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***Interactive comment on “Characteristics and assessment of biogenic phosphorus in sediments from the multi-polluted Haihe River, China, using phosphorus fractionation and phosphorus-31 nuclear magnetic resonance ( $^{31}\text{P}$ -NMR)” by W. Q. Zhang et al.***

**Anonymous Referee #2**

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Anonymous reviewer 2

Characteristics and assessment of biogenic phosphorus in sediments from the multi-polluted Haihe River, China, using phosphorus fractionation and phosphorus-31 nuclear magnetic resonance ( $^{31}\text{P}$ -NMR) W. Q. Zhang, H. Zhang, W. Z. Tang, and B. Q. Shan

General comments: This paper is a report of the distribution (fractionation) of phospho-

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rus in the sediments of five Chinese rivers. The authors of the paper have chosen  $^{31}\text{P}$  Nuclear Magnetic Resonance, an excellent tool for evaluating phosphorus-containing organic compounds in environmental samples, to provide sediment data for phosphorus species including phosphorus-containing organic compounds which are subject to microbial degradation. Sequential extraction data are included in the report. The study was not interdisciplinary. Data from the study are presented in the style of an inventory. Processes are minimally discussed. This paper is geochemical in nature.

Specific comments: If the transfer of phosphorus from bottom sediment to the overlying water column is the major concern of this study, inorganic phosphorus extracted by NaOH (released from iron oxides) is the form of phosphorus that is the largest, by percentage, of all the forms of phosphorus in the sediments in this study. This form of phosphorus is vulnerable to release from the sediment under anaerobic conditions. It is true that there could be a contribution to phosphorus concentrations in water overlying these sediments by the organic phosphorus compounds in these sediments, but, in terms of possible importance, the NaOH extracted inorganic phosphorus overshadows organic forms of phosphorus because the overall concentration of NaOH extracted inorganic P was determined to be 16 times larger than the concentration of NaOH extracted organic P. The overall impression of the text is slanted more toward discussion of the organic phosphorus compounds than the inorganic phosphorus compounds which is apparently related to the complexity of obtaining  $^{31}\text{P}$  NMR data. Although apatite is not expected to be a source of phosphorus to the overlying water column, no comment is made about the large concentrations of apatite found in the sediments.

No reference is made to a companion paper: Zhang W, Shan B, Zhang H, Tang W (2013) Assessment of Preparation Methods for Organic Phosphorus Analysis in Phosphorus-Polluted Fe/Al-Rich Haihe River Sediments Using Solution  $^{31}\text{P}$ -NMR. PLoS ONE 8(10): e76525. doi:10.1371/journal.pone.0076525 Received: May 2, 2013; Accepted: August 31, 2013; Published: October 15, 2013 <http://www.plosone.org/article/info:doi/10.1371/journal.pone.0076525> The companion

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paper discusses sediment from the same sampling sites as this paper which has been submitted to Biogeoscience.

The Haihe River system, including the five rivers which were sampled, has an approximate total length of 2000 km. There are 18 sampling sites discussed in the manuscript. Is the number of sampling sites adequate to 'characterize and assess biogenic phosphorus in sediments' from the total length of the 5 rivers which were sampled?

Technical corrections: An abstract is not intended to be a summary. An abstract should present a concise description of the findings of a study presented in a way that the average reader will understand the purpose and experimental approach of the study. Please consider rewriting the abstract.

On what dates were samples collected?

Please give a reference for the method used to determine total P (TP) in sediments

Samples were collected with a grab sampler. Collection of sediment samples from sectioned sediment cores would provide data for describing chemical gradients in the sediment near the sediment-water interface. This information would contribute to the authors' hypothesis that the sediments in these rivers are providing phosphorus to the overlying water column.

Statement on page 16275 . 'We verified the chemical shifts of the P compounds by carrying out spike experiments using known compounds to assign peaks (e.g., using  $\text{Na}_4\text{P}_2\text{O}_7 \cdot 10 \text{H}_2\text{O}$ )'. Data for these experiments should be included.

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Interactive comment on Biogeosciences Discuss., 10, 16269, 2013.

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