Geophysical Research Abstracts
Vol. 20, EGU2018-14966, 2018
EGU General Assembly 2018

Operating conditions and microbial key populations in Managed Aquifer Recharge ponds: A statistical approach

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Managed Aquifer Recharge (MAR) is a worldwide-implemented practice that aims to increase the groundwater reserves off into the aquifers. Furthermore, the filtering process occurring in the vadose zone combined with water mixing in the saturated zone, imply water quality improvement. Indeed, biogeochemical processes, most of them catalyzed by microorganisms, are the main paths for organic matter and pollutant degradation.
Our study is focused on a MAR facility located in the Llobregat River Basin (Sant Vicenç dels Horts, Catalonia). This highly-impacted zone, like other Mediterranean regions, is suffering Climate Change consequences, especially dealing with recurrent droughts. The Sant Vicenç infiltration ponds were designed as a strategic management tool to treat river water as well as to restore groundwater levels. It is composed by a sedimentation (to reduce suspended solids) and an infiltration pond.
Two field campaigns were performed in July 2014 and March 2015 respectively. We tested microbial, physical and hydrochemical changes between the facility continuously operating and after a long period of activities being discontinued. Data from hydrochemical depiction of recharge water and groundwater, grain-size soil measurements and microbial characterization of soil, water and groundwater were studied using a multivariate statistical approach. Our preliminary results indicate the presence of groundwater microbial groups with the capability to degrade water pollutants during recharge. For example, the presence of Vogesella sp. seems to be strongly affected by DOC concentrations in groundwater samples. Furthermore, we found correlations among soil granulometric properties and some microbial clades, such as Uniformity Coefficient and the proportion of fine material with the phylum Acidobacteria, specifically with members affiliated to subgroup 3.