Special Issue

Innovative Modeling of Water Systems: Integrating AI, Digital Twins, and Observations

Message from the Guest Editor

The innovative modeling of water systems is undergoing a rapid transformation driven by advances in artificial intelligence (AI), digital twin technologies, and the expanding availability of high-resolution observations. Traditional process-based models, while foundational, often struggle to capture complex nonlinear dynamics, scale interactions, and real-time variability inherent in natural and engineered water systems. This topic presents an integrated framework that combines physics-based understanding with data-driven intelligence to enhance prediction, monitoring, and decision-making across hydrological, hydraulic, and water resource applications.

The integrated modeling paradigm represents a significant step toward intelligent, adaptive, and scalable water system management, offering actionable insights for researchers, practitioners, and policy makers facing increasing water-related risks and uncertainties. Such approaches support sustainable, equitable, and evidence-based water governance across the world.

Guest Editor

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In the context of global changes, the sustainable management of water cycles, going from global and regional water cycles to urban, industrial and agricultural water cycles, plays a very important role on the water resources and on their relationships with food, energy, biodiversity, ecosystem functioning and human health. *Water* invites authors to provide innovative original full articles, critical reviews and timely short communications and to propose special issues devoted to new technological and scientific domains and to interdisciplinary approaches of the water cycles. We ensure a critical review process and a quick turnaround between submission and final decision.

Editor-in-Chief

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