

## ***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 #2**

Received and published: 14 August 2009

#### Part I. General Comments

The submitted manuscript describes at first geochemical, molecular biological and macro-biological findings at extinct seep in the Larsen B area. While cold seep environments have been well characterized in many places there is still a need of better understanding of the interactions between sulfate reducing and methane oxidizing populations in marine sediments affected by gas seeps in a new locations.

The data collected in this study are comprehensive and impressive. The manuscript is well written and organized. The strength is in the thorough interpretation of macro-biology signaling a former seep type environment, then the current geochemical situ-

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ation of the seep, and finally the microbial ecology of this system. The study is novel in that describes an ecosystem that may have quickly lost its flux, as evidenced by potential mat material that was not observed during the most recent cruise. The temporal biogeochemical evolution of these communities is not well defined yet, and the scale at which fluxes last is not constrained either. The paper is an important contribution to better understanding of a “life cycle” of marine cold seep systems.

Because no current seep activity was detected, I would suggest rewording of the title of the paper writing, for example, “extinct cold seep” instead of “low-activity cold seep”.

#### Part II. Detailed Comments

Line edits:

1. Please review manuscript thoroughly as several pages have words without spaces, it may simply be a formatting issue during submission (e.g. pg 5743 line 15).
2. Typo pg 5745 line 23 change tan to than.
3. Pgs 5746-7 rate equations do not include isotopic discrimination corrections ( $\alpha$ ).
4. Pgs 5746-7 are rates corrected by porosity? For AMO rates it is not necessary if methane concentrations were measured for wet sediments, but for SRR rates it is absolutely necessary because  $\text{SO}_4$  concentrations were measured in pore waters.
5. Pg 5747 lines 7 and 8 are worded poorly. It's not availability of oxygen or sulfate because oxygen and sulfate co-occur. The presence of oxygen dictates which process you observe be it aerobic or anaerobic, adding sulfate into this sentence makes it awkward.
6. Pg 5747 is 30 g of sediment for DNA extraction a typo? Seems excessive, maybe 0.3 g?
7. In section 3.4 relative proportions of groups of bacteria and archaea are described. It would be good for the reader if these were defined as a percentage of the clone library

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throughout, rather than qualitative statements (e.g. largest archaeal clone group).

8. Pg. 5747 3.2 ‘...andseep activity’ , separate “...and seep activity”.

9. Pg 5754 line 1 ‘bacterial partner’ should reference Pernthaler et al., 2008, as diverse bacterial partners to ANME are observed.

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