

MSc Thesis Project in Engineering Geology

Topic:

Hydrogeology of the Ursprung Spring, Kanton Nidwalden, Switzerland

Project Framework:

Ursprung Spring (Swiss Coordinates: 673'494/198'797) is a karstic spring of a discharge rate between 200 and 4000 L/min. A cap of well-permeable limestones with some evaporitic Triassic rocks of the Klippendecke partly reveals an inverted stratigraphy. It forms a large syncline that dewateres towards the Engelberg Valley, where its deepest point is the emergence of Ursprung Spring. It is the largest supply resource of Kanton Nidwalden, as it serves with drinking water for about 30 per cent of its population. The quality of the spring water is not Swiss standard, and the water is treated. Tracer experiments revealed an infiltration of creek waters to the spring. For two years, this spring makes part of the Swiss groundwater survey project (NAQUA). In this context, there is an extensive water-quality program ongoing. Eawag, the Swiss Federal Institute of Water Science and Technology, received a grant from the "Mountain Water Network" of the "Regierungskonferenz der Alpenkantone" to further investigate on this spring. Eawag is specialized in the assessment of groundwater age and mixing of different portions of ground water, as well as in the establishment of novel methods for the assessment of bacterial contamination of ground water. The spring water is furthermore used for the generation of hydropower. Waterwork engineering thus has to cope with the requirements of hydropower generation. Eawag is cooperating with communal (Stans Water District), cantonal (Amt für Umwelt Nidwalden), and federal authorities (Bundesamt für Umwelt, Department of Water Quality). An MSc Thesis Project in Engineering Geology fits well into the concerted efforts of a better knowledge of the hydrogeology of this spring important for the supply of drinking water. Scientific student support is granted by the lecturers of "Groundwater Chemistry".

MSc Thesis Project Goals:

Loggers for hydraulic pressure, water temperature, and specific electric conductivity will be installed at the points of emergence of spring water and at points of expected creek water infiltration. Student work could include the analysis of time series measurements. Eawag will analyze the water for environmental and noble-gas tracers. Student work could include the analysis of the tracer results. Eawag will complement the federal efforts of analyzing the chemical water composition with water from other springs and from the creeks. The student could get involved in the chemical analysis and interpretation of ground water. Bacteriological analyses will be performed by Eawag, using their flow-cytometer instrument. As the functioning of this instrument is managed by a postdoc, the student could get involved in the modern interpretation of bacteriological information of ground water that is used as drinking water. Thus some field work is included in the study, lab work is optional, and quantification of the resultant data is mandatory.

MSc Thesis Project Supervisors:

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Further Msc Thesis Project Documents:

Can be made available upon request