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Interactive comment on "Distribution of chlorine and fluorine in benthic foraminifera" *by* Anne Roepert et al.

Anonymous Referee #1

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Review for "Distribution of chlorine and fluorine in benthic foraminifera" by Roepert et al. This study looks at the incorporation of the anions chlorine and fluorine into the shells of benthic foraminifera. This has received almost no attention yet, although the conservative nature of these elements on the oceans would make them interesting to function as paleo proxies. Four different species, both rotaliid and miliolid, were cultured under controlled conditions. Analyses were performed using laser ablation and nanoSims. The distribution of chlorine and fluorine in the calcite varies between the low/intermediate-Mg species and the high-Mg species. Similar to other elements the lower Mg species show a clear banding of Cl and F related to the organic linings formed during biomineralization. As the biomineralization process is different in the high-Mg species in that no banding is developed, this is also not visible in the Cl and F

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content. So, the distribution of Cl and F depends on the biomineralization process and seems mostly connected to organic content.

The manuscript is well written and organized, it is easy to read and extensive details on the methods are given. I do miss a few things on the methods though, and a final implications section or paragraph (see below). I recommend that this manuscript makes a valuable addition to Biogeosciences after minor revisions have been made.

In the abstract the potential of these conservative elements as paleo-proxy is mentioned, but then apart from one sentence (Line 182) this is not coming back anymore. I suggest to include a final paragraph at the end of the discussion what these results imply for proxy development. Is it possible at all to conclude something about this? It is stated already that the number of samples and different setups is not large enough to identify trends, but could the extremely high-resolution also be an issue to determine their use as a proxy? For a commonly used proxy as Mg/Ca you also see a very heterogeneous distribution when looking at the micro-scale that does not appear to correlate with environmental conditions. But the actual proxy is the ratio that is representative for the whole shell (or enough laser profiles). So, how representative do you think your results are? Just six specimens on four different species, and a laser profile through each one showing how heterogeneous the distributions are, is not very much.

Section 2.1: More details on the culturing experiments are needed. Part of them are in Appendix B, but I think this would be much better to include into the main text. What I miss is on what part of the forams the analyses were done. I assume on the newly grown calcite, but how was this determined? Did you use a marker in the solution, or simply took the last chamber? A comparison with the original, naturally-grown calcite would also be interesting. What were the concentrations of these elements in the culture solutions; similar to sea water? The saturation state of the angulatus and marginalis experiments is very high. Were there any indicators of inorganic precipitation of calcite, which could have biased the results?

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