

Biogeosciences Discuss., referee comment RC1
<https://doi.org/10.5194/bg-2021-188-RC1>, 2021
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Comment on bg-2021-188

Anonymous Referee #1

Referee comment on "Leaching of inorganic and organic phosphorus and nitrogen in contrasting beech forest soils – seasonal patterns and effects of fertilization" by Jasmin Fetzer et al., *Biogeosciences Discuss.*, <https://doi.org/10.5194/bg-2021-188-RC1>, 2021

The Ms of Fetzer et al. entitled 'Leaching of inorganic and organic phosphorus and nitrogen in contrasting beech forest soils – seasonal patterns and effects of fertilization' quantifies annual organic and inorganic P and N fluxes from organic layers and from the mineral topsoil. For this purpose, zero-tension-lysimeters were used in the three soil horizons that were artificially irrigated to standardize water flow. The authors established a comparative study; two sites under beech with different phosphorous availability and sorption capacity (sandy soil and a soil on basalt) were selected, and both sites were subjected to a full factorial N×P fertilization experiment. During the 18-months monitoring period, the sites were sampled five times.

In the context of increasing nutrient imbalances in trees and the occurrence of more frequent and intense climate extremes, the topic of this manuscript is of great importance to both science and practice. The experimental design is state of the art. I like very much that the authors have established a comparative study. The novelty of the study is that the dissolved inorganic and organic N and P fluxes are compared at different nutrient availability of the soils. I think this is not often done. The manuscript is well structured and very well written. After the presentation of the results, the hypotheses are discussed in detail on the basis of the results found and with reference to other studies. The conclusions are clear and based on the results of this study. I recommend the publication of this study in *Biogeosciences* with minor revisions.

Specific comments

95-100 Please provide information to the humus type and to the stand characteristics.

120 Zero-tension-lysimeter: Is the setup similar to Makowski et al., 2020 *JPNSS*? If yes, you may refer to it because this paper provides more detailed information.

435 You argue that P leaching reinforces nutrient imbalance between N and P. I am not sure if that can be concluded based on your study. Please explain in more detail your conclusion regarding the contribution of P leaching to nutrient imbalances.

440 Julich et al. (2017 in Forests) quantifies the P export from a small forested headwater-catchment in the Eastern Ore Mountains; their annual fluxes were between 2 and 4 mg m⁻² and year. These data support your argument.

530 Please note that N deposition is significantly underestimated due to canopy exchange processes as discussed by Bobbink et al., 1992 (in Environmental Pollution), Talkner et al. 2010 (in Plant and Soil) and others.