
Multi-timescale SST-Streamflow connectivity: A complex network approach

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Abstract

Knowledge of the SST-Streamflow interaction helps us understand local hydrology at future timescale with the changing climate conditions. Most studies exploring this relationship only focus on seasonal or annual scales however, various atmospheric and oceanic phenomena occur at different timescales, which need to be considered. This study investigates the influence of sea surface temperature (SST) on German streamflow, divided into Alpine, Atlantic and Continental streamflow regions, at timescales ranging from sub-seasonal to decadal by integrating wavelet transform and complex network techniques. The degree centrality metric is used to evaluate the spatially embedded network. Our results re-established known SST regions that have a potential connection with the various streamflow regions of Germany. Spatial patterns that appeared in this study resemble the North Atlantic tripole-like pattern, Equatorial Atlantic Mode and also the Mediterranean Sea, connected with the Vb weather system. In addition, we also identified the scale specific patterns in the Pacific, Indian and Southern Ocean regions at different timescales ranging from seasonal to decadal scale.

Keywords: SST Streamflow connectivity, Wavelets, Complex network

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