



Groundwater recharge and solute transport in the urban environment

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Understanding groundwater dynamics around cities and other areas of major human influence is of crucial importance for water resource management and protection in the 21st century, a time of active environmental and societal change. The human environment presents a unique challenge in terms of hydrological characterization due to the alteration of natural conditions. In these areas, the water cycle is partially artificial, and emissions of synthetic organic compounds from accidental leakages, spills, or deliberate release of wastewater into the aquatic environment tend to disrupt the quality and quantity of water in nature.

We present here results of a site investigation carried out on a small aquifer (15 km²) in the Swiss municipality of Fehraltorf, in the canton of Zürich. The purpose is to use novel site investigation and monitoring techniques to best characterize recharge in the anthropogenic environment, as well as the presence of emerging contaminants (pharmaceuticals, pesticides and biocides) from the city. Fehraltorf sources a large percentage of its water supply from the local glacio-fluvial aquifer, which signifies that any vulnerability of the local aquifer has major implications for human health.

We give detail on the wireless sensor network being utilized as part of the groundwater monitoring network in Fehraltorf. Analysis from sampling campaigns of this network attempts to delineate sources and pathways of micropollutants into groundwater. Our approach puts emphasis on the relationship between land use and the hydrologic cycle on the sub-catchment scale. Significant uncertainties still exist in the understanding of land development and how it affects groundwater recharge, and our research attempts to make a contribution to better understand these dynamics.