EGU26-14487, updated on 06 Jun 2026
https://doi.org/10.5194/egusphere-egu26-14487
EGU General Assembly 2026

Projections of Upper Danube River discharge applying the CMIP6 climate model ensemble and a physical storyline classification

Philipp Stanzel[1], Harald Kling[1], Fabio Lerche[1], Valentin Weis[2], and Albert Ossó[2]
[1]AFRY Austria, Hydro Consulting, Vienna, Austria (philipp.stanzel@afry.com)
[2]Wegener Center for Climate and Global Change, University of Graz, Austria

Runoff generation in the Upper Danube Basin upstream of Vienna, which can be regarded as the water tower of the Danube region, is characterized by complex interactions of glacier, snow and rainfall-driven processes. Previous studies have shown the high sensitivity of the basin's runoff regime to climatic changes. The presented contribution is the first climate change impact study for the Upper Danube applying latest-generation CMIP6 climate model projections.

Precipitation-runoff simulations were performed with a daily hydrological model calibrated with exceptionally long observation data series (1870-2023) that allowed comprehensive evaluation of the ability to adequately simulate the basin's hydrology under different weather and climate conditions. Climate model data for the emission scenarios SSP2-4.5 and SSP5-8.5 were bias corrected with the Scaled Distribution Mapping method. Climate change projections were analysed to inform a physical climate storylines classification based on the projected development of large-scale climatic features (jet latitude and jet speed) in the different models of the CMIP6 ensemble.

Application of the climate projections in the hydrological model yielded long-term hydrological projections for the entire 21st century. Simulated changes in the hydrological regime are presented, with a focus on low flow discharge due to its importance for river navigation. Differences to climate impact simulations with previous climate model generations are analysed, and the potential of jet-based storylines to explain the uncertainty in hydrological projections is explored.