Elevation-dependent drying signals under future climate change – a case study for Austria

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In this contribution future changes of surface water availability over the Austrian domain is investigated. We use an ensemble of downscaled and bias-corrected regional climate model simulations of the EURO-CORDEX initiative under moderate mitigation (RCP4.5) and Paris agreement (RCP2.6) emission scenarios. The climatic water balance and its components (rainfall, snow melt, glacier melt and potential evapotranspiration) are used as indicators for surface water availability and we focus on different altitudinal classes (lowland, mountainous and high alpine) to depict a variety of processes in complex terrain. Apart from analysing the mean changes of these quantities we also pursue a hazard risk approach by estimating changes in return periods of drought events of a given magnitude as observed in the reference period. The results show in general wetter conditions over the course of the 21\(^{st}\) century over Austria. Considering seasonal differences, winter and spring will be getting wetter due to an increase in precipitation along with a higher rainfall/snowfall fraction as a consequence of rising temperatures. In summer only little changes in the ensemble median of the climatic water balance are visible, hence uncertainties are large due to a considerable ensemble spread. However, by analysing changes in return periods of drought events, a robust signal of increasing risk of moderate and extreme drought events during summer is apparent. It emerges from an increase in interannual variability of the climatic water balance, which likely stems from intensified land-atmosphere coupling under climate change sustaining and intensifying spring preconditions towards even wetter or dryer summers.