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Impact of climate change on groundwater resources in Southern Austria

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Groundwater is the most important source for drinking water in Austria. In some parts of Southern Austria water resources already are very vulnerable to unfavourable climate conditions. This paper summarizes case studies of estimating the impact of climate change on groundwater recharge and groundwater flow in Southern Austria in the frame of the ETC-Alpine Space project ALP-WATER-SCARCE. In several pilot regions a distributed hydrological model was set up to simulate groundwater recharge and groundwater flow for a period of 10 to 30 years. The pilot sites range from mountainous catchments with steep hillslopes to Alpine valleys and flatlands with pore aquifers. In the model period comprehensive land data and meteorological data were used, and the models were calibrated to available stream gauge data. Additional low flow monitoring in the frame of the project also allowed for a more detailed regional analysis in some catchments. The simulations were firstly used to extend runoff and groundwater recharge depths on an annual basis up to 200 years into the past by regression analysis with long time meteorological parameters (HISTALP). The historical view shows that groundwater flow and recharge in most of the pilot regions decreased since the beginning of the 20th century, which is mainly the effect of climate change. Changes of land use are of minor relevance in most of the regions. Second, by the calibrated model scenarios were simulated to quantify the impact of a possible future change in the climatic conditions on water resources. The scenarios were generated by altering the model input by a “Delta-Change”, under consideration of the historical development. These scenarios can be interpreted as “what if”-scenarios to quantify the sensitivity of the hydrological systems on these climatic variables. The results are compared with actual and projected water uses as a basis for regional water resources management.