

Alpine groundwater monitoring using combined geophysical and hydrological methods

Context and objectives

Human reliance on mountain catchments is increasing while the reliability of these water resources is decreasing. Groundwater, which has a dampening effect on the extremes of mountain water cycles, will play an increasingly important role in ensuring perennial water resources down-gradient. There is increasing recognition of the importance of hydrogeological processes, including groundwater export, in mountain hydrology. Important questions about the role of deep bedrock flow and long-term mountain groundwater trends remain. There is currently a major lack of spatially-resolved, quantitative data on groundwater processes in mountain catchments which limits our understanding of the current and future states of these systems.

The Vallon de Réchy is a nival-regime alpine catchment that, like much of the Swiss Alps, is experiencing significant impacts from climate change. Previous research has uncovered a complex hydrological system and shown how groundwater ensures perennial streamflow throughout the post-snowmelt period. Several questions remain about, for example, the role of faults and deep groundwater export.

The project

Several MSc projects are available within the context of the SNSF-funded [RADMOGG](#) project.

This project follows on from previous successful studies in the Vallon de Réchy (Valais).

We will employ gravimetric surveys and take advantage of the extensive monitoring infrastructure already in place in the Vallon de Réchy. The student who takes on this project should be prepared and motivated to a) perform field work in a difficult alpine setting, b) manage and analyse diverse datasets from multiple sources, and to c) adapt and apply numerical models. For students with the relevant skills and motivation, a focus on snow accumulation and melt dynamics could be undertaken. Field work in early Summer and Autumn 2024 is required for this project.

Supervision and collaboration

The project will be supervised by Dr. Landon Halloran in collaboration with CREALP and the rest of the RADMOGG team. The student will benefit from synergies with other relevant MSc and PhD projects. Given satisfactory results, the publication of a journal article, co-authored by the student, is possible.

Contact : landon.halloran@unine.ch

