EGU24-20496, updated on 19 May 2024
https://doi.org/10.5194/egusphere-egu24-20496
EGU General Assembly 2024

A short review of the processes explaining water quality improvement during Soil Aquifer Treatment

Jesús Carrera[1], Paula Rodriguez-Escales[2], Cristina Valhondo[1], Lurdes Martinez-Landa[2], Silvia Diaz-Cruz[1], Benjamín Piña[1], Albert Contreras[1], Gerard Quintana[1], and Laia Navarro-Martin[1]

[1]CSIC, IDAEA, Barcelona, Spain (jesus.carrera.ramirez@gmail.com)

[2]Dep. of Civil and Environmental Engineering, UPC, Barcelona, Spain

Soil Aquifer Treatment (SAT) consists of recharging the effluents of wastewater treatment plants across the soil (possibly reinforced with a reactive layer), unsaturated zone, and aquifer. It has been known since long that a dramatic water quality improvement occurs after soil and aquifer passage. However, the actual contaminant removal mechanisms remain open to discussion. Here, we summarize results observed at a number of sites displaying significant degradation of the most recalcitrant chemical compounds, as well as orders of magnitude reduction of antibiotic resistance and pathogen indicators. We have observed that the most toxic species, with significant partition coefficients, tend to accumulate in biofilms, where microorganisms accumulate. The accumulation of degrading microorganisms at the place where they can be degraded suggest natural selection. Further, a broad range of redox conditions, from aerobic to sulphate reduction (and, thus, a broad diversity of microbial communities), do occur during SAT. Together, these processes ensure a an extremely bioactive environment, which explains the dramatic reduction in toxicity we have observed after relatively modest (some 15 days) residence time in the aquifer. An implication from these observations is that the strict conditions imposed by the EU on SAT must be relaxed.