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Interactive comment on “ ^{210}Pb - ^{226}Ra chronology reveals rapid growth rate of *Madrepora oculata* and *Lophelia pertusa* on world’s largest cold-water coral reef” by P. Sabatier et al.

Anonymous Referee #1

Received and published: 6 February 2012

Review of Sabatier et al., BGD

Sabatier et al apply the ^{210}Pb - ^{226}Ra dating method to establish a chronology for two different cold water coral specimens from the North Atlantic region. This is a systematic study that tries to explore the potential of the above dating method for young cold water corals including possible limitations. Although it seems to me that there are still many problems to be solved, I can support publication of the manuscript after some modifications. In general, the English grammar should be improved. Furthermore, the results concerning the *Lophelia pertusa* specimen should be interpreted in a more conservative way. A detailed list of comments, ordered as they appear in the main text,

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is attached below.

Detailed list of comments:

12249/18: average linear growth rate

12249/26: accurate?

12250/20: "Moreover, ocean warming may induce further yet unknown threats." This is completely speculative...

12252/21-25: Show a hydrographic/bathymetric map of the area including the reef and sampling location.

12253/25: Samples Mb, Mt and Lb, Lt are not indicated in Figure 1 and 2.

12254/9: counts per minute

12254/10: small sample weights

12254/20: to ensure

12255: Explain ICP-MS, AMS, and AMS-LMC14

12255/7: Give reference for JCp-1.

12256/1: you probably mean specific activity

12257/1: "displayed a very large activities" without "a". (these are specific activities, see above)

12257/13: "the 226Ra activities was almost constant" were almost constant

12257/17: Figure 3 and Tables 1 and 2 show 210Pb activities not excess 210

12257/25: 5% uncertainty – is this one sigma?

12258/18: the fact that "All (210Pb/226Ra) activity ratios along the coral specimen are once more clearly above secular equilibrium" does not allow the conclusion that the resulting age model is accurate (line 21).

12259/20: in the ocean

12259/24: both contributions

12260/4: Whatever the incorporation mode is,

12260/5 it is not exactly clear what you mean by "the first phase"

12260/12 check grammar: "the classic used of excess method"

12260/15 see above: "radiogenic 210Pb induce by"

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12260/14-17 "... either ...and..."

12260/20: The assumption that $^{210}\text{Pb}(0)$ was constant is crucial for the age model. Do you have evidence for this assumption?

12261/10-13: Isn't this argument circular? See comment above.

12261/≈15-20: Please indicate first which equation you use, and then present the results. This sub-section appears confusing to me.

12261/20-22: What is "Andrews et al. (2009)" good for in this context?

The above argumentation seems circular to me: ^{210}Pb input is assumed to be constant; results indicate a "well constrained slope" providing evidence that the input was constant; consequently the coral must have grown continuously.

12261/24-25 check grammar.

12262/11: "At 2 sigma uncertainty levels both bomb- ^{14}C and ^{210}Pb - ^{226}Ra age estimates are almost identical" Give uncertainties for the ^{14}C -derived growth rates, and then compare them. Either the values agree on a 2-sigma level or not!

12262/21 "this system was submitted to post-growth..."

12262/22: "which probably affect the"

12262/28: Which samples (exactly) were excluded?

12263/1: Give uncertainty for the calculated growth rates (see also further below). Is it really valid to use a two point fit for section B3?

12263/5: "Both growth rate estimates are in good agreement" To my opinion, this is completely accidental.

12263/24: "bleu area"

12264/16-17: "This type of correction can not be applied on the *L. pertusa* specimen in relation to the very high Mn content of the two last branch (B2 and B3)." Why is this so? If the Mn correction model works for one coral but not for an adjacent one, is it a good model then?

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Tables and Figures: Include Mn data in Table 1 and 2

Fig. 4: “bleue area“

Fig. 5 “excess model (3)“: “3“ does not appear in the legend of Figure 5. Use “(1+2)“ instead.

Interactive comment on Biogeosciences Discuss., 8, 12247, 2011.

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