

**Dear Prof. Slomp,**

Thank you for pointing us to these additional issues and for considering our manuscript for publication in Biogeosciences. The responses to each comment (in italics) are given below the relevant comment.

**1.** In the current version of the manuscript, there are (contradictory) statements about the possible dissolution of CFAP in the marine environment. Is there any evidence suggesting that dissolution of CFAP in the marine environment is an important process? Is it necessary to add “probably” in line 18?

The relevant sections are:

- (p3. line 18): “Because seawater is probably close to saturation with CFAP, both a possible formation and dissolution CFAP cannot be rejected”.
- (p14. Line 30-31): Given the possibility that CFAP or other less stable Ca-P phases do not readily dissolve in alkaline seawater...”
- (p15, lines 20-21) “Some authigenic Ca-P, however, could be dissolved when physical-chemical conditions change”.

*I am not aware of strong evidence that dissolution of CFAP is an important process in the marine environment. We therefore discuss the possibility that Ca-P at sites further offshore could be derived from Ca-P-generating areas of the intertidal zone:*

**p14. lines 30-31:** *"Given the possibility that CFAP or other less stable Ca-P phases do not readily dissolve in alkaline seawater (Faul et al., 2005; Lyons et al., 2011; Sheldon, 1981; see also Gulbrandsen et al., 1984 as cited in Slomp, 2011), some non-detrital Ca-P at sites further offshore could be derived from Ca-P-generating areas of the lower intertidal zone or even from freshwater environments (see e.g. Raimonet et al., 2013)".*

*A key question in this respect is whether seawater is largely undersaturated with CFAP or not. We believe that seawater is not largely undersaturated with respect to authigenic apatite, but there are contradictory statements on this question in the literature (ranging from largely undersaturated to close to saturation; we discuss this issue in more detail in our companion paper: Quantification of octacalcium phosphate, authigenic apatite and detrital apatite in coastal sediments using differential dissolution and standard addition, Ocean Sci., 10, 571-585, 2014).*

*Because the issue remains controversial or even contentious, we consider the different possibilities in the introduction (p3. line 18). However, we modified this section to clarify that the issue remains unresolved:*

**p3. line 18:** *"Authigenic Ca-P is widely dispersed in marine sediment, but its solubility in seawater remains difficult to predict. Because seawater has been suggested to be largely undersaturated or close to saturation with respect to CFAP, both a possible formation or dissolution of CFAP in seawater cannot be entirely excluded at present (Atlas and Pytkowicz, 1977; Baturin, 1981; Bendor, 1980; Faul et al., 2005; Lyons et al., 2011)."*

*[References added: Baturin, G. N. (Ed.): Principal features of the marine geochemistry of disseminated phosphorus, in: Developments in Sedimentology, Elsevier B. V., Amsterdam, 1981. Bendor, Y. K. (Ed.): Phosphorites: The unsolved problems, in: Marine Phosphorites: Geochemistry, occurrence, genesis, SEPM Special Publication, 29, 3–18, 1980.]*

*We also modified the third section to clarify that we refer to the sediment here (i.e., pore-water, not seawater):*

**p15. lines 20-21:** "Some authigenic Ca-P, however, could be dissolved when physical-chemical conditions of the sediment change (e.g., altered pH/Eh due to land reclamation) or after upstream transport by tides."

2. p7. Line 19. Please clarify the term "sediment humidity". Is that the water filled pore volume or water content? Volume or weight percentage?

*We replaced "sediment humidity" by "sediment water content".*

3. P11. Lines 6-8. Please rephrase this sentence. The text now suggests that Ca-P is adsorbed.

*We replaced "Further, Ca-P phases predominated in alkaline downstream environments and could undergo dissolution and subsequent adsorption after upstream transport by tides (cf. 2a,c,d; De Jonge and Villerius; 1989)." by "Further, Ca-P phases predominated in alkaline downstream environments and may undergo dissolution after upstream transport by tides with an accompanying increase in P adsorption (cf. 2a,c,d; De Jonge and Villerius; 1989)."*

4. P12. Line 17-19. Sink-switching of Fe-P to CFA is also common in the marine environment. This is discussed in detail in the review on the P cycle by Ruttenberg KC (2003) and (2014; revised version) The Global Phosphorus Cycle, In: Turekian KK, Holland DJ, editors. Treatise on Geochemistry. Elsevier, 585–643. It would be appropriate to also mention this in your paper.

*We referred to the switch of Fe-P to CFAP (p3. Lines 1-3; including citation of a related study by Ruttenberg). We modified the sentence to point to the marine environment and to add the suggested reference:*

*"Release of P adsorbed on Al/Fe-(hydr)oxide facilitates Ca-P formation at higher pH (e.g. during early diagenesis in marine sediment; Heggie et al., 1990; Ruttenberg, 2003; Ruttenberg and Berner, 1993; Slomp, 2011)."*

*[Reference added: Ruttenberg, K. C.: The global phosphorus cycle, in: Treatise on geochemistry, Vol. 8, edited by: Turekian, K. K. and Holland, D. J., Elsevier B. V., Amsterdam, 585-643, 2003.]*

5. P14 . Line 7. Typo in "Octacalcium"

*We have corrected the typo.*

Best regards,

Julian Oxmann