

Dear Referee #1,

Thank you very much for your comments on our manuscript. Please find below some replies to your comments.

Comment: I think for a special issue dedicated to 4.2 ka event, it would be useful to expand the discussion on this point.

Reply: We agree that the discussion on the actual 4.2 ka event is short. We did not want to put the discussion of the 4.2 ka event in the centre of the manuscript since the events observed at ca. 5.0 ka and 3.8 ka seem to be much more pronounced in our records. Nonetheless, a more detailed discussion on the timing of the 4.2 ka event in our records has been added.

Comment: Sometimes the text contains statements about good agreement between different proxies and archives while in some instances differences are recognized.

Reply: We computed correlation analysis (Pearson) with our records underscoring the good agreement in general. Moreover, the differences, which occur, are more critically discussed.

Comment: Probably it would be useful to plot in figure 2 also the older ages model. In a way that older records will not be any more selected if not recalculated on the new age models.

Reply: We agree. The previous age model of Jiménez-Amat and Zahn (2015) has been indicated with a dotted line in Figure 2.

Comment: Pag. 2 line 6: mean primary productivity (MPP), it is the first time quoted in the text.

Reply: You probably refer to line 26. Please note that MPP is already introduced in line 24.

Comment: Pag. 3 line 2, delete regime after Mediterranean

Reply: 'regime' has been deleted.

Comment: Pag. 3 line 7 mm instead of ml

Reply: 'mm' has been written instead of 'ml'

Comment: Pag. 3 line 14 delete during winter (written twice)

Reply: the second 'winter' has been deleted

Comment: Pag. 4 line 14 why you don't refer to Reimer et al. 2015? Pag. 4 lines 18-19 linearly interpolated.....be more precise which ages are interpolated.

Reply: Also following Referee #4 comments we used Bayesian Modelling to construct our age model. Accordingly, the whole chapter has been re-written, but we now referred to Reimer et al. (2013) mentioning the marine13 calibration curve and the 400 yr reservoir correction. We hope that Referee #1 intentionally meant this paper, because we are not aware of any paper from Reimer et al. in 2015.

Comment: Pag. 6 line 2, 10 ccm? Do you mean 10 cm? or?

Reply: We meant 'cubic centimetres' and adjusted it towards 'cm³'.

Comment: Pag. 6 line 13 Proxy restrictions? What do you mean precisely?

Reply: With 'restrictions' we mean the (spatial, temporal, etc.) limits of the used proxies. But we re-structured also this chapter and included it into the discussion.

Comment: Pag. 6 line 17 Jalali et al. 2016, 2017 Pag. 6 line 23 Vogts et al.,2009,2012

Reply: Thanks, we adjusted this. Unfortunately, this was a formatting problem with the citation software.

Comment: Pag. 7 line 18 how changes of 1°C are significant considering the accuracy of the methods?

Reply: Of course, these changes are not significant because they are within the methodological error. To emphasize this, we inserted a statement that these SST changes need to be considered with caution. Additionally, we have added an error bar indicating the methodological error within Figure 3.

Comment: Pag. 7 line 20 “Annual mean SST in GeoB5901-2 vary stable? Is very stable around ca. 20.0°C? It would be useful to give numbers as mean±sd. This can give also an idea of significant deviation from the mean.

Reply: We followed this suggestion.

Comment: Pag. 8 line 11well matches....later you wrote it is not always the case. It is better to write some like “there is a general agreement. and Pag. 9 line 15 “drought episodes are paralleled” I think once again caution is necessary and description of mismatching is necessary.

Reply: You are right. We computed correlation factors (Pearson) also referring to a comment from Referee #3 in order to statistically support our statements.

Comment: Pag. 9 lines 26-26. How is it possible that insolation decrease and SST increase? Is there any wrong in this sentence? Or a further explanation is necessary? Which temperature are really recording your proxy? It probably needs some explanation.

Reply: Sorry this was a mistake. We meant that over the Holocene SSTs are generally cooling (due to decreasing insolation) with lowest SSTs (in the mean) during the present. Consequently, it is reasonable that the SST in the Mid- Holocene was warmer compared to modern temperatures. We corrected this mistake.

Comment: End pag. 9 beginning pag. 9. Please check carefully. It is little confusing and it is not always evident to understand which SST you are referring to (mean, seasonal).

Reply: We agree that this is a little confusing and difficult to read. We re-structured the discussion chapter into terrestrial and marine sub-chapters and discuss the annual, winter and, summer SSTs more separately within the marine sub-chapter.

Comment: Pag. 10 lines around 15, some further, more explicit comment on what temperature are measuring with your proxies is necessary.

Reply: Comparing the Gulf of Cadiz alkenone (annual mean) SST with other data, we wrote: “*The here reconstructed annual mean SSTs appear actually more close to summer conditions*”. To be more specific a more detailed discussion on this issue has been added.

Comment: Pag. 10 lines 19-21. I don’t think second decimal can be considered significant considering the age model.

Reply: We aimed to delete every second decimal before submission, but obviously we must have missed those numbers. This has been changed.

Comment: Pag. 10 lines 21-21. “These events, notably, differ from....” Surely this part needs to be expanded a little more.....

Reply: We agree. Some additional sentences for explanation and discussion on this point were added.

Comment: Pag. 10 I have no particular problem about the selection of Goslin et al. 2018 record, but there are also others. Is there any special reason? Is this record better dated? More robust?

Reply: We followed the comment of Referee #4 and compared our data to the NAO reconstruction of Olsen et al. (2012). Initially, we chose the Goslin et al. (2018) record because it covers the whole time interval (until 5.5 ka BP), while the NAO-reconstruction from Olsen et al. (2012) ends at 5.2 ka BP.