

The present study address the impact of Managed Aquifer Recharge (MAR) activities on the features of the in situ microbial community. The latter having been characterized by analysis of both soils and (surface-ground-)water samples, during recharge and no recharge periods. The MAR facilities is located in the NE of Spain and the infiltrated water is taken from the Llobregat River, which suffers from contamination by emerging organic contaminants (ECOs) that are not fully removed during wastewater treatments. In this optic the MAR facility induces a perturbation of groundwater characteristic (e.g., organic matter, dissolved oxygen, temperature, pH) leading to the growth and stimulation of the microbial community, favoring the degradation of ECOs. The main goal of the study is that of quantify the MAR related changes on the microbial community. The Authors provide also a link with ecological principles and potential biogeochemical processes.

I think that the paper is interesting, and I applaud the Authors for facing the challenge at a real-world field site! In my opinion the paper is worth for publication after some minor comments are addressed. Note that some of my comments are dictated by my poor background on biological community characterization methods and interpretation.

#### **Comment 1**

Section 2.3: Are the groundwater samples taken for the microbial analysis taken at the same location of the samples used for the hydrochemistry analysis? I imagine yes, but please make it clear in the text.

#### **Comment 2**

Section 2.3: "The first one is Richness ( $S$ ), defined as the proportional number of microbial species present in a sample, i.e., equal to the total number of bands;" would it possible to further elaborate on the meaning of these bands? I am not an expert of the subject so if the Authors think that it is not needed, I agree with it, but a more detailed description of the 'bands' meaning would help to attract the interest of a wider audience!

#### **Comment 3**

Section 2.3: The Shannon ( $H$ ) and Evenness ( $S$ ) are used to characterize the diversity of the microbial community. I suggest to further elaborate on their meaning right after their introduction since it would not be that clear for reader unfamiliar with entropy and measure like that. Note that I am interpreting index  $H$  as the entropy of the 'bands spectrum' (perhaps is not the right wording),  $H_{max}$  as the entropy of a uniform bands intensity and  $E$  accordingly, e.g.,  $E \rightarrow 0$  the microbial community exhibit a poor variability.

#### **Comment 4**

Section 3.1.2: "The two green triangles in the center of the plot correspond to groundwater samples from P10." and so? The fact that these two triangles of water type IV are not expected to be 'near' the others is not immediate to me, could please the Authors elaborate further this observation. Furthermore, would be possible to further describe the meaning of the NMDS, its relationship with the bands and so how to read the empty and full circles? Paraphs in Appendix with other notions related with the microbial characterization or adding some reference. Once again if the Authors think that this is standard notions it would not be necessary.

#### **Comment 5**

Section 3.1.2: Figure 5 in the text is Figure 6 in the figures list. Please make the piezometers identifiers more readable in the dendrogram.

#### **Comment 6**

Section 3.1.3: I really liked Figure 6 (note that it is called fig. 5 in the list figure) and how it summarizes the lower variability in the bands for water type II an type III w.r.t. the unaffected waters, i.e., type I and IV.

Would it be possible to add the trend for the dry scenario in order to see how the  $H$  varies as a function of the recharge v.s. no-recharge conditions?

**Comment 7**

Section 3.2: "Figures 8 and 9 show the relative abundance of bacterial phylotypes at the taxonomical level of classes for surface water and soil samples." Should not be "Figures 8 and 9 show the relative abundance of bacterial phylotypes at the taxonomical level of classes for SOIL and WATER samples"?

"For surface water samples (Figure 9), there was a decreasing gradient in community complexity along the ponds" It would be beneficial to add something like "see the  $H$ ,  $S$  and  $E$  indices in Table 1" or add them to the Fig. 9 (the same for Fig. 8).

**Comment 8**

Section 4.1: I did not know the Intermediate Disturbance Hypothesis (IDH) and I really liked its application in the current study.

Line 9 pp 9: "in the latter case, values..." upper case is missing at the beginning of the sentence.

**Comment 9**

I really appreciate the fact of dealing with the issues dictated by the scale of the investigated dynamics not via widespread (and so thought as unquestionably reliable at all scales) system of partial differential equations (e.g., Darcy flow with mass continuity, advection-dispersion equation), but through a solid analysis of the available data (essentially following Information Theory metrics). This is a more common practice in the hydrology community, rather than the hydrogeology community. It remains to be seen how to move from laboratory to field scale according with this approach.