

Interactive comment on “Influence of the North Atlantic subpolar gyre circulation on the 4.2 ka BP event” by B. Jalali et al.

Anonymous Referee #6

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The article by Jalali presents a set of unpublished alkenone-based SST data from the North and South of Iceland along with pollen analysis from a core in the Gulf of Lion, W. Medit. to decipher how the 4.2 ka event altered the ocean/atmosphere system and precipitation pattern in N. Atl and W. Europe.

I read with interest this nice article which also reads well, along with reviews already provided by 5 referees. In such a situation it is difficult to wrap-up a review and I think the 5 other reviewers already pointed out many details that could be easily addressed. Hence I will simply build on what was, in my opinion, the most important remark to improve significantly the article, made by Anonymous Referee #4.

I indeed suggest the authors to consider re-writing the manuscript's last paragraph. As it stands it does not add anything to the article, but obscures the main message of

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the article, which has been so far a detailed description of the climatic pattern recorded regionally by marine and continental proxies. I think there are two options here: either you simply remove that paragraph and Figure 5, or you discuss more the model-data comparison in an appropriate and elaborated way. Unlike Referee #4, I think that adding that paragraph in the conclusion section would not help discussing model-data matches and mismatches, and eventually dilute the message of Figure 5 to convey. It perhaps deserves a little more work, including a full description of the climatic pattern associated with the SST field anomaly (shifts in winds/currents/etc.) simulated by the model would be helpful to understand under which circumstances the ocean currents and wind regimes described in the introduction and in Figure 1 have shifted in the model, potentially why there is a significant model-data mismatch, and finally what could be done (both in terms of climate simulation and data reconstruction) in the near future to better understand what likely happened during the 4.2 in the region. Otherwise I don't see much of a point to highlight a last figure such as Figure 5.

Other reviewers have provided a series of remarks on the model results, the age model and SST proxy uncertainties (such as e.g. seasonality) etc., so I guess it wouldn't be hard to (1) rectify the model result misinterpretation pointed out by Referee 1, (2) discuss a little more the uncertainties associated with climate reconstructions shown in figures 2-3-4, and (3) elaborate more on Figure 5 to provide guidance for the next studies devoted to understand the connection between the dynamics of the ocean and atmosphere and its impact on European climate during the 4.2 event.

If you opt for discussing more Figure 5 in your next version of the article, it would be helpful to provide some description of modern climate too. Concerning the connection between N. Atl and the W. Medit. climate you perhaps may want to refer to the article by Brayshaw, D. J., Hoskins, B. & Black, E., "Some physical drivers of changes in the winter storm tracks over the North Atlantic and Mediterranean during the Holocene", *Phil. Trans. R. Soc. A* 368, 5185–5223 (2010).

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