



Exploring the link between meteorological drought and streamflow to inform water resource management

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Drought indicators are an under-used metric in UK drought management. Standardised drought indicators offer a potential monitoring and management tool for operational water resource management. However, the use of these metrics needs further investigation. This work uses statistical analysis of the climatological drought signal based on meteorological drought indicators and observed streamflow data to explore the link between meteorological drought and hydrological drought to inform water resource management for a single water resource region. The region, covering 21,000 km² of the English Midlands and central Wales, includes a variety of landscapes and climatological conditions. Analysis of the links between meteorological drought and hydrological drought performed using streamflow data from 'natural' catchments indicates a close positive relationship between meteorological drought indicators and streamflow, enhancing confidence in the application of drought indicators for monitoring and management. However, many of the catchments in the region are subject to modification through impoundments, abstractions and discharge. Therefore, it is beneficial to explore how climatological drought signal propagates into managed hydrological systems. Using a longitudinal study of catchments and sub-catchments that include natural and modified river reaches the relationship between meteorological and hydrological drought is explored. Initial statistical analysis of meteorological drought indicators and streamflow data from modified catchments shows a significantly weakened statistical relationship and reveals how anthropogenic activities may alter hydrological drought characteristics in modified catchments. Exploring how meteorological drought indicators link to streamflow across the water supply region helps build an understanding of their utility for operational water resource management.