# Application of the LISFLOOD-FP Hydrodynamic Model for Impact-Based Forecasting over the Eastern Africa Region

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## Introduction

- Impact-based forecasting (IBF) supports risk-oriented decisions in disaster risk management by emphasizing anticipatory actions that minimize damage and loss.
- Inundation forecasting is essential for IBF hazard modeling and use with impact functions, linking flood water depth to displacement risks and damage to infrastructure.
- Currently, IBF uses hydrological forecasts combined with historical maps for inundation data from stream flow forecasts, but it struggles to capture urban and riverine rainfall-induced floods. Although hydrodynamic modeling is precise, it is too computationally intensive for routine IBF.
- A parsimonious modeling framework that balances the complexity and simplicity of hydrodynamic processes might be a promising approach for generating inundation data.
- Current study evaluated the hydrodynamic model LISFLOOD-FP [1] for its potential in impact-based forecasting. We also assessed the operational IBF suitability of the parsimonious, simplified model RIM2D [2].

## Methods

The Figure shows the method used to compare LISFLOOD-FP and RIM2D for operational use in cloud computing.

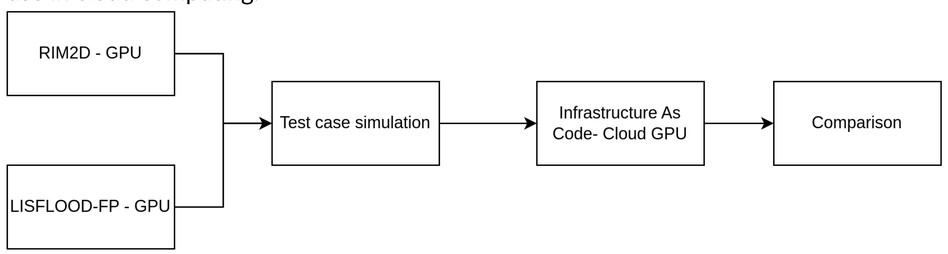


Figure 1: The GPU versions of the models are used in a similar GPU cloud computing setup.

## Results

- Test case simulations indicate that RIM2D is more efficient for operational IBF due to its parsimonious hydrological modeling approach, making it suitable for IBF risk measures.
- The validation of RIM2D's hydrodynamic modeling in East Africa is ongoing; the supporting materials detail the Python programs and cloud setup for the model.

## References

[1] Mohammad Kazem Sharifian, Georges Kesserwani, Alovya Ahmed Chowdhury, Jeffrey Neal, and Paul Bates. LISFLOOD-FP 8.1: new GPU-accelerated solvers for faster fluvial/pluvial flood simulations. *Geoscientific Model Development*, 16(9):2391–2413, 2023.

[2] Heiko Apel, Sergiy Vorogushyn, and Bruno Merz. Brief communication: Impact forecasting could substantially improve the emergency management of deadly floods: case study july 2021 floods in germany. *Natural Hazards and Earth System Sciences*, 22(9):3005–3014, 2022.

**RIM2D**, a streamlined, **parsimonious** version of **LISFLOOD-FP** model, might be the ideal choice for **impact-based forecasting**. After all, why putting on a **space suit** to water the **garden**?

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icpac-igad/rim2d-ibf
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