Understading changes of Eh, DOM and water quality in a MAR surface pond

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Understanding redox processes and the origin and the fate of dissolved organic matter (DOM) in artificial recharge ponds is key to understanding water quality improvement due to biodegradation processes. In this study, we present a MAR site where redox processes have been monitored with high resolution both temporal (12 minutes scale) and spatial (decimeter scale) in the topsoil below an infiltration pond during one year. Furthermore, the characterization of DOM by fluorescence (in protein-like and humic-like fractions) and the hydrochemical signature have been mapped in four field surveys in different seasons.

Castellbisbal Recharge system (Barcelona, Catalonia) is two ponds sytem that feeds the overexploited Llobregat pre-delta aquifer. The first pond (15000 m^2) receives water directly from the Llobregat River and acts as a natural impermeable wetland. In the second pond (1400 m^2) Later water is infiltrated through 4 m of vadose zone. The system is monitored with piezometers upstream, downstream and in the middle of infiltration pond. Furthermore, 3 manual piezometers installed in the infiltration pond vadose zone allow sampling water along the first meter of depth. Lastly, a monitoring network of temperature and redox sensors was installed at the soil.

The evolution of Eh in the infiltration pond is linked to the variations in river quality parameters, infiltration rate and hydrochemical signature along the year . These variations are produced by physical clogging, biological clogging and management operations (e.g., scrapping). At the same time, results of DOM characterization indicate that: 1) the sedimentation pond/wetland can act as a source of organic matter, and 2) the proportion of recalcitrant organic matter entering from the river changes along the year, with significant implications for pollutant degradation. These results allow defining MAR management measures in order to increase water quality while keeping a reasonable infiltration rate.