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Reply on RC1

Tuvia Turkeltaub et al.

Author comment on "Continuous monitoring of a soil aquifer treatment system's physico-chemical conditions to optimize operational performance" by Tuvia Turkeltaub et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-455-AC1, 2021

General comment 1: *Obviously, prevailing of unsaturated conditions immediately below the shallow saturated layer would impact dramatically the oxidation conditions as well as the analysis of the percolation conditions. The impact of the gas phase in the unsaturated layer very close to the surface, is well reflected through the O2 and Eh sensors at 50-100 cm, as can be observed in figures 4 and 6. Obviously these are the most important parameteer for efficient water treatment. However in the is manuscript, most of the analysis that refers to the treatment efficiency refers mainly to 25 cm which is in the very shallow saturated part (e.g. information presented in figure 7 8 and 9), ignoring the hydraulic and oxidizing conditions under that layer. Accordingly, I believe that the authored should elaborate on the potential impact of the unsaturated conditions that prevail vary close to the shallow saturated part, on both the infiltration and treatment conditions.*

Reply to general comment 1: Our main motivation to focus on processes that occur in the topsoil (25 cm depth) was driven by previous studies, which indicated that most of the removal processes occur at topsoil and further contribution of deeper parts of the vadose zone are negligible (Lin et al., 2008; Grinshpan et al., 2022; Fox et al., 2005; Quanrud et al., 1996, 2003; Miller et al., 2006; Essandoh et al., 2013; Sopilniak et al., 2018; Goren et al., 2014; Sopilniak et al., 2017). To demonstrate that the previously stated outcomes in the first version of the manuscript do not change substantially, we included further analysis of the E_h observations from 50, 75 and 100 and O_2 observations from 50, 75 and 150 cm depth of the SAT vadose zone.

Figure 7 now includes E_h observations that were obtained at 25, 50, 75 and 100 cm depth of the vadose zone. An additional figure is provided, i.e., new Fig. 8, which describes the gaseous O_2 concentrations in the SAT vadose zone at 25, 50, 75 and 150 cm depth during the recorded wetting cycles. Fig. 9 (previously Fig. 8) describes the E_h conditions and the gaseous O_2 concentrations during the drying stage for winter and summer. Further discussion was provided to describe the differences between the different depths and the possible impact of the unsaturated conditions on the SAT efficiency (lines 413-461).

Specific comments:

Comment 1: *One more aspect which is rather technical refers to the structure of figure 9.*

It is a very strange presentation where O2 concentration is presented Vs depth in multiple times, while the depth is constant and the time is variable. The data should be presented as O2 concentration Vs time in single or multiple depths.

Reply to comment 1: Figure 9 has been revised accordingly. Note that Fig. 9 includes the E_h measurements during the drying stage as well as the gaseous O_2 observations.