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What can we learn from groundwater level time series about future risks for water resources?

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Future scarcity of groundwater resources is usually assessed by driving hydrological models with climate change scenarios. However, the climate change scenarios derived from climate models are subject to high uncertainties, in part related with the downscaling procedures.
Historical data can provide additional insight in the response of groundwater resources to changing weather (and climate) conditions. In particular, historical time series of groundwater levels do contain valuable proxy information on past changes in recharge and their relation with vegetation and climate conditions. Analyzing those data can help to identify processes which will affect groundwater resources in the future. For instance, historical data indicates that for Central Europe reduced winter precipitation cause large groundwater level declines (Warren, 1994; Bradford, 2000).
Together with a working group of the Swiss Hydrogeological Society we have collected time series of groundwater levels in the perialpine region of Switzerland and Southern Germany reaching back to the 1930s and representing conditions in aquifers which are dominated by direct recharge. The potential of these data to assess future risks for groundwater resources is discussed and analyses of the spatial and temporal patterns of anomalies in groundwater levels are presented. The time series of groundwater levels are also analyzed together with hydrological model simulations, in order to identify the role of different hydrological processes.

References:
Bradford, R. B.: Drought events in Europe, in: Drought and Drought Mitigation in Europe, edited by: Vogt, J. V. and Somma, F., Kluwer Academic Publishers, 2000.

Warren, G. D.: Drought in the south – implications for the management of groundwater resources, in: Groundwater – Drought, Pollution and Management, edited by: Reeve, C. and Watts, H., Balkema, Rotterdam, The Netherlands, 1994.