

## ***Interactive comment on “What is the P value of Siberian soils?” by F. Brédoire et al.***

### **Anonymous Referee #3**

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#### General comments:

This is a very interesting study on the different forms, stocks and bio-availability of P in Siberian soils. An interesting effort was also made to compare P values obtained on Siberian soils to P values obtained on soils around the world. The question of P availability for plants and microorganisms is a key issue for our understanding of the functioning and evolution of eco- and agro-systems in a context of climate change. I thank the authors for incorporating the comments of the “quick review” in this new version of the manuscript. I consider this article acceptable to be published in Biogeosciences, but with minor revisions.

#### Specific comments:

Title:

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It is a cool name but it is a little bit confusing (reference to statistical analysis) and it does not mention the availability of P for the plants which is, in my view, an important result of your study.

Introduction:

The vocabulary used and the structure of some sentences make some ideas hard to understand. Two examples:

1- 19821, line 13-15: “These altered physical conditions are expected to modify the composition of the plant communities and the bioclimatic zones of Siberia have been predicted to shift northward and their relative size to change.”

2- 19822, line 9: “Also, P fertilization in agriculture is barely, if not at all, practised in Siberia”.

Materials and methods:

- 19825, line 15: “Such soil preparation was reported to affect biogeochemical processes only at a low magnitude (Černohlávková et al., 2009; Chapman et al., 1997).” I do not understand the meaning of this sentence. Drying largely affects biogeochemical processes (for example: mineralization). You should correct or precise this idea.

- What is the influence of the air drying-rewetting and grinding on: (i) the concentration of phosphate ions in solution, (ii) the diffusive phosphate ions at the solid-solution interface, (iii) soils textures (I think that this variable has been evaluated before grinding, am I wrong?).

- 19827, line 9: You should give the concentration of toluene not the volume.

- 19827, line 11: “This biocide does not affect P biochemical processes (Bünemann et al., 2007)”. If you suppress/reduce life from your samples you should inevitably influence P biochemical processes. This information contradicts the idea p19830 line 1: “Since a biocide was added in the suspension, mineralization was stopped and we

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only measured physico-chemical processes". You should correct or precise this idea.

- 19829, line 1: "In this study, we computed the values of Pr for 1 day, 1 week, 1 month and 3 months." In the manuscript you did not give the results for 1 month, is that important to precise this point in the "material and methods" part?

Discussion:

The vocabulary used and the structure of some sentences make some ideas/paragraphs hard to understand. Two examples:

1- 19837, line 8-11: "Soil formation processes and soil physico-chemical properties also explain that we observed such "outliers". Despite overall slight effects only, soil content in Al and Fe oxides had some visible influence on soil P at the scale of some soil profiles."

2- 19837 line 22 – 19838 line 2: "The restricted number of significant correlations – between P pools or isotopic dilution parameters (m and n) and soil physico-chemical properties – we identified in our study is not necessarily indicative of an absence of control on the P status. It may simply reflect that the values of the tested soil variables and P pools stand within a restricted range (same order of magnitude or difference of only one order; Table 2 and S4). Soils of the SW part of Siberia are indeed relatively homogeneous. They have developed on loess material deposited during the Quaternary era, mainly during the two last glaciation periods (Chlachula, 2003; Muhs, 2007) and despite some contrasted climate conditions, they have not been sufficiently impacted by diverging pedogenetic processes." This part can be simplified.

- Paragraph 4.3: You differentiate levels, concentrations and pH by qualifiers such as "high" and "very high". Please be more precise.

- 19838, line 20-22: "Contrarily to the other measured P pools in the studied SW Siberian soils, the concentrations of diffusive phosphate ions in the topsoil were not so high, in comparison to global levels (although not being very low; Fig. 4)." This is a

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very interesting result which deserved to be better discussed in this part.

- 19838, line 25-27: "In comparison, our SW Siberian soils have a low sum of Al and Fe oxides (68.44–184.08 mmolkg<sup>-1</sup>) – and the narrow range of values explains why we found only a few correlations between P pools and oxides – and a very high pH (5.37–7.16, Table S4)". You should divide this sentence in two sentences.

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Interactive comment on Biogeosciences Discuss., 12, 19819, 2015.

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