I am an early stage researcher at IWW Water Centre and a PhD student enrolled at TU Darmstadt in Germany. In the Marie Curie ITN project my research is focused on the investigation of natural nitrate mitigation processes within the groundwater system.

I hold a BSc. degree in Earth Sciences from Eötvös Loránd University, Budapest and got my MSc degree in Hydrogeology Engineering from University of Miskolc, Hungary. After my studies, I participated in remediation projects at an environmental company in Hungary and then I joined ITN project in November, 2016.

Today, the majority of European farmland is dominated by industrial agriculture – an intensive food production featuring enormous single-crop farms and animal production facilities – causing an agricultural nutrient surplus especially in nitrogen within the environment. As a consequence, this intense agricultural activity has already led to high nitrate concentrations above the drinking water limits of 50 mg/l in nearly 30 % of the shallow groundwater bodies in Germany.

In this context, I analyze the content of denitrification capacity (sulfide-/disulfide sulfur and organic carbon) of different sediments in aquifers used for drinking water production. However, studies show that only a fraction of the measured capacity is reactive. Therefore, batch experiments are set up to investigate the reactivity and reaction processes of different solid phases within the sediment. Based on this, denitrification rates can be determined.

In addition to lab experiments a concise field monitoring of the redox front will be established to investigate denitrification processes and potential loss of denitrification capacity within the aquifer. During this work, I will implement isotopic measurements to point out the microbial triggered processes.

These information are gathered and used to develope a hydrogeochemical transport model simulating recent and future groundwater quality. This hydrogeochemical model will provide detailed understanding of the different processes related to denitrification in a complex hydro-geochemical system, like an aquifer, and will also help to understand the impact of the different agricultural practices on these processes.