Visit of the PUB (Runoff Prediction in Ungauged Basins) Summer School at the Vienna University of Technology, July 2023

My name is Franziska Schwarzenbach and I started my PhD in Hydrology at the University of Zurich in February 2023. In my project, I am testing the value of limited data for runoff predictions using hydrological modelling. For example, I try to do model calibrations with limited information such as mean runoff estimates or water level data. I want to investigate which data are particularly valuable in which types of catchments in order to support the collection of suitable data in catchments that lack runoff measurements (so-called ungauged catchments or basins).

To broaden my knowledge about runoff predictions in ungauged basins, the SSHL generously supported my attendance at the PUB summer school in Vienna which is held each year in July. I am very grateful for this opportunity. Aside the valuable exchange with other students working on similar topics, this was a great opportunity to learn from scientists that have been working on predictions in ungauged catchments since many years already: Lectures were held by Günter Blöschl, Murugesu Sivapalan, Juraj Parajka, Alberto Viglione, Attilio Castellarin, Gregor Laaha, José Luis Salinas, and Peter Valent.

It would be beyond the scope of this report to list all the contents that were discussed and practiced during the week. Instead, I would like to reflect on three learning outcomes that were among the most important outcomes for me:

- ➢ There is no "one size fits all"-solution in defining the similarity of catchments: The best strategy of finding hydrologically similar catchments (e.g., for a regionalization study) depends on the availability of data. While an approach taking the nearest neighbors into account may work best in a region with a lot of data (i.e., with many gauged catchments), an approach considering the similarity of attributes may work better in a data-scarce region (where the nearest neighboring gauged catchments are not so near). When similarity is defined based on catchment attributes, the size and the aridity of a catchment were clearly stated to be the most important factors. Furthermore, precipitation patterns should be considered to define similar catchments.
- ➢ Modelling in arid regions remains challenging: Not only because the processes in arid catchments tend to be less linear than in humid catchments, but also because there is way less data available from arid regions compared to humid regions. Thus, one should not expect to be able to achieve similarly good results in arid catchments as in humid catchments. However, since aridity is expected to increase in the future, it may be of great importance to focus on predictions in arid regions.
- ➢ The exchange of knowledge is crucial: During their times of study, some of the lecturers of the summer school were not aware of the Budyko framework yet, even though the simple and powerful tool to distinguish between water and energy limitation already existed. The reason for this was its development in "the East" while the lecturers were studying in "the West". To be able to solve global (water) challenges, it will be of greatest importance to share our knowledge across borders and to exchange with researchers from all over the world. The summer school with participants affiliated in thirteen different nations was a good first experience for this.

Group picture on the first day of the summer school in front of the Vienna University of Technology. By Borbála Széles.