Université de Neuchâtel
Centre d'hydrogéologie
et géothermie

MSc in Hydrogeology and Geothermics

Thesis topic proposal 2026

Quantifying Groundwater–River Exchanges in Restoration Projects Using Fiber Optic Distributed Temperature Sensing (FO-DTS)

Context and objectives

Quantifying flux exchanges between aquifers and rivers remains a major challenge, particularly at relevant spatial and temporal resolutions at which such processes are involved. Recent advances in fiber optic distributed temperature sensing (FO-DTS) provide a unique opportunity to monitor temperature continuously along river and infer groundwater–surface water fluxes.

This MSc project aims to explore the potential of FO-DTS to quantify groundwater–river exchanges in the context of ongoing projects such as the Aire River artificial recharge site (Canton of Geneva) and/or restoration sites in the Val-de-Ruz (Dombresson, Canton of Neuchâtel).

The objectives are to (i) design and optimize a FO-DTS monitoring setup, (ii) process and interpret temperature data to infer fluxes, and (iii) integrate these observations into parsimonious models of groundwater–river interactions.

Methodology

The student will follow a multi-step approach combining field experiments and data analysis:

- Contribute to the design, installation, and optimization of a FO-DTS monitoring system in rivers,
- Process temperature time series to identify zones of groundwater inflow and outflow,
- Apply analytical heat transport models to estimate exchange fluxes,
- Use the results to evaluate the effectiveness of restoration or artificial recharge measures (scenario testing).

Supervision and collaboration

The MSc student will be supervised by Clément Roques (University of Neuchâtel, CHYN) in close collaboration with local and institutional actors involved in the project, i.e. Steve Hottinger (Canton of Geneva) and Olivier Stauffer (Canton of Neuchâtel). Contact : clement.roques@unine.ch