

Interactive comment on “Mg/Ca, Sr/Ca and stable isotope from planktonic foraminifera *T. sacculifer*: testing a multi-proxy approach for inferring paleo-temperature and paleo-salinity” by Delphine Dissard et al.

Anonymous Referee #1

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Mg/Ca, Sr/Ca AND STABLE ISOTOPE FROM PLANKTONIC FORAMINIFERA *T. SACCULIFER*: TESTING A MULTI-PROXY APPROACH FOR INFERRING PALEO-TEMPERATURE AND PALEO-SALINITY

Delphine Dissard, Gert Jan Reichart, Christophe Menkes, Morgan Mangeas, Stephan Frickenhaus and Jelle Bijma

This text is of very high degree of interest for everyone who works on salinity reconstruction and understanding oxygen isotope/element ratio/salinity/temperature relation-

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ship. As said line 511, the authors “have the perfect data set at hand”!

One very important point is missing: the reader does not understand at which ontogenic stage foraminiferal specimen were chosen for Mg/Ca and $\delta^{18}\text{O}$ measurements. Are the studied specimen of *T. sacculifer* without SAC (in the paper called “kummerform”) considered as adults or pre-adults ? so, do the author consider that *T. sacculifer* is adult when the SAC is built ? Same topic: the specimen size selected for measurement (cited line 316), is never explained - which test size the authors are talking about ? The reader has to wait until line 393 to know this information. So, the description of the species and its ontogenic stages (chapter 2.2) should be a bit more precise.

The problem of the calcification depth of the last chamber of the selected individuals should also be addressed. In this paper, I feel like the authors follow an inverse reasoning (hypothetical causes form the basis of conclusions about reality). In Line 327-328, it is written: “This is confirmed by the strong correlation ($R^2=0.87$) observed between our Mg/Ca reconstructed temperature vs. measured surface temperature.” I would write it (and think it) the other way around. The data set used for this paper is so nice, that the authors should start by the beginning = OK we don’t know very well where the *T. Sacculifer* calcifies its test => first see how the correlation between “Mg/Ca reconstructed temperature” vs. “measured surface temperature” is. It is very strong. Conclusion => *T. Sacculifer* calcifies its last chamber at the sea surface (around 10m depth) !!!

The statement given line 448 and following (differences between Mulitza et al., (2003) equation and this study . . . could possibly be due to a difference in studied size fractions) strengthens my opinion that sizes and associated ontogenic stages are of primary importance in the conclusion of this study. It would have been best to normalize the element ratio and Oxygen isotope data with the corresponding individual test sizes. In all calculations, I did not understand if the author have taken into consideration the precision error for in situ salinity measurements. Did the author estimate the quality of salinity data from the ship instrument (that effectively measures conductivity) by sampling sea waters for calibration purpose?

See the attached pdf for details

Please also note the supplement to this comment:

<https://www.biogeosciences-discuss.net/bg-2020-208/bg-2020-208-RC1-supplement.pdf>

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