Université de Neuchâtel
Centre d'hydrogéologie
et géothermie

MSc in Hydrogeology and Geothermics

Thesis topic proposal 2026

# Understanding PFAS transport and fate in soil and groundwater

## Context and objectives

The presence of PFAS in the environment is an increasing global concern because of its potentially far-reaching impacts on water resources and human health. Following environmental release, PFAS often accumulate in the vadose zone, while only a portion reaches groundwater, where additional retention and transformation processes may occur within aquifers. Because many PFAS compounds are both highly persistent and mobile, they can form extensive groundwater plumes that may eventually discharge into surface water bodies. However, important knowledge gaps remain regarding the factors that control PFAS migration through groundwater systems and the timescales over which water quality may improve after site remediation.

The main objective of this project is to investigate how PFAS composition changes along groundwater flow paths, from soils through aquifers to groundwater discharge zones, and to determine whether and where PFAS accumulate during transport. Several potential field sites are available, and the specific focus of the study can be tailored to align with the interests of the student.

## Methodology

Because PFAS can migrate over long distances, a sound understanding of the hydrogeological system is essential for assessing their environmental fate and transport. Although the project focuses on PFAS, it will therefore involve a broad range of hydrogeological methods to characterize groundwater flow systems, including hydrochemical and environmental tracer techniques.

Depending on the project focus, PFAS may be analyzed in both the vadose zone, using suction samples, and in groundwater. At selected field sites, there may also be opportunities to install additional boreholes, including multilevel monitoring systems, to investigate the vertical distribution of contaminants.

PFAS analyses will be conducted at the Neuchâtel Analytical Platform (NPAC), offering the opportunity to gain experience with advanced LC-MS methods. There is also potential for collaboration with the CSIRO research centre in Adelaide to apply ultra-high-resolution mass spectrometry for the identification of unknown compounds.

The resulting hydrogeological and PFAS concentration data will provide the basis for developing a conceptual model of PFAS migration.

## Supervision and collaboration

The project will be carried out in collaboration with the cantonal environmental agency in charge of contaminated sites and/or site owners. The project will be supervised by Daniel Hunkeler and one of the postdocs in his group, Dr. Ursina Morgenthaler. Contact: Daniel.Hunkeler@unine.ch