

Interactive comment on “Planktonic foraminiferal spine versus shell carbonate Na incorporation in relation to salinity” by Eveline M. Mezger et al.

Toyofuku (Referee)

toyofuku@jamstec.go.jp

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General considerations

In this study, detailed sodium (Na) content and distribution of planktonic foraminiferal test. Na distribution of spine and spine base had been not well studied by previous studies. This point is greatly progressed by this study. The authors also succeed to show that presence or absence of spine / spine base enriched with Na can have a significant effect on bulk Na / Ca. Geochemical analysis of numerous shells and organic linings and model calculations are carried out by this study. I can certify this is a good research that has been extensively studied about spine and spine-based Na / Ca, and it is expected that readers of Biogeoscience will be interested with this topic.

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Questions and comments

Have authors not analyzed chlorine by EPMA? Also, please be sure to show the how many times and how long time the samples were wash with water (L. 94). In considering Na / Ca, salt NaCl is the most popular and strong contaminant from seawater. It is necessary to know whether the distribution of Na is related to Cl or independent. Authors insist that Na is included in lattice with cited literature, but may Na that is not included in lattice exist, too. It is also necessary to make sure whether there is a change in Na concentration depending on the time and number of washing with water (L. 98) to consider the influence of NaCl. The washing process never change Na contents?

Why authors did not analyze using samples with different salinity conditions to examine the relationship between Na / Ca of spine and spine base and salinity? (Section 4.3). In Mezger et al. (2016), the first author analyzed planktonic foraminiferal specimens collected by plankton pump in Red sea with salinity gradient. Therefore, it seems possible to analyze Na / Ca of spine compared with salinity with these samples. However, in this study, as shown in Fig. 8-10, from the consideration based on the model calculation, it is concluded that Na / Ca of spine does not correlate with water temperature. The approach by model calculation is interesting and the conclusion is logical. Robust discussion can be constructed if there is support by measurement. In the future study, I think there is a possibility that samples with different salinity conditions can be measured. For that reason, it is not bad idea to leave room for discussion in the conclusion.

L. 101: Gentle setting for measurement of Na. Did you check reproducibility of Na measurement with this setting on standard materials? Further, this voltage seems bit weak (not impossible) for calcium detection. Authors will explain about the meaning of optimization of measurement setting of EPMA.

L. 132: SEM 3000 means "Miniscope TM 3000"? I can not find this type of SEM on Internet.

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L. 201; I prefer more informative subtitle of paragraph. e.g. SEM measurement of spine morphology and densities.

Figure 5: Can you indicate the difference in species by color? e.g. *T. sacculifer* is blue-green colors, *G. ruber* is red-orange colors. Describe the meanings of shown lines in this caption. Further, could you indicate which data were measured by EPMA or LA-ICP-MS?

4.1 Organic Linings: Authors could show that organic lining were poor with Na. Why EPMA Na mapping never show OM as low concentration bands?

Figure 6: It is not appropriate to show "?" here. Describe possible explanation for "Spine Na/Ca" and "Outliers" in the plot Instead of indicating "?".

L. 331: This is important consideration because the measured results are variable at part by part by such partial measurement method as LA-ICP-MS, SIMS, EPMA and more. The authors will mention the importance about the choice of measurement portion on the test.

Figure 7: It is good useful compilation figure of Na/Ca understanding. Could you explain all indicated knowledge of these in the main text? It would be fit the paragraph started from L333 or around the sentence.

L. 355: Some figure and/or previous study should be referred after "function of salinity".

L. 357 "either Na/C a spines must increase with increasing salinities"

Figure 10: What are the lines in the fig. 10a? Can you indicate Na/Ca of spine and Na/Ca of spine base in separated plots?

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