

## A generic framework to analyse the spatiotemporal variations of water quality data on a catchment scale

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Most spatiotemporal studies treat spatial and temporal analysis separately. However, spatial and temporal changes occur simultaneously and are correlated. In this study, we propose a generic framework to simultaneously analyse the spatial and temporal variations of water quality on a catchment scale. Specifically, we analyse the heterogeneity of temporal evolution of water quality data among different sampling sites, and the heterogeneity of spatial distribution of water quality data over different sampling times, respectively, by integrating the techniques of normalised mutual information, dynamic time wrapping and cluster analysis. To bring deep insight into the spatiotemporal variations, inter-change and intra-change are further defined and distinguished, respectively. Taking the Fuxi River catchment as a case study, results indicate that the proposed framework is intuitive and efficient. Beyond, the generic framework can be expanded for other catchments and environmental data.