

The Groundwater Drought Initiative (GDI): Characterising and analysing groundwater drought across Europe

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Major droughts, such as recent events in 2011-12, 2015 and 2017-18, exhibit spatial coherence across Europe and have been the subject of spatio-temporal monitoring and analysis of the driving meteorology, surface and soil water droughts and vegetation status. However, to date there has been no such equivalent monitoring or analysis of groundwater droughts at the pan-European scale – this represents a significant gap in drought research and therefore in water management. Groundwater drought, defined as below normal groundwater levels, is a threat to water security across Europe. Groundwater resources are highly susceptible to major multi-seasonal to multi-annual episodes of meteorological drought due to the pooling, lagging and lengthening of drought signals in groundwater systems. These phenomena are dependent on river catchment and aquifer characteristics and may be impacted by anthropogenic influences such as abstraction and land use management, having potentially important consequences for society and ecosystems.

To address this research gap, the Groundwater Drought Initiative (GDI), a pan-European collaboration, is undertaking a large-scale data synthesis of groundwater level data across Europe to produce the first assessment of spatio-temporal changes in groundwater drought status from ~1960 to the present, and the first systematic assessment of the impacts of groundwater drought at the European scale. Here we describe the methods used to undertake this continental scale status and impact assessment including illustrations from regional-scale analysis of drought in the Chalk aquifer of the UK. Facilitating and underpinning these activities, the GDI is establishing a new network to co-ordinate groundwater drought research across Europe. We welcome all contributions to the Initiative and explain how to become involved with the GDI.