Review and Discussion of "Benthic phosphorus and iron budgets for NW-Atrican slope sediments; biogeochemical processes and the importance of bioturbation" submitted by Kuester-Heins et al.

General Comments:

This manuscript presents high quality pore water and solid phase chemical measurements of interest to marine biogeochemists. The inclusion of detailed, down-core measurements of the specific solid phases in which P is incorporated is an important addition to the general description of diagenesis at these locations. The conclusion that the downward transport of particulate reactants through sediment mixing is required to balance pore water fluxes (i.e. sedimentation rate alone is too slow) has been reported by others studying deep ocean sediments since the development of coupled pore water - sediment models in the early 1980's. Nevertheless, re-iteration of this point is an important conclusion.

Specific Comments:

p. 5382, l. 5. In the discussion of the 14C age determinations, the authors dismiss the fact that the data do not display a linear increase in age with increasing sediment depth to bioturbation and scatter. Two of the cores (9510 and 9518) actually display gradient reversals (i.e. younger ages below older ones) which cannot be attributed to random particle mixing but are either due to measurement uncertainty or to non-local transport processes. It would be better for the authors to provide a bit more thorough discussion and whether non-local transport could alter their interpretations.

p. 5383, l. 20. While I have no criticisms of the discussion provided for cores 9518 and 9519, the authors do not discuss the results from core 9510 where the pore water P maximum is significantly above the main Fe pore water maximum. For consistency, all three cores should be discussed.

p. 5384, l. 25-26. The authors state that there are no indications of non-steady state conditions or movement (I assume vertically) of the redox boundary. As mentioned above, the 14C results cannot be interpreted simply with continuous sedimentation and simple random particle mixing. In this manuscript there is no other supporting information such as MnO_2 distributions. The authors should provide the evidence upon which their 'steady state' and 'no significant movement of the redox boundaries' statements are based.

p. 5386, l. 17. The authors suggest that there have been temporal variations in terrigenous input while suggesting steady state previously. I suspect that these are not in specific conflict but represent different scales. The authors may wish to provide a length and time scale of there 'steady state' assumption.

Technical Corrections:

p. 5374, l. 22. replace 'or just' with 'and' to read " ... carbon, nitrogen and phosphorus."

p. 5377, lines 11, 20, 24 and elsewhere. replace 'squezzing' and 'squezzer' with 'squeezing' and 'squeezer'

p. 5378, l. 4. edit to read " ...of the standard methods used is given ..."

p. 5379, l. 8. delete 'of' to read " ... Despite the recovery of ..."

p. 5381, l. 13. Should refer to Figure 3 instead of Table 4 as the Table only reports mean values and not downcore variations.

p. 5381, l. 19. replace 'come from up here' with 'increase' and remove to read " ... which increase to a maximum ..."

p. 5382, l. 20. I believe there is some text missing here.

p. 5383, l. 1. remove 'let' to read " ... water data indicate a ..."

p. 5385, l. 6. replace 'solvents' with 'solutes'

p. 5385, l. 8. add 'd' to read " Based on the ..."

Figure 2. Caption. The caption indicates that the P and Fe are shown with dashed lines while solid lines are used. Also, correct spelling of 'squeezer'.