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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}P-NMR)" *by* W. Q. Zhang et al.

Anonymous Referee #3

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General comments: The manuscript describes the P species of sediments along the Haihe River System. The P forms has been determined by using of 31P NMR and a sequential extraction procedure. Despite the careful and extensive analyses only less new insights into the biogeochemical processes and into the interactions between sediment and water are presented. In my opinion the study is too descriptive and is not sufficiently inspired by scientific hypotheses or questions based on knowledge gaps. Contrary to the last sentence of introduction 'consequences of the study for P control

and manage river eutrophication' could not be really deduced. The assessment of sediments for the water quality needs also the consideration of mass balance approaches. It is expected that the horizontal P transport is substantially higher than vertical exchange with the sediments in river systems. But the P dynamic in the river could be influenced by episodic P release from sediments into water. Additionally, I think that the P content of the sediment can have only little indicative value for the regional external P load because of (1) the dependency of P content on the particle sizes which is heterogeneously distributed in a section according to hydrological situation, (2) the dependency of sedimentary P content on the amount and composition of terrestrial material and (3) the dislocation of particles over longer distances.

Specific comments: p. 16272: Please formulate relevant scientific questions, which will be answered in the study. p. 16273: What kind of digestion for water samples were used (TP can not directly determined by molybdenum blue method). Organic P: The organic P content were determined by three ways: (1) as difference between TP and Pi, (2) as difference between TP and Pi NaOH-EDTA extract prepared for NMR analysis and (3) as difference between TP and Pi in the NaOH extract using the Hieltjes-Lijklema scheme. I wonder about the low portion of NaOH-Po produced by the sequential extraction scheme (Fig. 2). In most cases the NaOH-Po was very small (< 10%) or so low that is invisible in the columns. p. 16276: Is the unit for water samples right (mg kg-1)? Normally, concentrations are related to volume and the contents are related to mass. Therefore I suggest a change 'concentration' to 'content' in case of sediments. Discussion: some parts are repetitions of results. I little doubt the application of half-life time concept in this context. The decay rate of organic P species depends on specific conditions (e.g. redox) as well as on the availability and quality of organic matter. p. 16279: Please, add some limitation for exact quantification by NMR (overlapping or broadening of signals, low signal noise ratios,. . ..).

Technical corrections: p. 16271: The study of Newman & Tate (1980) was one of the first applications of NMR in soil analysis (not Turner et al. 2005). p.16273: re-

place trimestral by trimestrial, Page 16281: What does mean ‘under redox conditions’? p.16284: Kopáček, p. 16285: Reference Reitzel et al. 2009: Flindt, M., Fig 5 Poly-P instead of Ploy-P

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