

Geochronology Discuss., referee comment RC2
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Comment on gchron-2022-25

Colin V. Murray-Wallace (Referee)

Referee comment on "Amino acid racemization in *Neogloboquadrina pachyderma* and *Cibicides wuellerstorfi* from the Arctic Ocean and its implications for age models" by Gabriel West et al., Geochronology Discuss.,
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This is a very interesting and in many respects, thought-provoking manuscript because it tries to come to terms with a complex marine geological problem, while at the same time, resolve some of the typically challenging issues in Quaternary aminostratigraphy. The latter involves the potentially different diagenetic temperatures and a genus-effect on racemization with their ultimate influence on the measured extent of amino acid racemization in fossils, and ultimately an assessment of age of the marine successions. The manuscript discusses the potential difficulties of inferring the age of the successions in question and clearly outlines many geological and environmental attributes that confound a conclusive age interpretation. While concluding that the higher amino acid D/L values for the foraminifer *C. wuellerstorfi* is not due to a genus effect, a whole set of new questions arise to reconcile the basis for the extent of racemization observed in these individuals compared with other Arctic Ocean deep sea cores. In this sense, the existing manuscript is to some extent open-ended in its conclusions. Perhaps the conclusions can be more decisive?

Some additional more specific comments include:

Line 21 and other instances - oxygen isotope stratigraphy and magnetostratigraphy are, strictly speaking, not 'dating methods' in themselves, although with appropriate calibration using geochronological methods have an obvious role in unravelling Earth history.

Please be consistent in the spelling of racemization (either s or z but please be consistent throughout the text).

Line 24 and other instances 'n' italic font

Line 40 epimerization

Line 51 and elsewhere - do you mean calcium carbonate?

Line 62 'upper Quaternary' is not a stratigraphically recognised term - please be more specific

Line 82 sample mass

Table 1 please indicate unit of measurement for temperature

Line 119 correlated with

Line 149 mL and for microlitre later in the same paragraph

Line 186 high serine content - please quantify and explain in what sense.

Line 214 fossil age (sample is something that you have collected)

Figure 4 caption - uncertainties rather than 'error bars' - they are not really an error, meaning something that is incorrect

Line 249 compared with

Line 323 as above

Line 334 validity of this assumption?

Lines 341 to 345 Is this a manifestation of the kinetics of racemization and overall form of the extent of AAR with time?

Line 364 but is this valid?

Figure 9 benthic oxygen isotope curve - perhaps have times arrow reading to the right-hand side of the page?

Line 391 calcium carbonate.

Colin Murray-Wallace