

## **Highly-resolved hydro-meteorological trends in Norway: impacts of observed climate change on snowmelt- and rainfall dominated streamflow in Western vs. Eastern Norway**

Amalie Skålevåg, Klaus Vormoor

Institute of Environmental Science and Geography, University of Potsdam, Germany

Mountainous and Nordic regions are experiencing more rapid temperature increases as compared to regions at lower altitudes and latitudes, which will impact the hydrology in these regions. For Norway, there is increasing evidence for gradually increasing temperatures and recent changes in the intensity and frequency of precipitation as well as in the number of days with snow cover. The most pronounced differences regarding their hydro-meteorological regime can be found between Western and Eastern Norway (Vestlandet vs. Østlandet). Most catchments in these regions are characterized by mixed snowmelt/rainfall regimes with streamflow peaks during spring (dominant in Østlandet) and autumn (dominant in Vestlandet). Changes in the hydro-meteorological drivers will have direct implications on the snow regime, and thus, also on streamflow via their direct effect on the relative importance of snowmelt vs. rainfall for streamflow generation.

In this study, we analyze daily-resolved streamflow trends for 112 catchments in Western vs. Eastern Norway for the period 1983-2012 and compare them with daily-resolved trends in the hydro-meteorological drivers. We also estimate the relative contribution of snowmelt and rainfall on daily streamflow for each catchment and identify trends therein. This process-orientated approach at high temporal resolution allows for a better identification of (in)consistencies with changes in the hydro-meteorological drivers than simple seasonal comparisons. Lastly, we aim to attribute observed changes in daily streamflow to the most dominant hydro-meteorological drivers by applying seasonal multiple-regressions. The major findings of this study are as follows:

- The high-resolution trend analysis allows for in-depth seasonal-specific insights into the hydrological response of catchments with different hydrological regimes to changes in the hydro-meteorological drivers.
- Increasing (decreasing) contributions of rainfall (snowmelt) to streamflow generally agree with prior expectations. The trends, however, show differences in magnitude and timing, depending on the geographical location (Vestlandet vs. Østlandet) and altitude.
- The seasonal multiple regression approach suggests that daily streamflow changes can be explained best by adding temperature as an additional predictor to snowmelt and rainfall, which may indicate the changing relevance of evapotranspiration particularly during summer.