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Discussions

Interactive comment on "Chemosynthesis in the deep-sea: life without the sun" *by* C. Smith

L. Levin (Referee)

llevin@coast.ucsd.edu

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This submission focuses on the independence of chemosynthesis- based ecosystems from sunlight and terrestrial energy. The piece could be valuable in addressing the question and compiling the evidence in one place – I'm not sure whether this has been addressed before, other than in passing comment in papers with broader focus.

I wasn't exactly sure who the audience was. The writing style resembles that of a popular article for an educated, non-specialist audience that does not work directly in the field discussed. In addition - it comes across more like an editorial or opinion piece than a review article, as much of the literature cited is classic but somewhat old in what is a rapidly changing field.

Abstract – Perhaps state the goal of the discussion? Key points to include those organisms forming organic falls (wood and whales) that have photosynthesis as a basis

of life. (this is discussed later in the paper). Chemical energy from methane production results from accumulation of organic matter that has photosynthetic origins.

Consider that a good test of the importance of oxygen to development of chemosynthetic communities can be found at seeps (and possibly vents) that fall within oxygen minimum zones. . . the absence of mussels and tubeworms is one manifestation. Also note that various genera of symbiont-bearing clams and sulfide oxidizing bacteria persist at exceedingly low oxygen levels.

It would be useful to think through more thoroughly what microbial process are truly isolated from the influence of the sun, if any. Sulfate reducers and methanogens involved in AOM) may work on organic matter produced by photosynthesis. Access to sulfate for AOM and sulfate reduction may provided by pumping or transport activity of animals that require oxygen (clams, tubeworms). (see work by Cordes, Boetius, Goffredi).

Overall a better treatment of biogenic vs thermogenic methane and ties to sunlight/photosynthesis is needed.

Below are some suggestions and comments for the author to consider: Page 17038 Line 3 – oxygen minimum zones also sometimes host animals using chemosynthesis. (also on page 17041 line 5)

Page 17040 Line 7 It is now recognized that H2 also functions as an electron donor.

Discussion should cite Hugler and Sievert review of alternative C fixation pathways in Ann. Rev. Mar. Science.

Page 17042 – Discussion of cold seep cites references are 12-14 years old. Since then many different, new types of seeps have been found and there is a blurring of vent and seep. . . (e.g. Levin et al. 2012, Proc. Royal Soc. doi: 10.1098/rspb.2012.0205).

Page 17038 Line 2 Deep sea is not hyphenated unless it is used as a double advective. (correct throughout)

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I strongly urge the author to sign the paper with his first and middle name. There is another highly-published deep sea biologist – Craig Randall Smith – and the confusion created about authorship would be pervasive if only C. Smith is the author byline.

Interactive comment on Biogeosciences Discuss., 9, 17037, 2012.