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Biogeosciences Discussions

Interactive comment on "Biogeochemistry of a low-activity cold seep in the Larsen B area, western Weddell Sea, Antarctica" *by* H. Niemann et al.

Anonymous Referee #1

Received and published: 30 July 2009

General Comments:

The authors sought to provide geochemical analysis to confirm videographic evidence that the former ice shelf area at Larsen B hosts the first cold seep ecosystem discovered in Antarctic waters as proposed by Domack et al. 2005. In contrast to this previous study, the authors found little videographic evidence during the 2007 cruise (e.g., no living clams, thiotrophic bacterial mats or gas ebullition), indicating the presence of an active cold seep habitat. However, this study provided a nice geochemical survey of the sediments in the former ice shelf at the Larsen B area. The authors show that there are low levels of methane flux and provide evidence of higher seep activity in the

past (e.g., presence of dead clams and movement of the sulfate-methane transition zone). In addition, molecular analyses showed that methanotrophic Archaea within the ANME-3 clade were most abundant and a diverse community of sulfate-reducing bacteria is present in sediments.

Specific Comments:

1.Did you analyze replicates for methane, ethane, sulfate, or sulfide (Fig. 3, 4, and 5)? If so, please add error bars to the graphs. If not, it is difficult to determine the accuracy of your results and subsequent conclusions. How can you definitively say that a single replicate is representative of the true geochemistry at each of the sites?

2.Please show the data for the reference core (702-6). If the whole paper is trying to show that the trough is a methane seep then the reader needs to see the data for the background site. I recommend adding the background data to the graphs of data for the other cores.

3.Is a "scattered aggregation" and a "dense bed", as indicated in figure 1, considered the same thing as a "clam bed" or "clam patch" as mentioned on pg. 5749, l. 5-20? If these are considered the same thing in terms of the geochemistry then why give them different symbols in figure 1? Also, I would consider an area with a dense patch of clams to have different geochemistry than a scattered, low-density patch. If this is the point of defining the different macrofaunal observations, please revise the section to make it clearer.

4.The latitude and longitudes presented in Table 1 are redundant with figure 1. Please remove these columns. It may also help to add a column with the analyses run on each core.

5.Why are no rates or sulfate and sulfide concentrations presented for cores 711-4 and 711-5? For core 711-4 the hydrocarbon concentrations are similar to those of core 706-4 and the same for 709-3 and 711-5. This would make an interesting comparison.

Technical Corrections:

Pg. 5742, l. 7: please put a space between ‘synthetic’ and ‘clam’

Pg. 5742, l. 23: please put a space between ‘animals’ and “(“

Pg. 5743, l. 15: please put a space between ‘collapse’ and “of”

Pg.5744, l. 20: The name of the database is spelled wrong, please change to PANGAEA.

Pg. 5745, l. 13: do you have a reference for the methods used to determine methane/ethane concentrations?

Pg. 5745, l. 18: please put a space between “helium” and “at”

Pg. 5747, l. 15: The name of the online program is capitalized incorrectly; please change to CHIMERA CHECK version 2.7.

Pg. 5749, l. 4: please put a space between “and” and “seep”

Pg. 5749, l.16: please put a space between “patches” and “(up”

Pg. 5750, l. 20: please put a space between “results” and “have”

Pg. 5752, l. 23: please put a space between “assemblage” and “in”

Pg. 5753, l. 2: please remove the hyphen between AOM and associated to be consistent

Pg. 5754, l. 4: please change to Desulfococcus group (with Desulfococcus italicized and group in normal text)

Pg. 5755, l. 6: please put a space between “populates” and “sulphidic”

Pg. 5755, l. 16: please hyphenate sulphate-reducing bacteria

Pg. 5764: Please add the accession numbers to Table 2.

Pg. 5767: Please be consistent in the way the depth below surface is written in the text and legends. The legend of figure 3 has “8 cm bsf” whereas in other parts of the paper it is written as “- 8 cm bsf”, please make corrections as needed.

Pg. 5768: please remove the text about the chloride concentrations from the figure legend. This is redundant to the text and does not relate to the figure.

Interactive comment on Biogeosciences Discuss., 6, 5741, 2009.