



## **Sensitivity of stream water age to climatic variability and land use change: implications for water quality**

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Advances in the use of hydrological tracers and their integration into rainfall runoff models is facilitating improved quantification of stream water age distributions. This is of fundamental importance to understanding water quality dynamics over both short- and long-time scales, particularly as water quality parameters are often associated with water sources of markedly different ages. For example, legacy nitrate pollution may reflect deeper waters that have resided in catchments for decades, whilst more dynamics parameters from anthropogenic sources (e.g. P, pathogens etc) are mobilised by very young (<1 day) near-surface water sources. It is increasingly recognised that water age distributions of stream water is non-stationary in both the short (i.e. event dynamics) and longer-term (i.e. in relation to hydroclimatic variability). This provides a crucial context for interpreting water quality time series. Here, we will use longer-term (>5 year), high resolution (daily) isotope time series in modelling studies for different catchments to show how variable stream water age distributions can be a result of hydroclimatic variability and the implications for understanding water quality. We will also use examples from catchments undergoing rapid urbanisation, how the resulting age distributions of stream water change in a predictable way as a result of modified flow paths. The implication for the management of water quality in urban catchments will be discussed.