

Interactive comment on “Ikaite crystals in melting sea ice – implications for $\vec{p}CO_2$ and pH levels in Arctic surface waters” by S. Rysgaard et al.

Anonymous Referee #1

Received and published: 10 April 2012

This manuscript presents new data of ikaite in sea ice from a decaying floe in the Fram Strait and its potential impact on the CO₂ cycle. It is well written and the message is clear. I think it should be published in The Cryosphere. However, there are some points that should be cleared first. An interactive comment (full review) of this manuscript by S. Papadimitriou was published on 28 March 2012 on The Cryosphere website, in which many of the points I would like to raise were addressed. It is not useful to repeat this in the same or slightly other words. Therefore, I would like to refer to those comments.

At the end of the discussion, the authors touch upon the role of melting sea ice and conclude that it may have a significant effect. This is an interesting result which is certainly worthwhile being brought here. However, what I would also like to read here is the role of ikaite on an annual scale, i.e., combined for sea-ice formation in autumn

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and melting in spring. This would give the reader some idea about the net effect of the ikaite cycle. Possibly, the authors cannot give definite answers to this question, but some speculation will also do (when marked as such). At least, they should mention the whole ikaite cycle and its consequences here.

Below, I have listed some additional minor comments.

Minor comments P1016,L4 ... (a polymorph of $\text{CaCO}_3 \cdot 6 \text{H}_2\text{O}$) ...

P1016,L23-26 Please explain how CO_2 can be more efficiently rejected than alkalinity, as this is not self-evident.

P1017,L25 On 22 June, ...

P1018,L3-4 Please add the country how this is usually done. I guess this is not Lebanon.

P1018,L5-7 It is fine that the authors realize that brine is lost during handling. However, I do not understand ("Thus, ...") how they can be so certain that this is about 10%. Please explain.

P1018,L11 Lenzkirch (typo)

P1018,L23 Konduktometer (typo)

P1019,L17 To avoid confusion with reading, add gaseous to CO_2 , i.e., ... and gaseous CO_2 by gas chromatography ...

P1022,L18 delete first comma

P1023,L2 ... is in line with the existence of ... ("strongly suggests" suggests that you need evidence, but you have observed the crystals indeed)

P1023,L3 were, instead of was

P1023,L5-6 I do not see an obvious reason for this contention. Please explain better.

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P1023,L19-20 I would suggest something like: Our ikaite data originate from the off-shore Fram Strait . . .

P1023,L21 delete: may

P1023,L23 delete: Normally

P1024,L22 add: "into the water" at end of sentence

P1025,L1 It is not clear how these figures were obtained. For example, for obtaining air-sea CO₂ fluxes you need wind velocity. Please present a detailed description of the calculation.

P1025,L4 . . . using 14C. (everyone understands 14C)

P1025,L5 "may potentially" This is rather vague.

P1027,L12 Year appears to be wrong.

P1027,L23 Mehrbach

Figure 1 Please include latitude and longitude Caption Figure 1: . . . on 30 June 2010.

Interactive comment on The Cryosphere Discuss., 6, 1015, 2012.

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