



Climatic sensitivity of river temperature regimes within England and Wales

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Identification of the most sensitive hydrological regions within England and Wales to a changing climate is essential to inform climate change mitigation/ adaptation and management strategies. This study presents a classification of between year variability and associations with regional climate and hydrological processes of river thermal regimes at 39 sites within England and Wales. Hierarchical, agglomerative cluster analysis is used to identify shape (timing) and magnitude (size) regimes in 702 (702) station-years for river (air) temperature. Comparisons between air and river temperature regimes provide large-scale perspective on spatial and temporal patterns and linkages between climate and river thermal regimes. A Sensitivity Index (SI), based on conditional probability, is used to quantify the climatic sensitivity of river temperature regimes. Results indicate that inter-annual variability in river temperature regime shape is driven by climate primarily but is moderately sensitive to climate, as hydrological processes override the climatic signal in some years. River temperature magnitude regimes are driven primarily by climate also but display a range of climatic sensitivities and clear spatial differentiation in sensitivity is apparent, attributable to regional hydrological processes. The outcomes of this research provide insight into the regional controls on river temperature; form the basis for structuring further analysis at smaller spatial and temporal scales, and; inform management and adaptation planning in a changing climate.