The study by Maier et al., “Spatial and temporal variability of sea surface temperatures and monsoon dynamics in the northwestern Arabian Sea during the last 43kyr” would be a significant contribution based on Alkenone proxy in the Arabian Sea.

There are only few studies based on Alkenone proxy in the study area and the present study with high resolution, long SST record is interesting work in the complex region and is accepted subject to minor modifications. There are few suggestions which authors need to address prior its acceptance.

Major comments

Gulf of Oman, is a complex region and specifically influenced by SW monsoon due to its location and regional factors. Studying the region where seasonality is less pronounced due to the upwelling induced cooling during the summer season. Can the present study mark the variations in the seasonality of the two monsoon periods. Please elaborate on this aspect.

It is assumed that the alkenone proxy used in the study provides an Annual Mean SST. Does it not bias the study, can this give a true measure of the seasonality in the study area?

Annual SST variations are combination of different temperature signals such as Solar insolation and evaporative cooling, Strong NE winds, intensity of Upwelling, thus overcoming the bias by each signal would be difficult to estimate.

Past studies based on alkenones and other proxies from Arabian Sea reveals cooling during the LGM which varied regionally.

“The Unusual SST pattern at LGM” is not explained properly, majorly all the records in the Arabian Sea suggest cooling of atleast 2°C at LGM. There are several reasons as discussed in this section which prompts towards reduced SST contrary to what has been given as justification for warm SST at LGM, for example

(i) When there is an intensified NE monsoon effect the associated SST would be lowered

(ii) Reduced solar insolation compared to Holocene

(iii) Weakened SW monsoon during the entire glacial period cited references such as Boll et al., 2015; Naidu and Malmgren, 2005; Schulte and Müller, 2001, also suggest reduced SST at LGM.

(iv) Elevated dust levels could lower the SST then why there is a warm SST at the core site?

Infact, at the YD the low SST was explained with these reasons, compared to LGM’s warm SST anomaly. All these points indicate towards lower SST’s. Please provide proper justifications of warm SST at LGM.

Is there any time lag similar to what has been discussed by Naidu and Malmgren, 2005 or the chronology of the sediment core needs to tested for its robustness. Since in few studies the increase in sedimentation rate has been reported at LGM for various reasons in the basin.

The chronology part is discussed in Burdanowitz paper, however there should be an age model in the present study.

Minor Comments

Line no. 62, $\delta^{13}O$ needs to be corrected to "$\delta^{18}O$"

References should be in chronological order (for eg., line no. 72-75), this needs to be corrected throughout the manuscript. At several instances similar correction has to be made.

Line no. 90, "500 -1500m", add space between the no. number and units. Similar comment for the line 96, 98, 99, then at 120 and at several other. This need to be corrected throughout the manuscript.

The initial sampling was done at 2 cm interval. However, the alkenone analysis has been done only for 219 samples. The reason stated behind this the concentration of organic matter. However, is there any difference in terms of resolution of the study at later half of the core?

At line no. 199 "Enhanced SW monsoon conditions can also strongly impact the SST" If the SST is Annual average then how to distinguish the seasonality?

Why there isn't any trend in increase in SST at DO 2 and DO3?, Please provide justification for these two interstadials.

In general, for DO Interstadials strong NW monsoon was predicted, however the authors didn't mention about the effect of upwelling induced cooling on the SST in these time periods. Specifically looking at DO2 the low SST justification provided is due to intrusion of RSW or AIW in the Oman margin, with stronger mixing forced by NW/NE winds. However, at large at all the interstadials the SW monsoon winds were prevalent then what led to the change in contrasting wind conditions at DO2 interstadial? Please elaborate.

Is there any specific reason behind the increase in SST after DO2 and at the onset of LGM at 23 Ka.

At line no. 246, Moreover, during the LGM it has been postulated that there was an increased transport of warm water into GOM. The authors didn't provide any justification for the statement.

Global Factors influencing the SST variations at Gulf of Oman
In this section, the present dataset compared with records of other regions show similar variations. However, at LGM variation doesn't match with global records and the authors suggest influence if regional processes. What significant factors change this trend when comparing the records at other time periods such as Heinrich events, DO and BA cycles, early Holocene etc. which doesn't apply compared to LGM?

The spectral analysis periodicities of 7200 in the SST data which is attributed to Heinrich Events due to changes in Laurentide ice sheet. However, the authors may look at Naidu et al., 2019 wherein changes in the cyclicity is attributed to precision.

Conclusion

The significant points of the present study should be elaborated rather just mere stating the results of the study.

In general the dataset is very interesting but the discussion lacks proper reasoning and interpretation and the authors are encouraged to touch upon the comments to provide a better insights on their study.