

YAMAZAKI LAB.

Modeling complex water flow dynamics at the global scale



Department of Human and Social Systems
Global Hydrological Prediction Center

Global Hydrodynamics

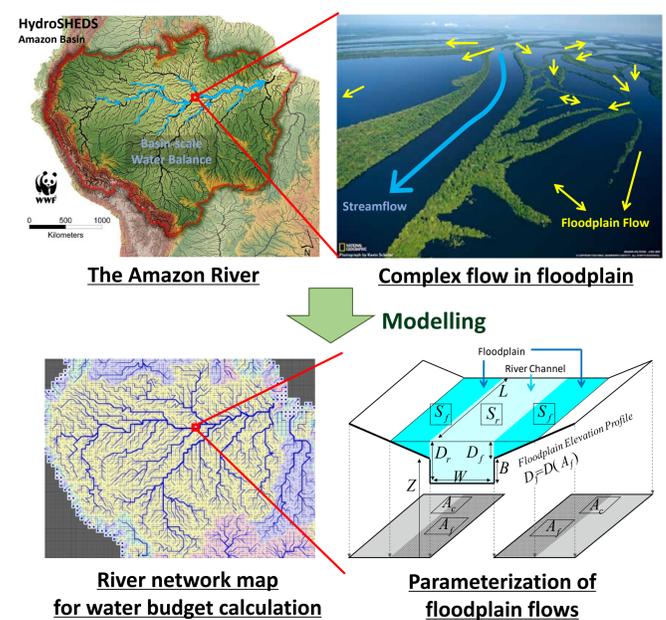
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<https://global-hydrodynamics.github.io/>

How can we simulate the complex water flow in continental rivers?

Flood is one of the most hazardous disasters in the world. Flood simulation by computer models is an essential tool for real-time flood forecast & quantitative flood risk assessment. However, it is still difficult to model complex flow dynamics of the continental-scale rivers, such as the Amazon or the Mekong, because we have to simultaneously consider $\sim 1000\text{km}$ scale water budget and $\sim 1\text{m}$ scale topography.

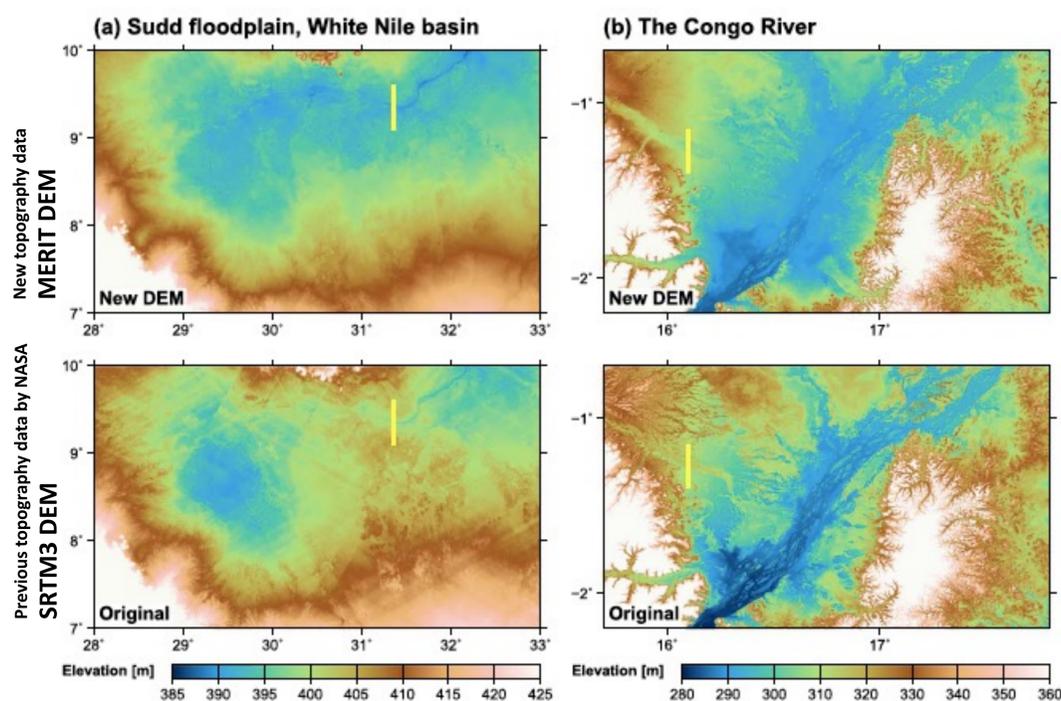
Our laboratory is developing a framework for global-scale flood simulation system, by utilizing the high-resolution satellite topography datasets (right figure). In addition, we aim to achieve real-time flood hazard forecast and future flood risk assessment under climate change, by integrating weather forecast data and advanced technology on big-data handling.



High-resolution & high-accuracy global topography datasets

High-accuracy topography data is essential for precise flood simulation. However, most satellite-derived topography maps contain various errors, which degrades the accuracy of flood simulation.

Our laboratory is developing high-accuracy and high-resolution topography datasets, based on the state-of-the-art techniques on big-data handling. Our topography datasets are now used by many researchers in various study fields other than flood simulation.



MERIT DEM: A precise topography by multi-component error removal

High accuracy topography map was developed by combining multiple satellite data and removing multiple error components. Now widely used in various research fields.

GWD-LR: Global River Width Data

The *first* world map of river width, based on the satellite-derived high-resolution water body data.

