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Interactive comment on "Soil solution phosphorus turnover: derivation, interpretation, and insights from a global compilation of isotope exchange kinetic studies" *by* Julian Helfenstein et al.

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Here we would like to shortly address the main concern of reviewer one, concerning possible impacts of microbial processes on the results. Indeed, we accepted the basic assumption of the isotope exchange kinetic experiment that the dilution of radioisotopes is purely due to physico-chemical reactions. We think this is a fairly robust assumption since microbial turnover is generally perceived to occur in the timeframe of days to weeks (Oehl et al. 2001), while the turnover controlled by surface reactions occurs within seconds. We need to point that out more clearly in the manuscript and will make sure to do so in the revision.

While it has been shown that in special cases microbial processes affect radioisotope dilution in the short-term batch experiment (Bünemann et al. 2012), this seems to be an exception rather than the rule, and only the case for soils with high microbial activity but low sorption / desorption. Thus, in studies following the 2012 study, the authors wrote that pre-tests showed no impact of a microbial inhibitor and use of a microbial inhibitor during the isotope exchange kinetic experiment was deemed unnecessary (Randriamanantsoa et al. 2015, Bünemann et al. 2016, Wyngaard et al. 2016, Schneider et al. 2017). These studies covered a wide range of land uses, soil characteristics, and geographical locations. The studies support the traditional assumption that only physiochemical processes influence short-term P exchange. Thus, we deduce that while microbial processes may have impact on short-term P exchange in certain soils, this is the exception and not the rule. We maintain that all future studies should test the necessity of a microbial inhibitor. However, we don't think that the results of our meta-analysis are affected by the fact that some (especially earlier) studies did not test the use of microbial inhibitors.

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