



## Evaluation of groundwater droughts in Austria

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Droughts are abnormally dry periods that affect various aspects of human life on earth, ranging from negative impacts on agriculture or industry, to being the cause for conflict and loss of human life. The changing climate reinforces the importance of investigations into this phenomenon.

Various methods to analyze and classify droughts have been developed. These include drought indices such as the Standard Precipitation Index SPI, the Palmer Drought Severity Index PDSI or the Crop Moisture Index CMI. These and other indices consider meteorological parameters and/or their effects on soil moisture. A depletion of soil moisture triggered by low precipitation and high evapotranspiration may also cause reduced groundwater recharge and thus decreasing groundwater levels and reduced groundwater flow to springs, streams, and wetlands. However, the existing indices were generally not designed to address such drought effects on groundwater. Thus, a Standardized Groundwater level Index has recently been proposed by Bloomfield and Marchant (2013). Yet, to our knowledge, this approach has only been applied to consolidated aquifers in the UK.

This work analyzes time series of groundwater levels from various, mostly unconsolidated aquifers in Austria in order to characterize the effects of droughts on aquifers in different hydrogeologic and climatic settings as well as under different usage scenarios. In particular, comparisons are made between the water rich Alpine parts of Austria, and the dryer parts situated in the East. The time series of groundwater levels are compared to other data, such as meteorological time series and written weather records about generally accepted phenomena, such as the 2003 European drought and heat wave. Thus, valuable insight is gained into the propagation of meteorological droughts through the soil and the aquifer in different types of hydrogeologic and climatic settings, which provides a prerequisite for the assessment of the aquifers' drought susceptibility in a changing climate.

### References:

Bloomfield, J. P. & Marchant, B. P.  
Analysis of groundwater drought building on the standardised precipitation index approach  
Hydrology and Earth System Sciences, 2013, 17, 4769-4787