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Interactive comment on "Evidence of Changes in Sedimentation Rate and Sediment Fabric in a Low Oxygen Setting: Santa Monica Basin, CA" *by* Nathaniel Kemnitz et al.

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Interactive comment on "Evidence of Changes in Sedimentation Rate and Sediment Fabric in a Low Oxygen Setting: Santa Monica Basin, CA" by Nathaniel Kemnitz et al. Anonymous (Referee) Received and published: 7 February 2020

This paper utilizes sediment cores collected over the past 45 years to determine changes in sediment accumulation rates in Santa Monica Basin in response to urbanization using 14C and 210Pb methodologies. The overall conclusion shows that the mass accumulation rate did not show evidence of significant changes over this period. The paper will be a somewhat useful contribution with minor changes

Specific comments: 1. The authors should clearly identify which 210Pb data were measured and which rates are from previously published work.

Answer: This has been addressed in section 4.1 Excess 210Pb as a measure of sedimentation rate, by stating clearly where each accumulation rates were derived .

2. The Pb-210 method section is long and can be summarized by references appropriate publications, given that 210Pb is a commonly used method.

Answer: I am assuming this is referring to the first paragraph in section 4.1, Excess 210Pb as a measure of sedimentation rate, where this section discusses the method and shows 2 equations that were used to determine sedimentation rates via 210Pb. I have removed the 2 equations, shortened the paragraph, and stated the appropriate references for the 210Pb method.

3. The figure for alpha vs gamma calibration for Pb-210 can be moved to supplement and is not directly relevant, especially since some of the co-authors have long established history of working in these isotopes.

Answer: As per this reviewer's suggestion, the section, 2.8 210Pb Calibration, was moved to supplement section of this paper.

4. Pb-210 should explicitly state this method is based on constant input and constant sedimentation rate (e.g. Appleby; Cochran papers).

Answer: We now explicitly say this in section 4.1, Excess 210Pb as a measure of sedimentation rate: constant initial concentration model is what we use.

5. The constant rate of sedimentation can be partly verified by looking at the goodness of fit and any apparent break in slope. In this context it will be more appropriate to plot Fig xx as ln(Pbex) vs depth and provide the regression equation and r2.

Answer: I believe this is shown in Figure 12 and 13. While I do not have R2 or regression equation on each plot, I do have, in Table 2, each plot's accumulation rate and its associated uncertainty.

6. The mass accumulation rates calculated using the slope of regression has an associated uncertainty term based on fit, which should be translated to the uncertainty term for the determined sedimentation rates. Since change in sedimentation rate is an important objective of this work, the uncertainty associated with determined sedimentation rate can give a sense of how much it could have changed.

Answer: Uncertainties in each mass accumulation rate has been added to Table 2 by determining the uncertainty for each slope regression.

7. On the same note it might be worthwhile to do a sensitivity study for the 210Pb model used, to determine its ability to capture subtle changes in sedimentation rate. A single sedimentation rate is determined by linear regression of downcore distribution of 210Pb excess, where it is assumed each data point provides equally precise information about the deterministic part of the total process variation. However, the 210Pb excess activities in deeper layers are lower with larger errors compared to shallower depths. Thus, it is possible, barring major shift in sedimentation rate, less dramatic changes in sedimentation rates may not be detectable.

Answer: A sensitivity calculation assuming a step-change reduction of 40% in accumulation rate in 1930 (2 half-lives before the Bruland et al., (1974) core) shows 210Pb has marginal sensitivity to resolving the timing of the change (computed profile not shown).

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