Science for Solutions decade: HELPING
Hydrology Engaging Local People IN one Global world
IAHS Scientific Decade 2023-2032
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Details of the Working Group – Development and application of river basin simulators

Describe the work and how your suggested working group will contribute to the goal(s): Based on big data of river system observation, hydrological knowledge, and artificial intelligence technology (AIT), a river basin simulator (RBS) stands as a data-driven simulation and regulatory decision-making system within a river basin. Encompassing monitoring, simulation, assessment, early warning, and decision-making support capabilities, a river basin simulator finds practical applications across diverse sectors including water resources, agriculture, energy, shipping, flood control, environmental preservation, and beyond. Through these applications, it plays a pivotal role in supporting integrating natural hydrology with socio-hydrology and fostering sustainable development.

Describe the methods you will use to achieve the goal(s): The development of river basin simulators will be based on the research advancements made through Panta Rhei. This includes a comprehensive understanding of hydrological processes, utilization of advanced hydrological models that adapt to changing environmental conditions, and the practical application of socio-hydrology insights within expansive river basins. These simulators are poised to seamlessly integrate cutting-edge hydrological models, remote sensing technology, artificial intelligence, and robust big data analytics. Additionally, a crucial element will involve fostering active engagement with local stakeholders, ensuring a holistic approach to the simulator's functionality and impact. The efficacy of the river basin simulators will be showcased through their application in large river basins such as the Yangtze, Yellow, Amazon, and Nile, playing a pivotal role in integrated water resources management.

Describe the (a) short-term, (b) the long-term and (c) the ultimate results you hope to achieve:
(a) Short term goal: developing and applying a river basin simulator aimed at furnishing essential decision support for effective flood management. (b) Long-term goal: developing an advanced river basin simulator to offer decision support for the integrated water resources management of large river basins such as the Yangtze, Yellow, Amazon, and Nile. (c) Ultimate results: establishing a robust tool for ensuring water security and fostering sustainable development of river basins. These outcomes hold the potential to significantly shape river basin master planning and integrated water resources management over the long term.

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