**Biogeosciences
Discussions**

Interactive comment on "Technical Note: Highly precise quantitative measurements of total dissolved inorganic carbon from small amounts of seawater using a common gas chromatographic system: an alternative method compared to established detection systems" *by* T. Hansen et al.

Anonymous Referee #1

Received and published: 29 April 2013

The authors of this technical note present a method to measure dissolved inorganic carbon (CT) by gas chromatography. For the growing field of research on ocean acidification effects on marine organisms, an establishment of the described method could mean a big improvement, as it is relatively cheap to establish (gas chromatography systems are available in most institutions) and requires only a small sample volume for the measurements. Even though I am not an expert in gas chromatography, the technical details of the method seem to be well described and I have no reason to question

the applicability for CT measurements.

There is only one larger point that should be addressed before publishing this manuscript: I am missing a comprehensive table comparing the three different methods you compare. Please provide a table with information on range of CT values used to verify the method, accuracy, precision, and overall uncertainty (next to the other two, this is also an important measure of measurement quality!) for your method as well as for the coulometric- and infrared detection method. If not too much extra work it would also be good to have some samples measured with all three methods. Currently, the number of measurements done to test your method is rather low, a method comparison could also help improving this aspect.

Please check the grammar as well as the use of different tenses throughout the manuscript, maybe with the help of a native speaker. Especially in the methods section some parts are written in present and others in past tense, but those parts should be in the same tense.

Specific comments:

p. 4449 l.5: Please delete the "The" in front of "coulometric- and infrared..."

p. 4440, l.20-21 and throughout the whole manuscript: What you refer to as "Dickson standard" should be called "certified reference material (CRM)" and should be referenced (e.g. Dickson et al. 2003 in Marine Chemistry) or described as produced by Prof. Dicksons laboraory at Scripps.

p. 4441, l.5-8: References are missing.

p. 4441, l.9: This sounds as there would be a logical relationship between the small volume and the need for filtration. Furthermore, high biomass should generally be avoided in OA experiments (see Guide for Best Practices in Ocean Acidification Research and Data Reporting by Riebesell et al 2010).

p. 4441, l.20: This should read "sample and acid addition".

p. 4441, l.28: Reference for standard deviation is missing.

p.4441, l.17-p4442, l. 2: The paragraph about GC measurements seems the interrupt the description of commonly used CT-measurements. Also, you continue to write about GC in the next paragraph (p.4442, l. 19 ff.). I suggest moving these two paragraphs together.

p.4442, l.3-5: Wording: If coulometric and infrared methods replaced CG measurements in the 70ties and 80ties, this is not "currently".

p.4442, l.8: Please combine the two brackets.

p.4442 l.20-28: replace "DIC" by "CT"

p.4445 l.7: The first sentence is lacking some information. Please specify what you mean, for instance by repeating part of the heading of this paragraph.

p.4446, l.9 & p.4447, l.22: A value can either be "accepted" or "true" (even though I would try to avoid talking about the "truth" in the context of measurements). I would rather call it the "assigned value".

p.4448, l.23-25: You mention the need to filter samples from phytoplankton cultures several times throughout the manuscript but it never gets properly discussed nor do your data provide information on a) how large the impact of a filtration step can be (you would need measurements before and after filtration from abiotic samples with different CT); b) why this problem is solved better with your method compared to others. If you want this to be part of the manuscript, spend some more time discussing this issue.

p4449, l.18: Please add some more information to this sentence, e.g. "... the typically small sample amount available for CT measurements".

p.4449 l.20-22: This sentence basically repeats what has been said above.

p.4449 l.23-25: You use the words "potential", "might" and "potentially" in one sentence/for describing one single point. If you think this can be an issue, you can also be

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a bit braver here.

p.4449 l.26: "...e.g. due to manipulated seawater" should read "... e.g. in manipulated seawater" or "... g.e. when working with manipulated seawater".

p.4451, l.20: In your conclusion you suggest sub-sampling CRMs to decrease costs of CT measurements. To be able to rely on sub-sampling, one would need data showing that sub-samples are stable over time (i.e. no gas exchange with the surrounding atmosphere).

Figure 3: Is the CT on the x-axis the assigned / target-value for the respective volume or measurement results? Please clarify.