

In the following we show how we have revised the manuscript based on each of the reviewer's remarks.

Rev. 1.

1. We include the suggested reference to Comeau et al (2010).
2. We add a sentence with the notation that the  $\text{HCO}_3^-/\text{H}^+$  ratio or just the  $\text{H}^+$  are the controlling factors of biogenic calcium carbonate precipitation and include the suggested references.
3. We cite the paper by Haese et al (2014).
4. A sentence describing the consistencies of our measured carbonate system data is included at the end of the method section.
5. Finally with regard to the impact of salinity on the solubility of calcium carbonate we have changed the text in the beginning of the discussion section to stress that salinity impacts the calcium ion and DIC concentrations (and that pH impacts the chemical speciation of DIC).

Rev. 2.

1. The depth of where the corrosive water spreads in the deep basin is added.
2. Same as comment 5 by reviewer 1.
3. A discussion on the potential importance of photodegradation is included in the discussion and the conclusion sections. The text describing the river plume and the exchange of  $\text{CO}_2$  with the atmosphere of this water is altered in the conclusion to specify the processes more in detail.  
We also stress that the conclusions are mainly based on our observations that we have discussed in the above section and thus the statements are drawn from that.

Rev. 3.

1. As a general action to the comments of lack of references we include such where the reviewer suggests so.
2. We shift the two first paragraphs as suggested.
3. Regarding eq 1-2 the notations "equilibrium" and "observed" are added as a superscript to make this point clear.
4. The expression "solubility state" is changed to "saturation state".
5. We apologize for our sloppy expression of "calcium carbonate saturation". All through the manuscript it is changed to "water saturated with respect to calcium carbonate" or a similar notation.
6. –p 4. The dissociation constants  $K_1$  and  $K_2$  are given in the original manuscript, but we complement with that of the solubility product ( $K_{\text{so}}$  according to Mucci, 1983) and salinity-calcium ion concentration ratio (Riley and Tongudai, 1967).
7. –p 4, l 30: The intention was to introduce the result section by setting the mind of the reader and then substantiate the statements in the following text. Now we have moved this part to the introduction.
8. –p 5. We change from "low saturated water" to "water undersaturated with respect to .."
9. –p 5, l 29. We changed the text to be more specific to strengthen the arguments.
10. Figure 3. We change "correlated" to "associated" as we don't mean a statistic correlation. No such has been done in the manuscript and we don't feel this add any substantial information.

11. –p6, l 5-10. The text is expanded to make this point clearer to the reader. We take the advice of the reviewer and include specific concentrations, as well as parts of the text arguments.
12. –p 6, l 12-13. We do not see the problem here; however, we changed accordingly to clarify the arguments.
13. A reference to Redfield et al., 1963 is included.
14. –p7, l 9. The text has been changed to i/ specify how Jones et al (2003) defined Pacific originating water, and ii/ include a part of a sentence to couple that Pacific originating signature to the high silicate and low omega.
15. –p 7, l 15. The source is the Siberian shelf and this is spelled out explicitly in the next version.
16. Fig 7. Our mistake. Should be PO<sub>4</sub> (as also clear from the scaling). This is changed. Thank you for noting.
17. Fig 7b. The only relevance of these arrows is the directions. Length and location are not relevant. This information is added both in the figure legend and in the discussion text.
18. Fig 9. We have moved the detailed explanations to the main text.