*We thank **Anonymous Referee #3** for his time and effort to review our manuscript and for his highly helpful comments and encouragement.*

This is an interesting paper which on the base of new and upgraded marine proxy records from the subpolar North Atlantic contributes to a better understanding of the oceans constraints for the 4.2 event. Based on high-resolution sea surface temperature reconstructions of two sites in the North Atlantic subpolar gyre the authors conclude that a weakened subpolar gyre may have been related to blocked atmospheric circulation, may have caused / modulated this RCC event. The potential implications on western Mediterranean climates are discussed against a background of currently available paleoclimate and - environmental records, as well as with regard to recent climate model simulations of the LIA. Opposite SST patterns across the 4.2 event (4400-3800 y BP) found at the sites from the North Iceland shelf and SW of Iceland, respectively are interpreted in terms of a temperature "dipole". The new high-resolution records here presented indeed provide new pieces of evidence for the North Atlantic mechanisms behind the 4.2 event, and possible links for the detailed evolution of the 4.2 event in the western Mediterranean. Thus publication of this article is highly recommendable.

Yet a more critical evaluation of the new proxy results and thus robustness of conclusions drawn appears well indicated. There are in particular issues with lacking informations about accuracy, analytical and calibration errors, potential seasonal bias as well as the regional performance of biomarker proxies here employed.

Uncertainties issues have been answered (see reply to referee 2). The changes we discuss are significant. Our two marine core SST reconstructions are derived from alkenones produced in summer season. The temperature dipole they fingerprint points to a weak SPG. This contrasting T pattern is probably persistent throughout the year and not only in summer, and probably over several years otherwise it would not be detected in our marine cores given their temporal resolution. This weak SPG mode would in turn create the conditions for North Atlantic blocking which is stronger in winter. We do not need to have a winter proxy to disclose a phenomenon that expresses strongly in the atmosphere in winter but result from a feedback from the ocean to the atmosphere.

This information should be integrated into the very brief results section, or alternatively into the methods section. In particular seasonal patterns are crucial to understand potential forcing of subpolar gyre and ocean atmosphere dynamics. An array of earlier alkenone studies have outlined the problems with the Uk37 proxy which has been "globally" calibrated for annual mean sea surface temperatures. Yet this proxy has been shown to have problems to properly reconstruct SST in the high latitudes and in polar water masses (generally very low alkenone concentrations), in particular. Accordingly it cannot be excluded that the opposite patterns reported from the two sites may to some extent a result of seasonal bias (thus challenging the dipole interpretation). Further reading suggestions: e.g. Moros et al. 2004, Bendle et al. 2005.

It could be helpful for instance in Fig. 2 to show additionally the alkenone concentrations to gain a better insight into the reliability of these records.

In this study we used Uk'37 and not Uk37. SST are derived from the widely used calibration published of Prahl et al. 1988 as recommended by the international workshop held at WHOI in the US in 1999 (see Prahl et al. G-cubed 2000). The C37 alkenone concentrations used to calculate temperatures in MD95-2015 are on average 334 ng/g (range 36 to 700 ng/g). Mean value in MD99-2275 is 362 ng/g (range 20 to 3062 ng/g), which is high enough to calculate reliable SSTs. These data are now shown in figure 2cd.

A second issue in my view very interesting but unsufficiently addressed in this paper is the timing and duration of this event in the North Atlantic and western Mediterranean area. This also requires to adress the accuracy of the age models (already outlined by the 2nd reviewer). Given the high resolution of the new records there is a chance to narrow down the timing of the RCC regionally. Nevertheless a broad time window of 600 year duration (4400-3800 y BP) for 4.2 event is adopted, nevertheless a narrower window of 4400 - 4000 to y BP is used in fig. 4. An explanation for this discrepancy is missing.

The age models of the two cores have been calculated based on the Bayesian approach of Oxcal software as requested by rev#2. The window width has been corrected to be same in fig 3 and 4 and in the revised version of the manuscript.

I moreover hook up the arguments of two already available reviews for this manuscript provided by Chamarro and an anonymous reviewer with regard to the role of seasonal patterns, and with obvious differences between LIA and 4.2 scenarios and their potential forcing.

This has been addressed (see answer to reviewer 1 and 2)

While the paper is generally well and clearly written, and nicely illustrated there is quite a large number of inconsitencies, slips and typos which make it eventually difficult to fully understand this text. Those must be eliminated prior to acceptance. I spent quite some time with that, yet not being an English native speaker myself I certainly cannot identify all of them and therefore I strongly recommend careful English proof reading.

Here is my list :

P1 L 19. What do you mean with "reduction of the subpolar gyre circulation"? Strength / intensity or extension?

The word "weakening" instead "reduction" is more appropriate. However, in the discussion we also argue about the associate changes in the shape and position of a weak SPG.

L 28. Must be Mayewski insted of Mayewsky L 39. Must be megadrought instead of Megadrought L 51. Must be Berkelhammer instead of berkelhammer.

Done

p2 L 60. I guess there should be an article: the equatorial Atlantic

Done

L 83. Even of the East Greenland Current are relatively low saline, to my knowledge in the ocean there are no freshwaters. You may say relatively fresh

Melt water instead

L 87. Sentence should start with The age model instead of Age model. L 90. Must be IMAGES program instead of IMAGE program. You may also give additional information what it is/was about (International Marine Past Global Change Study, http://www.images-pages.org/)

Done

L 102. Please provide the reader here with information of where those changes are explored

Terrestrial inputs deposited in the GoL originate from the catchment basin of the Rhone River. This has been added in the revised manuscript as well as a reference to this statement.

P3 L 110. This list of trees seems to be incomplete as indicated by the dots. Do you want the reader to complete it? L 112-113. Incomplete sentence? Do you mean Altitudinal forest taxa Abies and . . . were grouped? L 114. . . . interpreted as a decrease in temperature Should be interpreted as a result of a decrease in temperature

We now use the *Fagus*/*Quercus* ratio instead which inform on precipitation only.

L 116. Spell sea surface temperature (SST). Alternatively introduce abbreviation in the abstract (L 15)

Done

L 125. Must be include instead of includes L 128. Must be Nordic Seas overflow, a major. . . instead of Nordic seas overflow a major. . .

Done

L 133. Do you mean diatom assemblages?

Yes, it has been added in the revised version of the manuscript.

L 135. dynamical proxy reconstructions. What do you mean?

Has been changed to "…proxy reconstruction of dynamical parameters..;"

L 138. Sentence should start with A similar temperature pattern

This has been changed as "The same temperature …" as suggested by rev2.

L 142, 143. Severe climate. What do you mean? 'Severe winters?

Yes, it is "severe winters". Has been changed in the revised version of the manuscript.

L 144. Regression of the subpolar gyre. What do you mean? Contraction?, attenuation?, weakening?

This is changed to "weakening"

L 154, 155. Must be Globigerina bulloides instead of Globigerna.bulloides

Done

P 4 L158. Which index? Do you mean the difference between surface and subsurface waters, or the ratio between the contributions of NAI and polar waters?

It is the difference between surface and subsurface waters. Changed in the revised text.

L 160. What is SS? Do you mean SST or sea surface salinity? Please clarify

We mean "mean grain size of the sortable silt (SS; 10-63µm)". Modified in the revised version of the manuscript.

L 173. Do you mean A decreasing influence of polar waters? L 175. . . . an increasing influence. . .

Yes, done

L 182. Must be Cassidulina neoteretis instead of casidulina neotertis

Corrected

L 185. Must be Barents Sea instead of Barents seas Sentence

Yes, done

L 189 -191. I cannot follow the argument. Why should an unchanged Arctic fauna (in the Nordic Seas) support the hypothesis of low Arctic water influence? Do you mean ongoing low influence?

We clarified this point of the discussion. Ran et al (2008) provide evidence of an increase of sea ice diatoms at the MD99-2275 site. However this increase is marginally due to Arctic sea ice diatoms but instead of local sea ice production.

L198. Say high-resolution SST. . . instead of high-resolution of SST. . .

Done

L 203. Must be seem to instead of seams to

Done

L 205. coldest SSTs compared to what?

Has been changed to "The coldest values of SSTs in the Gulf of Lion…;"

L 208. over the adjacent continental regions?

Yes

L 209. Must be follow instead of follows

Done

L 213. and an increase

Done

L 215. Must be not necessarily . . . relatively

Done

L 216. (750mm)?

Amount of rainfall

L 222. Better use complex instead of different? Sentence

Done

L 224 -228. Please split this long one into two sentences and rephrase.

Done

L 230. Who abandoned the cave?

Human groups. This has been added in the revised version.

figures The figures well illustrate the paper. If space is to be saved it is maybe not necessary to repeat the same alkenone records 3 times (figs. 2,3 and 4). Fig. 4 b. the yellow labels, scales and curve can hardly be read. Better use another color instead.

Done