Reviewer 2:
In this manuscript, authors Skinner et al. perform several tasks that are of importance for the understanding of deglacial changes in atmosphere and ocean Δ14C: 1) By using an interpolation method, they produce gridded three dimensional fields of radiocarbon ages in the global ocean for different time slices associated with the last deglaciation. They then use models to attribute those changes and their relationship with air-sea CO2 transport to different processes in the ocean interior, and discuss the implications fro atmospheric Δ14C. The paper is clearly written and the figures are adequate. Follow some comments:

We are grateful to Juan Muglia for his detailed reading of the manuscript and for all the very helpful comments and corrections provided.

Major comment:

The only major comment I have is regarding the concept of transport rates governing ocean Δ14C. Throughout the manuscript, transport rate is discussed as a factor governing atmospheric-benthic Δ14C offsets. In the paper Muglia and Schmittner (2021), an analysis is performed with an ensemble of LGM model simulations. They find that mean ocean radiocarbon ages are much more closely related with deep ocean water mass structure than with overturning transport (please see Figs. 5 and 6 in that paper). I believe the authors should consider changing the attribution of Δ14C changes to deep water mass transport to deep water mass structure, and reflect that in the final version of their paper.

Yes, water mass 'geometry' is clearly a determinant of spatial B-Atm distributions, as it combines the influences of transport time and trajectory (i.e. transit time, gas-exchange and mixing history). We have added a note of this from line 452 in the revised text, where we also cite the study of Muglia & Schmittner (2021).

Please also note that while we do discuss transport rates as one factor influencing B-Atm offsets, we also emphasize that it is only one of several factors (e.g. from line 373 in the revised text). Indeed, our study is at pains to underline the dominant role of air-sea gas exchange in some aspects of deglacial marine radiocarbon (e.g. from line 421 in the revised text), while further noting and quantifying the additional influence of attenuation biases.

Minor comments:

Lines 60-70: Please include the values and uncertainties (if available) of ocean-atmosphere radiocarbon age offsets calculated by the cited literature.

These have been added to the revised text.

Line 320: "A few data points". Imprecise. Say the number of points.

This has been removed. We have updated the compilation to include a new study from the deep Indian Ocean that renders the 'Indian variant' exercise redundant. We have

therefore removed the ‘Indian variant’ and replaced it with a ‘high sedimentation rate’ data flag scenario, where only sites with sedimentation rates >10cm/kyr are retained.

Line 324: "This comparison highlights the Indian basin as an important target for future work". What type of future work? Please specify.

Added (we meant more reconstructions of past B-Atm offsets in the Indian basin).

Line 327: I don't understand the correlation coefficients expressed here. Are you calculating a correlation coefficient between data and a gridded interpolation calculated from the same data? If that is the case, what is the purpose of such calculation?

Yes, this is indeed what we have stated. The purpose of these correlation coefficients is to indicate how close the interpolation is able to get to the observations on average (if the correlation was poor, it would mean that the interpolation was only weakly guided by the data), bearing in mind that we use a Bayesian approach that strikes a balance between fitting each data point, and matching the volumetric representativity of all data locations in the modern ocean simultaneously.

Line 337: I can't use Figure 5 to compare with LGM with the modern state because the modern state is not plotted.

Yes, good point. We have decided to move the time-slice reconstructions for the HOL and EHOL from the Appendix to the main text, and therefore add a new figure that compares these with the BA and LGM, thus demonstrating the relative range of variability before and after the BA.

Figure 8: d14O? You probably mean d18O.

Yes, this has been corrected!

Line 1174: Typo "indicate are for constant"

Yes, corrected.

Figure 8: Please specify how the splines where calculated. What data did you use? Did you calculate them from time slices or using the x-axis of the age models?

This has been added to the caption; the splines use all available data, on their corrected age models, taking into account B-Atm uncertainties and the ‘baseline’ data flags, as described in the Methods section.

Figures 9 and 10: Please us the same color scheme for the experiments in these two figures.

This has been corrected.

Data availability comment:

The production of 3-dimensional past global fields of Δ14C based on data interpolation is very useful for the paleoceanography community. It will be good if the authors make those fields available on a repository.

These will be included in our data submission to PANGEA.