

Interactive comment on “Modeling variations of marine reservoir ages during the last 45 000 years” by J. Franke et al.

Anonymous Referee #2

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This paper is a GCM follow-up to Bard’s original box modeling work that examined the sensitivity of reservoir ages to a variety of processes (Bard, *Paleoceanography*, 1988). The experiments are straightforward and the results are presented concisely. While I think the original paper should be cited, placing reservoir ages into a GCM context is certainly worthwhile. I support this paper for publication with little modification. My main reservation is that the UVic model may have relatively high vertical diffusivity in the ocean and that this will make the absolute value of the reservoir ages calculated here somewhat suspect. Practically I think this means that the authors should “tone down” the language in the paper that asserts that the calculated ages presented here should be used to correct planktonic foram ages. I think the paper is very useful for pointing out the spatial trends in reservoir ages and for thinking about reservoir age

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sensitivity more generally, but I would be hesitant to directly apply the numbers used here to make new age models for any single core.

In the spirit of this journal's wish to foster discussion in the community, I have a separate comment. If I understand the beginning of the Discussion correctly, there is a calculation that has been done in this work that should be included as a separate figure and made available to the community as a digital table. Two competing reconstructions of past D14C production rate exist in the literature right now and they have very different implications for atmospheric D14C and deep ocean circulation rates. Each record takes an assumed D14C production rate and then passes that through a model that assumes a constant, and modern, carbon cycle to generate the history of D14C with no change in the ocean overturning rate. Muscheler's Be-10 based record assumes no climatic influence on Be-10 deposition in Greenland ice and gets a very low value for the glacial atmospheric D14C. Laj's Napis stack gets a much larger D14C history that almost lies on the atmospheric data from forams and corals (i.e. no change in glacial deep ocean overturning rate). Each of these curves has their critics. The new calculation here uses Laj et al.'s 2004 Glopis stack that has a similar shape to Napis but a very different absolute value for much of the record. I would like to see (and I think others would too) the results of the Glopis calculation. In relation to the Glopis calculation the authors say, "the UVic ESCM confirms the results of the box models used in other studies before and only simulates up to ~ 300 permille." I know this paper is about reservoir ages and not about deep ocean circulation, but the authors have done an important calculation that many of us would like to use in our own work. Could they please publish, as part of this paper, the Glopis based history of atmospheric D14C when run through the "PD" version of the UVic ESCM?

Interactive comment on Clim. Past Discuss., 4, 81, 2008.

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