

## ***Interactive comment on* “Quantification of calcium carbonate (ikaite) in first- and multi-year sea ice” by Heather Kyle et al.**

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Received and published: 2 March 2018

Based on the critical reviews and the author response, I will provide here some additional guidance for the authors as they prepare a revised manuscript. I see three main points raised by the reviewers that should be addressed if the paper is to be accepted:

(1) The question of other sources of DIC. Given the large discrepancy between methods for some samples, this should be thoroughly addressed. The authors do provide several references that may be sufficient to rebut this claim. I do urge the authors to provide a quantitative estimate of the potential contribution to DIC from non-ikaite sources.

(2) I agree with reviewer #1 that there is a fair amount of discrepancy between the

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methods for different cores. This is a serious weakness if the paper is claiming the new method matches the old. The authors do not really address this comment in their response. The authors do provide possible explanations for these discrepancies in the original text, but the reviewer has a point that this then makes validation of the new method difficult. I suggest that the authors either spend more time justifying this purported match (e.g. the 1:1 plot suggestion of the reviewer), or, if they are claiming the new method is superior for some cases (e.g. issue (1) above is not significant, while issues with image analysis techniques are) then to make this argument instead.

(3) Reviewer #2 argues against the importance of lkaite in the carbon cycle, and hence the potential impact of this study. The authors provide a strong response and clarify the motivation for the study (which should be made clear in the revised manuscript). The contention is perhaps over the interpretation of “may be significant”, which is a vague and not very informative term. I urge the authors to consider how they might better convey the potential importance of lkaite in the introduction in more quantifiable terms if possible.

When the authors submit a revised manuscript, it will be sent out for additional review.

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Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2017-226>, 2017.

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