Geophysical Research Abstracts
Vol. 17, EGU2015-3367, 2015
EGU General Assembly 2015


# Microbial community analysis and bioclogging identification in a Managed Artificial Recharge system.

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Managed Artificial Recharge (MAR) is a well-known technique that aims at increasing the aquifer resources while managing its quality. In order to increase water resources in the Barcelona conurbation, an area with significant quantitative and qualitative groundwater disturbances, a MAR facility was built in Sant Vicenç dels Horts, Catalonia, Spain. The system, constructed in 2009 consists of a sedimentation pond that pre-treats the water that is then diverted to the final recharge pond.

The facility was originally aimed at increasing the availability of supply water during scarcity periods. Later, it was considered as a good test site to study best infiltration practices regarding water quality evolution. For this purpose, a reactive layer was installed in 2011 at the bottom of the pond. This was composed by organic compost and autochthonous material. Small proportions of iron oxides and clay were added to promote ionic adsorption and exchange. The objective of the layer was to boost microbial activity that would be structured in depth according to the presence of a marked redox profile, thus enhancing the reduction of all organic matter, including a number of recalcitrant compounds. In the last 3 years, site studies were focused on the layer's efficiency (i.e. percentage of organic pollutants degradation). It was found that degradation is occurring despite the infiltration rate has been significantly reduced.

In our most recent work, we took a step further in the study of the processes occurring in the facility, and specifically with those related to the presence of the reactive layer. We focused on characterizing microbial communities in the system by combining the sampling of soil in the recharge pond bottom, water of the vadose zone, and groundwater in the aquifer zone from a series of nearby piezometers. Molecular techniques, such as Denaturing Gradient of Gel Electrophoresis (DGGE), were applied to the water and soil samples. This information was matched with physicochemical parameters of the water sampled in the existing piezometers, allowing relating them with different measured hydrogeological parameters (conductivity, dissolved oxygen, temperature and Eh). This information is an initial step to understand how the reactive layer induces microbiological activity and therefore degradation and bioclogging processes in the studied MAR system.