Description of groundwater droughts in the UK: 1890 to 2015

Drought and Standardized Groundwater Index

Bloomfield and Marchant (2013) developed an index for standardising groundwater level time series and characterising groundwater droughts, the Standardised Groundwater level Index (SGI), and calculated SGI for 14 relatively long, up to 103 years, groundwater hydrographs from a variety of aquifers, including Chilgrove House and Dalton Holme. Here we have used the SGI time series for these two sites as the basis of the current investigation of the groundwater drought history of the UK.

SGI is a non-parametric normalization (the normal scores transform) of data that assigns a value to observations, in this case monthly groundwater levels, based on their rank within a dataset; in this case groundwater levels for a given month from a given hydrograph. When SGI is negative it indicates drought conditions and the more negative it is the more intense the drought. The normalised SGI values can be compared between sites over similar time periods to characterise the relative intensity of a drought between sites. More details about how SGI is calculated can be found in Bloomfield & Marchant (2013).

Describing and Classifying Droughts

For each drought event we have defined a start and end date, defined by SGI but compared to meteorology. Groundwater drought terminations can be highly spatially and temporally variable and the end of a groundwater drought is particularly difficult to constrain. For consistency, end dates have been derived from the SGI (SGI values return to positive for a prolonged period of consecutive months) and groundwater reports where possible. Each drought is classified return to positive for a prolonged period of consecutive months) and

Event selection

9 groundwater drought episodes have been identified by analysing the SGI time series for Chilgrove House and Dalton Holme from Bloomfield and Marchant (2013), i.e. for dates between 1910 and 2006. For each SGI time series a drought event is defined as any period where consecutive months are negative; a drought ends when SGI returns to a positive value. Two additional events are reviewed: the ‘long drought’ of 1890 to 1910 (Marsh et al., 2007) and the drought of 2011 to 2012 (Marsh et al., 2013).

Contact information

Andrew McKenzie aam@bgs.ac.uk