**Data-driven Modelling of Lithuania Fresh Groundwater Features**

**Supevisor**: dr. Vytautas Samalavičius

Lithuania groundwater is a part of multilayered hydrogeological unit Baltic Artessian Basin. Groundwater is a critical resource in Lithuania, providing freshwater for domestic, agricultural, and industrial uses. This research aims to leverage advanced data-driven modelling techniques to analyse, simulate, and predict groundwater features in Lithuania, focusing on freshwater bearing aquifers. The study will integrate data from previously developed mathematical models (MODFLOW), aquifer geospatial parameters, satellite data, and meteorological records to create models that enhance conventional approaches or develop novel methodologies.

Justification: conventional mathematical modelling in hydrogeology is based on physical process simulations, which are mostly static. New updates require manual input of data into existing models and adjustments, which is time consuming and often omitted. Encompassing historical hydrogeological data and remote sensing technologies into data-driven models would enable to make up-to-date insights into the regional situation of fresh groundwater in Lithuania, e.g. groundwater level. In cases where physical processes are unclear, conventional modelling is limited and could be substituted for machine learning or other artificial intelligence applications to get desired results.

This approach will address critical challenges such as groundwater resource sustainability, resilience, and the impacts of climate change.