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Interactive comment on "The silica-carbon biogeochemical cycle in the Bohai Sea and its responses to the changing terrestrial loadings" *by* Jun Liu et al.

Anonymous Referee #2

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The manuscript describes the results from two campaigns in the Bohai Sea, China and computes Si and C budgets for the coastal system. There were many measurements made, but also data from the literature was necessary to compute budgets. The methods section is not clear, so it is difficult to partly understand how the measurements were made and how many samples were collected. Although large spatial gradients were observed in water column Si and C concentrations, a 1D box model integrated over the coastal bay was used to calculate the budgets. The primary production of the system was then related to the water, sediment and nutrient inputs from riverine inputs.

I am not confident in the adequacy of the measurements or the budget produced. Details regarding the results and calculations in the manuscript are not well described.

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The manuscript requires extensive revisions. However, once revised it will not make a significant contribution to the biogeosciences.

Specific comments

How many water samples were taken in Bohai Bay and where were they located?

Lines 66-76 This paragraph is difficult to understand. Both changes in the river and in the Sea are mixed together. They present the idea that river regulation of the Yellow River has changed, but do not mention what changes were made.

Line 93 Two campaigns for water column measurements are inadequate to produce meaningful mass balances.

Lines 103-105 Were the filters cleaned using this method or were the samples processed using this method?

Line 225 Was atmospheric deposition from a model or from measurements?

Lines 277-284 Using satellite remote sensing to calculate primary productivity in a coastal area with sediment inputs is difficult. Further, extrapolation of uptake rates from standard nutrient ratios is not sufficient.

Lines 368-369 If there was a large spring diatom bloom, couldn't the high bottom water column concentrations be due to settling?

Lines 480-482 The dissolved silica concentrations show not evidence for Si limitation of DIATOMS. However, even if the Bay becomes dissolved silica limited there are other algae that do not require Si, so I do not understand how the system is not limited by N and/or P.

There are an excessive number of references.

The BSi data in Table 3 has extremely low numbers in the sediments and surprisingly low standard deviations, especially when you compare it to the data in Figure 4 that has

large spatial variations in BSi. In addition, sediment BSi concentrations then to be relatively invariant with time, but there are large differences spatially in BSi concentrations between the spring and fall samplings. I find it difficult to believe these numbers.

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