

Interactive comment on “The pH dependency of the boron isotopic composition of diatom opal (*Thalassiosira weissflogii*)” by Hannah K. Donald et al.

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This manuscript focusses on a truly challenging task. The goal of using biogenic opal, i.e. diatoms, as a seawater pH proxy archive is timely. I really applaud the author's efforts and think, this study has the potential to trigger further work into that particular application. Thus, I strongly believe the study is of interest for the readership of BG and will be published after major revision.

My main problem at this stage is to evaluate the data and in particular the potential for analytical biases. I had the opportunity to analyze cultured *T. weissflogii* samples for their boron isotopic composition using LA-MC-ICPMS about 7 years ago. On av-

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erage those analyses resulted in $\delta^{11}\text{B}$ of 14.0 ± 1.1 (1sd). Unfortunately, the results appeared too imprecise to be useful and never got published... Nevertheless, the significant difference of both, own data and those reported in this manuscript, is quite striking to me. Don't get me wrong, if we had been fully confident in our old data, we would have published... ;)

Thus, I've got to trust this new data as presented and need to evaluate the proposed interpretation. I would like to see in an additional figure a direct comparison of the [B] vs. pH systematic reported by Meija et al. (2013) and this study. The authors suggest the differences may be due to the use of LA and conventional ICPMS. I do not think, the LA results published by Meija et al. (2013) are inaccurate. Measuring [B] in silicates using silicate standards for normalization leaves little wiggle room for matrix effects. So, this would indicate three possibilities: a) samples for the older LA study had not been cleaned sufficiently (which I doubt strongly) b) the sample preparation used in this study resulted in a loss of boron or c) some details in the culturing setups resulted in these observable differences.

I would also be interested to see a figure displaying $\delta^{11}\text{B}$ vs. [B]. From figure 5 it appears there may be a stronger correlation of those two parameters than the ones of each of both vs. pH. The model proposed to explain the data (including the -10permil offset during incorporation into opal) is not really satisfying. Sorry, maybe I do not get it properly. But I struggle with understanding how this model can produce $\delta^{11}\text{B}$ values which are some 15-18permil lighter than the lightest seawater-derived borate $\delta^{11}\text{B}$ values (likewise for pH5.5). This would need a better, more detailed description, maybe including a schematic figure for a better conceptual understanding.

Overall, pretty interesting material and worth getting published. Perhaps starting very controversial future debates, if heavier diatom $\delta^{11}\text{B}$ data are reported by other groups in the future. But fine, we need to get this started.