Study of Watershed Processes Under Varying Climatic Regimes: Role of Spatial Scale

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Abstract. This study presents a computational analysis for evaluating the spatiotemporal variability of critical nutrient processes at the watershed scale. In the analysis, model parameters are treated as surrogates for natural processes that they represent. We aim to investigate the response of watershed systems to uncertainties associated with model parameters and critical natural processes at various spatial and temporal scales and under varying climatic scenarios. A global sensitivity analysis, i.e., Fourier Amplitude Sensitivity Test (FAST), was applied to examine which natural processes influence flow, sediment, and nutrient loads at daily, monthly, seasonal, and annual time steps at various locations within the watershed. Using the Soil and Water Assessment Tool (SWAT), this framework was applied in the St Joseph River watershed in Indiana where flow and water quality data at various locations are available. The results of this study bear importance for implementation of management actions for nonpoint source pollution control. In particular, inferences pertinent to the appropriateness of best management practices (BMPs) for pollution control at various locations within the watershed are discussed.

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