Uncertainties in hydro-climatic modeling under changing climate

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The high climate sensitivity of hydrologic systems, the significance of these systems to society, and the imprecision of climate projections for the future, all stimulate interest in defining uncertainty in the hydrologic implications of climate change. It is now widely accepted that climate change will have immediate and long-term effects on the global availability and management of water resources. All hydrological models can be classified into three fundamental categories of uncertainty: measurement, structural, and parametric. Inaccurate measurements of variables and attributes contribute to the problem of measurement uncertainty (e.g., stream flows that are typically an output and rainfall that serve as an input to hydrological models). Inaccuracies in the mathematical representation of actual hydrological processes generate structural uncertainty. Insufficient calibration data and the inherent inaccuracy of structural and measurement-based approaches add to a degree of parametric uncertainty. Despite the fact that scholars have studied measurement and parametric uncertainties, there has been a paucity of research on structural uncertainty. To be more specific, there is no known model for determining the magnitude of structural uncertainty in an unmeasured area.

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