

## ***Interactive comment on “Soils from cold and snowy temperate deciduous forests release more nitrogen and phosphorus after soil freeze-thaw cycles than soils from warmer, snow-poor conditions” by Juergen Kreyling et al.***

### **Anonymous Referee #2**

Received and published: 22 May 2020

The manuscript addresses the effects of FTC magnitude and frequency on the short-term release of nutrients by conducting a three-factorial gradient experiment. Although the experimental design is simple, the hierarchical regression analysis was applied to detect the underlying response patterns in the threefold interactive gradient experiment. Therefore, the manuscript is more innovative from the perspective of analytical methods. I think that the manuscript is particularly well-written. The figures are excellent and do a great job of summarizing your results. Here are some minor suggestions.

Abstract Line 14: Generally speaking, we use “intensity” instead of “magnitude”

Line 20: change “higher frost” to “higher FTC”

Line 29-30: The unit representation is incorrect, there is no subscript and superscript. Please check the full text.

1. Introduction Line 55: delete “(FTC)”

Line 94-96: Compared to nitrogen, there is less description of phosphorus. Could you add more descriptions about phosphorus.

2. Materials & methods Line 104: Can you clarify what you mean by “FTC magnitude”; delete the second “FTC”;

Line 128: The collection date and depth of soil samples are not clarified. Soils sampled in different seasons have different properties, such as soil water content, soil microbial biomass, soil nutrients, and so on. Soil microorganisms also show different tolerance to changing temperature in different seasons. So, the unrealistic time of soil collection will affect the experimental results. In addition, why should the soil be stored for 16 weeks before starting the experiment? This may change the original physical and chemical properties of the soil.

Line 130: 10 grams of soil seems to be a bit less, which leads to greater intensity and rate of freeze-thaw cycle than under field conditions.

Table 2: change “PO<sub>42</sub>-P” to “PO<sub>43</sub>-P”; The value of soil moisture is a dot instead of a comma Line 145-146, 158: Could you show the pattern of freeze-thaw cycle with a figure? (Wang, et al., 2015. Effects of freeze-thaw cycles on the soil nutrient balances, infiltration, and stability of cyanobacterial soil crusts in northern China. Plant and Soil (Figure 2))

Line 197-198: Please explain in detail how to use the AICc to determine the best model

Line 232: Please explain the abbreviation of AICc

3. Results Line 239: Explain abbreviations in the legend (“FTC”)

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Line 261: Change “were” to “was”

4. Discussion Line 315-330: In the paragraph about FTC effects, you discuss potential mechanisms leading to increases in inorganic N and P. The whole discussion did not involve the discussion about phosphorus. Could you add some discussion about phosphorus.

Line 336: delete the second “FTC”

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Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2020-134>, 2020.

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