I am a PhD student at Eawag (the Swiss Federal Institute of Aquatic Science and Technology) near Zurich, enrolled at the University of Neuchatel. In this position, as part of the INSPIRATION ITN, my research is focused on groundwater monitoring techniques and emerging organic contaminants in aquifers which are impacted by agricultural and urban land use.

I hold a Bachelor degree in Physics from the University of Texas at Austin in the USA, completed in 2013. I hold a Master in Geological and Mining Engineering from the University of Liege, Belgium, completed in 2016. In Liege I specialized mainly in hydrogeology, and conducted a Master thesis on the topic of groundwater salinization in the Senegal River Delta.

My current research tackles the issue of changes in the natural water balance (including changes in water quality) due to land use including agriculture, urban development, and industry on a small-catchment scale. I am making use of a variety of field-based methods in an attempt to quantify changes in groundwater recharge in the human environment, including tracing recharge waters to the source. Due to the central importance of land use, a detailed and systematic survey of land use and a workflow around water dynamics as a function of land use is being developed. To carry out these investigations, I am working at a small field site of 10 km^2 in and around the municipal boundaries of Fehraltorf, Switzerland. This field site was chosen due to it's small-catchment scale size and the fact that it contains a well-defined mix of urban and agricultural landscapes, and roughly 70% of Fehraltorf's municipal water supply comes from the small aquifer underlying the village. Ease of access and opportunity for collaborations were also motivating factors in the choice of a field site.

A groundwater monitoring network was established in the last year in Fehraltorf. 10 shallow piezometers (average depth 6 meters) were drilled and equipped with wireless CTD sensors so that data may be accessed in real-time. In addition, ground geophysical surveys (ERT) were collected in order to better characterize small-scale heterogeneities in the aquifer matrix. Regular sampling of our piezometers is carried out for isotopic measurements, major ions including nitrates, and for a specific list of emerging contaminant compounds. Network establishment and data collection will continue for the most part of 2018. Plans to install 10 more wells are in place, and automated groundwater samples will be installed in two piezometers. In addition to field work, I am conducting laboratory work to measure concentrations of specific compounds (25 in total) in water samples using targeted on-line liquid chromatography tandem mass spectrometry.

A variety of chemical markers are being investigated as indicators for processes influencing groundwater recharge - including water body interactions, diffuse infiltration from irrigation waters, and impervious surface runoff. Aside from using basic physico-chemical parameters (temperature, electrical conductivity or pH) and major ions, emerging contaminants (ECs) are being extensively studied for this purpose. Used in tandem with other parameters, the concentrations of relevant ECs can signal groundwater recharge from areas of different land use types. For example, it is known that the pharmaceutical product Carbamazepine present

in the groundwater is from urban sources (sewer leakages, storm overflows, wastewater treatment plants, etc), while the presence of Mecoprop or Chloridazon is likely to come from agricultural sources.

With the data gathered in Fehraltorf, we hope to pinpoint the spatio-temporal patterns of these chemical parameters as a function of the aforementioned land use types. Use of chemical markers in the environment requires a detailed knowledge of (bio-)chemical processes in the sediment, including the non-saturated zone, aquifer sediment, riverbed and riverbank zones. With respect to ECs, it is important to understand their respective reactivities under different chemical conditions. The results gathered from these essais will be used to shape a groundwater recharge model for Fehraltorf, and to compile a conceptual model of groundwater recharge coupled with land use types.