to this article. SURE – WE CAN REWORK THIS

Lines 262-266 - Table 1 is a really nice visualisation of drought impacts. However, there are some issues with 'drought mentions' as a proxy for drought occurrence, if this is the intention of the figure. The authors do acknowledge that this can be dictated by the availability of documentary material, but there may also be other issues here, e.g. the length of time a missionary had been resident in Namibia. There is also the issue of the extent of alignment between Table 1 and Figure 4, e.g. the drought of 1877-1879 had most of the 'reported consequences' categories ticked whilst also being the drought that was most mentioned, which one might expect, but this was closely followed in breadth of reported consequences by the drought of 1900-1903, yet the discrepancy in drought mentions is very large indeed. Why is this?

YES – WE HAVE ADDRESSED THIS AND EXPANDED THE TEXT CONSIDERABLY TO EXPLAIN ALL THIS MORE FULLY TO AVOID SUCH CONCERNS BY THE

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READER: Figure 4 lists the number of times 'drought' is mentioned in documentary sources each year, and how this compares with the hydro-meteorological 19th C chronology by Grab and Zumthurm (2018). While the depicted results are impacted by documentary data availability and do not necessarily indicate drought severity, the intention with this figure is to provide a visual impression highlighting times when 'drought' received much mention (and thus attention) through written sources, such as during the significant drought events of 1865-69, 1877-79, 1895-96 and 1900-03. Although the 1900-1903 event does not receive as much mention (according to Figure 4) as those during 1895-96 and 1877-79, this is largely due to fewer documentary source materials having been consulted for times since ~1900. The more recent documents contain a much greater detail of information, hence requiring fewer sources. However, the figure also demonstrates that concerns of drought conditions are reported much more frequently (66% of years) than the actual occurrence of drought (29% of years) during the 19th C. This is owing largely to conditions of [prolonged] seasonal aridity, usually described as 'drought'.

Section 4 - this section provides a nice social-environmental chronology and is rich in detail. It relates this chronology to the larger southern African picture, though only in terms of drought periodisation rather than that of societal responses. It would be very valuable to see some comparative elements to this section, the most obvious example being the work by Kelso and Vogel (2015) on Namaqualand, which has a very similar temporal scope and would provide a fascinating comparison. ALTHOUGH WE WERE FAMILIAR WITH THESE PAPERS, WE HAVE NOW READ ALL THESE PAPERS AGAIN TO ADDRESS THIS CONCERN. ON HAVING READ THEM AGAIN, WE REALIZE JUST HOW DIFFERENT (AND IN OUR VIEW WE BELIEVE 'UNIQUE') OUR PAPER IS, IN TERMS OF WHAT IT PRESENTS CONCERNING HISTORICAL DROUGHTS IN SOUTHERN AFRICA. OUR PAPER DEMONSTRATES SOME IDENTIFIED TEMPORAL CONSEQUENTIAL AND HUMAN RESPONSIVE PATTERNS TO DROUGHT, WHICH NONE OF THESE OTHER PAPERS ADDRESS. ALTHOUGH ALL THE WORK FROM THESE OTHER REGIONS IS EXCEPTIONALLY INTERESTING

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