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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.

Christopher Fuller (Referee)

ccfuller@usgs.gov

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This paper seeks to combine results of recent cores with those collected over the past 45 years to assess changes in sediment accumulation rate and spreading of suboxic conditions to shallower depths in Santa Monica Basin in response to urbanization. 210Pb derived sediment mass accumulation rates (MAR) are combined with presence/absence of laminations or infauna. The overall all conclusion of little change in both mass accumulation rate and extent of the low oxygen condition are generally supported by the new data in conjunction with a summary of previous studies. After addressing comments below, this paper will be a useful contribution to further the

understanding of changes in sediment and geochemical dynamics in this near-shore environment.

How are constant activities in the upper 3-5 cm of cores from shallower depths defined (lines 245-250)? Are the activities are within uncertainty of each other? A factor of two decrease is shown in the upper 5 cm in some of these profiles (MUC 5, 6, 7) compared to deeper depths, so not "constant" but instead upper 5 cm has a different slope than below, which can be interpreted as higher accumulation rate and/or mixing. This warrants further discussion such as whether there is a increase in MAR, or mixing is the likely cause. The reasons for excluding cores from discussion needs to be made clearer such as in lines 329-339.

Turbidite layers are noted in core MUC10 (line 267), which could impact 14C profiles. Were these layers accounted for in deriving rates? Figure 10 and 11 would benefit from showing depth as well as mass on y axis.

Section 4.1. It is unclear if mass accumulation rates from 210Pb profiles of the previous studies were re-determined here or if rates from previous papers are accepted as is. Did the earlier efforts account for sediment compaction?

The comparison of rates within the depth regimes (Table 2 and section 4.1) uses the mean of all cores within a depth group. The means have a small standard error. However, the range in rates is a factor of 1.7 so that stating that rates are "consistent" is somewhat misleading. It would be more instructive to determine the uncertainty in each mass accumulation rate from the uncertainty in slope of unsupported 210Pb versus cumulative mass, then evaluate if rates among a depth regime are significantly different.

It would be helpful in section 4.1 to state (or remind the reader) the basis for dividing the core sites into >900 and <900-meter water depth groups.

Section 4.2, lines 318-320. It is unclear how the assignment of age was made to es-

tablish the onset of laminations, and the resulting spreading rate. Are these estimates from the literature or derived here? In either case, this warrants additional explanation.

The inferred step-wise change in mass accumulation rates in section 4.3 is based on 14C profiles from two cores but the inference seems erroneous. Lines 346-350 state similar MAR of 17 mg/cm2/yr for cores MUC 9 and 10, yet Table 2 lists rates of 16.8 and 12.2, respectively, for MUC 9 and 10. In addition, the comparison of two 14C rates from cores MUC 9 and 10 is made to the 210Pb MAR averages of all cores in Table 2, not to the MAR for specific two cores. Instead, the MUC10 C14 rate of 12 is in very good agreement with its 210Pb rate of 12.2 (per Table 2). Something seems a miss here in concluding a step-wise change for both sites. The ensuing discussion on lines 380-395 needs to be revised accordingly.

The statement of “nearly indistinguishable” 210Pb profiles on line 420 doesn’t follow the difference in 210Pb derived MAR in Table 2 for these two cores.

Statement on lines 441-443 of consistent surface 210Pb activity is not supported by the range of almost a factor of 3 shown in Table 2. Revise accordingly.

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