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PFAS transport in the unsaturated zone

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Characterization of contaminants transport in the subsurface is a key component for any measures required for either prevention of water resources pollution or remediation of contaminated sites. Yet, most water resources pollution start with down percolation of contaminated water from land surface through the unsaturated zone to the underlying groundwater, and from there to related surface water resources such as rivers and lakes. Therefore, real time monitoring of contaminant migration in the unsaturated zone is critical for both characterization of pollutants fate and to effective remediation of contaminated sites.

Per- and polyfluoroalkyl substances (PFAS), are a group of new man-made chemicals which is considered emerging contaminant that impose great concern to human health. PFAS release to the environment is attributed to many sources. Yet, decomposition of domestic and industrial waste in landfills and fire-fighting training zones, where PFAS has been heavily implemented as part of the chemical compounds which were commonly used for fire control, are considered major sources for PFAS release to the environment.

SCENARIOS, is an EU funded project, aiming at achieving new strategies and methods for detection, quantification, control and elimination of PFAS from soil, vadose zone and water. Throughout the framework of project, advanced Vadose zone Monitoring Systems (VMS) are implemented at typical PFAS contaminated sites, landfills and fire fighting training zones. Sensoil's VMS technology provides real time continuous information on water flow and contaminant migration through the unsaturated zone, from land surface to the water-table. Analysis of unique data on PFAS transport in the subsurface, with respect to the site-specific hydro-geological, chemical and climatic conditions creates the base-ground for setting up the optimal remediation strategy. The mobility of PFAS in natural unsaturated zones, as measured in full scale field conditions, will be analysed by combining measurements of their interfacial properties with experiments in porous media models and multi-scale numerical models able to describe the fate of PFAS from the pore-scale to aquifer-scale.