Manuscript Review:

Variations in the characteristics of Changjiang sediment discharging into the sea due to human activities
by J.H. Gao, J. Jia, Y.P. Wang, Y. Yang, J. Li, F. Bai, X. Zou, and S. Gao
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Paper summary:

In this paper, the authors present a study on the change in sediment load and sediment grain size over time in the Changjiang river basin. The study uses long-term datasets (1956-2010) of annual sediment load and grain size to determine when and where there were changes in sediment load at each sampling station along the tributary rivers and main stem. Changing sediment supply to coastal ecosystems is an important topic in an area where there are many anthropogenic pressures (i.e. dams) on watersheds. These impacts are felt throughout the watershed and near-shore environment, but timing of these changes can be different depending on the watershed and type of disturbance. Therefore, this paper addresses an important subject in global change.

General comments:

Overall, this paper is hard to understand and confusing. The introduction seems to introduce a paper that is different than what is presented in the methods and results, creating a narrative that does not fit their data. The introduction mentions a variety of sediment characteristics, but as far as I can tell the paper only includes information about load and grain size. The introduction also does not state any hypotheses or predicted trends, which makes it hard to understand the methods and their rationale.

The major issue with the methods is that they do not address much of the analysis that they report in the results and the discussion. For example, how was cumulative reservoir storage capacity determined? (see Specific Comments below for other examples). Perhaps most importantly, it is not at all clear how the authors attributed changes in sediment flux to the various tributaries. Was this based on mass flux data? How were the sediment grain sizes used to do this (as I assume that they were)? The methods fail to explain how they came to the numbers used in the analyses and tracing of sources of sediment in the river basin presented in the results and discussion (see Specific Comments below for examples). Finally, the results and discussion bring up topics not discussed or detailed earlier in the paper, making the narrative confusing. There needs to be a complete reworking of the narrative (in both the introduction and discussion) and the methods section of this paper in order to fully capitalize on the potential of the long term datasets used in this manuscript.

Specific Comments:

Title – does not adequately portray what the paper is about. The authors are not really looking at the characteristics of the sediment, but the load and the grain size.

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Line 8: What are products of the coastal catchment system?

Line 14: How do alterations affect grain size and the proportion of sediment from different estuaries?

Line 21: "The importance of these two features lies in that they reflect the sediment contribution of different sub-catchments to the marine deposits and determine the mineralogy and geochemistry characteristics." The authors do not address the mineralogy or geochemistry characteristics of the sediment contributions in the methods or results.

Line 24: "Sediment provenance tracing is a major method used to study the spatial-temporal 25 distribution patterns of terrestrial sediments in continental margins; thus, constructing valid and accurate end-member components on the basis of the mineralogical and geochemical characteristics of catchment sediment is a prerequisite for such an analysis (Morton and Hallsworth, 1994; Svendsen and Hartley, 2002; Yang et al., 2009; He et al)." - This sentence is misleading because the authors do not create end-members based on mineralogical and geochemical characteristics.

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Line 1 – "However, variations in the composition of sediments supplied by a catchment modify the "end-member" characteristics. Therefore, knowledge about the variations in the catchment sediment composition during different periods is critical to the analysis of the change in the mineralogy and geochemical features and the selection of five terrestrial sediment end members." – Again, the authors did not include this analysis in the methods or results. The introduction sets up the reader for a different paper than what the results actually report. I think that the analysis of grain size change and sediment supply is interesting on its own without this set up. The authors need to rewrite the narrative – there is a mismatch between the rationale and the analysis.

Line 9 - Authors should support "one of the largest rivers in the world" with discharge info and the size of the delta

Line 16 - Gao et al 2014 – is unpublished results. Authors report 90.10% reduction in sediment because of dam interception. They should considering putting in supplemental material to support this claim.

Line 17-23 – What are the variations in sediment between the three reaches? How can the authors identify what sediment comes from each particular reach?

Line 23 – Again, the authors should identify how they expect the grain size and composition to change with decreases in sediment load. What are their hypotheses?

Section 2 – Regional Setting: This could be a good section to explain the differences in sediment in each region. I also think that this detailed description of the geography could be cut down with a better map in Figure 1.

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Lines 1-16: Again, I am not sure why the authors describe the rock types and mineralogy when this is not the data that they analyzed. I do not understand how they trace the origins of the sediment with just grain size based on their description of methods.

Line 23: How often were they sampled?

Whole paragraph – It is hard to understand where the hydrological stations are and their names. The names should be intuitive to the reader – maybe based on the location?

Section 3.2: I could not tell how the authors analyzed grain size data. This is essential information and should be included here.

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Line 19 – Authors did not detail how they calculated cumulative storage capacity. The description should be in the methods.

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Line 14- 19 - This text should be in the discussion.

Overall, the results section really needs some cleaning up. It lacks narrative and much of the results described in text could be concisely presented in a graph or table.

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Line 6 – This is the first time the authors have talked about the analysis of grain size. The methods need to go in the methods section for this analysis. Methods also need to detail how many and which stations have grain size data.

Line 15: There is no information about calculation method or data for the variation interval.

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Lines 5- 8: "No clear variations" – This is a very broad statement and needs more clear cut support from data.

Line 17: How did the authors determine the percentage of contribution of those rivers? How did they trace these numbers? It was not clear to me whether or how the authors account for erosion

and deposition along the main stem before it goes out to sea. This was not detailed in the methods.

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Line1: Methods for determining channel erosion should go in the methods section.

Line 4 – 11: I do not understand how they traced sediment back to particular rivers. First, what methods were used for assessing sediment composition? Second, they have not traced the sediment composition back to particular rivers (because they are only using two stations for grain size analysis), so how did they come to the conclusion that certain rivers were driving the change in sediment composition. Methods should reflect results reported and discussion.

Line 13: Citations - Thiry 2000 – Shows that it is difficult to trace origin and climate based on clay materials; Garzanti and Ando 2007 – use heavy mineral concentration index to determine source environment. Neither of these studies use similar methods to those used, or at least described, in this manuscript.

Line 16: The authors should consider taking source samples from each of the rivers to analyze grain size and sediment composition. This could lead to better tracing results.

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Line 7: The manuscript states here that all of the sediment is derived from a homologous source. How do the authors trace it then? And what are "mineralogy characteristics"? These assertions seem inconsistent. Again, the methods should reflect all of the results reported in in the subsequent sections.

Line 14: In is unclear how the composition of the sediment at Dongting Lake was determined. This information should be in the methods section

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Line 3: "Briefly" does not make sense at the beginning of this sentence.

Line 10: How did the authors come to this conclusion: "As far as sediment provenance tracing is concerned, due to the variations in end-member components induced by changes of the sediment composition in the Changjiang catchment, the end-member components of one phase cannot be used to trace the sediment origin of another phase?" - The end-members or phases were not discussed in the methods of the paper. The methods and results do not support this conclusion.

Line 14: There should be more detail about how change in grain size will affect these areas.

Line 23: I would change to "and deserve further study"

Conclusions: I think that the conclusions are a good outline for what this paper needs to look like. They concisely sum up your results and discussion and highlight the main points. I did not come to the same conclusions when I read the paper myself and was generally confused about the analysis.

Bullet 4 in conclusions: Where in the paper did they look at the depositional area or estuarine-coastal deposits? This bullet does not reflect the text of the paper.

Tables and Figures:

Table 1 – The information presented here is if it will be used to test for changes in the sediment, but the paper did not address this.

Table 2 – This following need to be addressed in the methods: how the quantities were measured and analyzed for each station, how frequently samples were taken, and how were annual numbers determined.

Figure 1 – The map is hard to read with the font and the flowlines. This is a crucial part of the paper because they reference the different names of the reaches throughout the paper. The map needs to be clearly labelled so the reader can understand what areas are discussed.

Figure 2 – This figure is a really good illustration of what I think the main story should be - Understanding the sediment load changes through time. The reservoir storage capacity index calculations need to be addressed in the methods.

Figure 5: How did they choose the time periods for breaking up the data? Was it random or based on some sort of analysis? These details need to go in methods.

Figure 6: What data did they use for this distribution? How often was it taken? Make y-axis the labels and scale the same across all of the graphs.

Figure 7: This figure is a bit confusing. Do the different colors signify the different tributaries? What is the label for the x-axis of the graphs (what do the numbers stand for)? What is y-axis label on the graphs (what do they mean by sediment load variations)?

Figure 8: Hard to determine if there really is a relationship from four points. Is there yearly data for this graph (instead of the time periods used)? How did they come up with these time periods? Are the randomly selected? How did they calculate the data from the pie charts? Again, the methods do not reflect the results: I am confused about how they came up with the percentages from each river.