

Interactive
Comment

***Interactive comment on* “Seasonal and interannual variability of sedimentation and organic matter distribution in the Buor Khaya Gulf – the primary recipient of input from Lena River and coastal erosion in the SE Laptev Sea” by A. N. Charkin et al.**

Anonymous Referee #2

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This manuscript report results for size distribution, organic carbon and d13C in suspended particles and surface sediments from the Lena delta and the Laptev Sea east of the Lena River, the Buor Khaya Gulf. Also hydrography were obtained using CTD. About 250 stations were occupied during six seasons between 2000 and 2008, including one late winter sampling. This is clearly a large set of samples and data collected from an important region of the Arctic. The overall aim of the study is to investigate seasonal (winter/summer) and interannual variability of coastal sedimentation processes

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in the Buor Kaya Gulf. Given the rapid changes reported from the Arctic region, a multi-year study is of great value in order to understand sediment sources and remobilization.

My major concern with this manuscript is the way the data is being presented. Most of the data presentation and discussion rely on colored graphs showing the areal extent, i.e. maps of the different properties being studied, i.e. SPM, OC, POC, $\delta^{13}\text{C}$. From this type of descriptive graphic it is somewhat hard to actually follow changes quantitatively as they tend to be hidden by the graphic presentation. For example in Fig 2 the water column stratification is shown in three colors. Another way would be to pick out a few representative stations and show depth profiles with the stratification.

The discussion regarding the $\delta^{13}\text{C}$ in section 3.3, which rely on the colored map in Fig 6 is somewhat hard to follow. Three of the panels marked a show the $\delta^{13}\text{C}$ in the particles from the water column and in one panel labeled b all the sediment data are reported. In the text it is suggested that the $\delta^{13}\text{C}$ in the sediments is a mixture of different OC sources including coastal erosion, river discharge and possibly primary production. From the figures it is hard to evaluate if this is actually the case. To show possible mixing I would suggest that the data are plotted somewhat differently maybe in a section with distance from the shore, or vs salinity or OC content. The end-members should be defined and their variability discussed. By doing a more formal treatment of the mixing, discussing different sources and showing this in plot it would be easier and more convincing for the reader to understand what is happening to the OC.

More than 250 stations have been occupied and sampled for this report. From the text it is not clear to me how the sampling was actually done. Are the same stations being occupied every time? What sampling method was used? What time interval do these surface samples represent? What is the approximate sedimentation rate? I think these type of issues need to be discussed to give the large data set an improved frame.

Analytical methods. How was the accuracy and reproducibility of the OC and $\delta^{13}\text{C}$ of

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$\pm 0.1\%$ obtained? Is there a calibration need for the laser to obtain size distribution? If so how was this done? I think the analytical section need some more details, which also can include some references.

On page 5 line 11-14 (Fig 4 and 5): “Spatial variability of the OC content in the bottom sediments follows the sediment size distribution (Fig. 5)”. This might be the case but I cannot see this relationship, at least not from Fig. 5. In order to show this it would be easier to plot the OC content vs the particle size distribution.

Two sedimentary regimes are defined “-on the basis of obtained results” (page 7, line 11). This is shown in Fig 7 but it is somewhat hard for me to understand that figure. Are the lengths of the red and blue arrows of importance? If so please clarify. What are the color pictures illustrating? I suggest a text explaining the differences between the two regimes and some reference in that text to the pictures shown in Fig 7.

In summary I think this manuscript report a large and important dataset, but my view is that the presentation and interpretation is very descriptive when mainly shown as areal maps of the distribution. I think there is potential for a more elaborated discussion which can be done by adding or replacing some of the “maps”, with figures illustrating specific processes discussed, e.g. mixing. Also the interpretation of possible interannual variability should stand out more clearly by adding selected graphs for illustration.

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