

Interactive comment on “Deciphering the spatio-temporal complexity of climate change of the last deglaciation: a model analysis” by D. M. Roche et al.

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We thank R. Gyllencreutz for his comments on our manuscript. We answer in details below.

Our response is in **bold**. When we simply followed the reviewer’s suggestion, we stated it as **DONE**

P2594, L5: “Though many studies have focused at a complex understanding of. . .” - semantic question: can understanding be complex? I suggest to rephrase: “Though many studies have focused on a detailed understanding of the complex sequence. . .”

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DONE, also required by reviewer 1

P2594, L12: “. . .freshwater forcings that have led to rapid climate shifts -> “. . .freshwater forcings that potentially cause rapid climate shifts. . .”

DONE

P2596, L5: “. . .an ocean (CLIO) and a vegetation (VECODE). . .” -> “. . .ocean (CLIO) and vegetation (VECODE). . .”

DONE

P2596, L18-19: realistic bathymetry = LGM bathymetry? Adopted from where, at what resolution, re-interpolated (re-gridded) using what algorithm to fit your model resolution? This should be stated. Also see comment for P2597, L22-28.

This is now done in the "Deglacial Forcings" section. We added the sentence: "Similarly, the bathymetry of the ocean was kept to LGM conditions, that is we reduced its depth by 120 meters, with a cut-off to the closest model vertical level."

P2596, L26-27 – P2597 L1-2: The overestimated precipitation over the Arctic and North Atlantic in LOVECLIM has been described previously, e.g Renssen et al. 2001 (GRL 28, p. 1567-1570), and www.pikpotsdam.de/emics table of emics 08.02.pdf. Please cite the most relevant reference for this.

The flux correction has changed since 2001, we thus included a citation to Goosse et al. , GMD (2010), as in this paper the correct percentages are discussed (on page 619).

P2597, L22-28: You state that you use ICE5-gV1.2 for the ice sheet evolution. This

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is incorporated with (and inseparable from) a glacio-isostatic model (Peltier 2004), already taking changes in sea level in account. You thus “lock” the land-sea mask in LGM-state for the climate reconstructions, while the ice is allowed to change in accordance with changes in the land sea-mask, because you adopt the ICE-5g-time slices as fixed ice states and interpolate between these (how this was performed needs also to be stated).

We explained it now in the "Deglacial forging" section that now reads: "Between the given ICE-5gV1.2 time slices reconstructions, we linearly interpolate in time with a time step of 50 years."

What implications does this have for the modeled climate evolution ? Please comment this in the (good but insufficient) discussion on the land-sea mask implications.

The direct implication is that the areas that are kept land instead of ocean are not modelled properly with respect to proxy data and should be regarded with caution if not discarded. This has been detailed in the text of the revised version.

P2599, L14-17: The simple and effective scheme for statistical testing is a good part of the paper, and is pedagogically described. However, it should be stated that it's the sample variance that is used in the test, and it should be denoted σ^2 (“[sigma]” normally refers to standard deviation, and the total variance is denoted “ s^2 ”). Using the t value >1.962 gives anomalies that are significant at the 5% level ($P=0.05$), not 95% (probably confusion with confidence intervals).

This has been modified according to the suggestions, see also comment from reviewer nb. 1

You also write “When variances. . . If not, we make use of. . .” which is a bit confusing (when-if). Suggestion: “When sample variances. . . When not, we make use of. . .”

Text is now modified according to the suggestion

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P2600, L22-24: Please clarify whether the part about “local orbital forcing” and not “delayed response to NA warming” was proposed by or contradicts the referred papers (Duplessy et al., 2007; Renssen et al., 2010).

The sentence was clarified and now reads: “. . . and not to a delayed response to the North Atlantic warming through upwelled waters as found in other climatic periods (Duplessy et al., 2007 ; Renssen et al., 2010)”

P2601, L23: “depicted by those to samples” -> “depicted by those two samples”

DONE

P2602, L25: “Not all proxies for climate change as well as not all regions of the world do exhibit. . .” -> “Not all proxies for climate change, nor do all regions of the world exhibit. . .”

DONE

P2608, L14: “understood within slowly vaying forcing framework.” -> “understood within a slowly varying forcing framework.”

DONE

Figures: Fig 4, 5, 7-9: Add “N”, and “E” or “Latitude ()” and “Longitude()” to map axes.

DONE

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