

Understanding PFAS transport mechanisms in soil and groundwater

Context and objectives

The presence of PFAS in the environment is a growing environmental concern worldwide, potentially with far-reaching consequences for water supply and human health. After environmental dispersal, PFAS tend to accumulate in the vadose zone. Only some of the PFAS reach groundwater and further retention and transformation might occur in aquifers. However, there is little knowledge on the factors that control the migration of PFAS across groundwater systems.

The main objective of this project is to investigate how the type of PFAS present in water changes along groundwater flow systems from the soil all the way to the groundwater discharge area. The study will be carried out at a site with a well-defined PFAS source in the soil that has impacted an aquifer and springs.

Methodology

A range of field and laboratory methods will be used to characterize the PFAS distribution in various parts of the system. The PFAS source zone will be characterized based on soil samples. Porewater samples will be taken from the vadose zone using suction cups to identify the PFAS that are migrating to groundwater. Finally, groundwater and spring water samples will be analyzed to evaluate which substances show a high mobility in groundwater and reach the spring.

Depending on the advancement of the study and the interest of the student, the field study can be complemented with laboratory column study to investigate the mobility of different PFAS under controlled conditions.

Supervision and collaboration

The project will be carried out in close collaboration with the cantonal environmental agency in charge of contaminated sites and the federal office of the environment that supports the project. The project will be supervised by a PhD student, Francesco Scattolini, working at the site and Daniel Hunkeler.

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Fig. 1: Site with PFAS contamination in soil.