

## ***Interactive comment on “Glacial to interglacial climate variability in the southeastern African subtropics (25–20° S)” by Annette Hahn et al.***

### **Anonymous Referee #2**

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Based on a sediment core from Delagoa Bight offshore southeastern Africa, Hahn and co-authors present a new multi-proxy reconstruction of the continental climate for the last 100,000 years. The new record has high potential to improve our understanding how continental wetness has varied in response to latitudinal shifts in the westerlies and South Indian Ocean convergence zone. The data are certainly of very good quality and the new record has great potential, which, however, is not fully exploited in the current version of the manuscript. In my view there are several major shortcomings (see comments below) and major revisions are therefore required before the manuscript can be accepted for publication in CoP. I would like to emphasize that I will focus only on major issues at this stage of the review process: ã The study site appears to be ideally situated to record displacements of the westerlies and the South Indian Con-

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vergence Zone. Unfortunately, the authors do not really present a more detailed figure of the present-day atmospheric circulation patterns, which would help the readers to understand the discussion better. Basically, more detailed information on the atmospheric dynamics and according figures are required, such as the one presented by Charlotte Miller and co-authors in a previously published article in *Climate of the Past* (Figure 1 in Miller, C., et al. (2019). "Late Quaternary climate variability at Mfabi peatland, eastern South Africa." *Climate of the Past* 15(3): 1153-1170. Although multiple proxies were measured, there is rather little and very rudimentary information on their paleoclimatic significance and potential uncertainties and limitations are not discussed. For instance, the precipitation indicators  $\delta D$ , K/Al, Ca/Fe and red/blue ratios are only very briefly presented in paragraph 3.1.3. All proxies depend to varying extents on precipitation, erosion and fluvial transport, whereas these factors do not necessarily vary in concert. For instance, erosion is not always directly linked to the amount of precipitation and vegetation density is often an additional and more important factor for erosion rates. Erosion rates can also increase substantially at times of rapid climatic and associated vegetation changes. Because the relationship between precipitation and erosion (and riverine transport) is not linear. I would like to see a more critical discussion about the strength and weaknesses of the proxies. Some of the authors have worked for a long time in this region and published multiple articles on past climate variability in this region. It is therefore quite surprising that there are no attempts to incorporate other continental records from South Africa more effectively into this study. Some of the records are mentioned in the text but not displayed in a figure. The major precipitation indicators are presented in Figure 4, together with ice core records from both poles. The authors try to mark wet periods associated with different atmospheric circulation regimes. However, it remains absolutely enigmatic which scientific criteria were actually used to determine these periods. The width of the color-coded bars seems to be rather arbitrary as, for instance, indicated by the width of the green bar during MIS 5, which do not really match the minima in the  $\delta D$  and K/Al records. The authors must explain in close detail which criteria were used to

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determine the different climatic phases. Furthermore, what is actually happening during the white intervals? Figure 5 is a basic conceptual model, but it also highlights the problem of this study as other records were not really used to support this basic model. The authors suggest that the major changes on glacial interglacial time scales are related to latitudinal shifts of atmospheric boundaries and westerlies. Are there no zonal shifts in the moisture transport? Furthermore, I would like to see a third figure showing the conceptual model for the present-day situation.

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