Session 29: Advance in flood research, its prediction, impact assessment and mitigation strategies Presentation Number: 29-41 - C06

# **Development of a Manual on Flash Flood Forecasting System for Small and Medium-Sized Rivers** Daiki KAKINUMA<sup>a</sup>, Shingo NUMATA<sup>a</sup>, Takafumi MOCHIZUKI<sup>b</sup>, Keijiro KUBOTA<sup>a</sup>, Yosuke NAKAMURA<sup>c</sup>, Toshio KOIKE<sup>a</sup> and Koji IKEUCHI<sup>d</sup>

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# **Introduction / Purpose**

Almost every year, record-breaking rainfall causes flash floods in both large and small rivers in Japan. These disasters are also occurring globally, with growing concern that climate change will further increase the damage.

- $\succ$  While Japan's major rivers have water level forecasting systems, there are approximately 1,500 small and medium-sized rivers that have a large population and are at risk of serious damage due to flooding, but for which no water level forecasting have been made.
- Since the flood travel time is short in small and medium-sized rivers, flood forecasting requires a high level of technical expertise to accurately forecast water levels in a short period of time for calculation. In addition, the construction of the system requires a large amount of money and time.

This study aims to develop flood forecasting system that is **fast in** calculation, low-cost, simple, and adequately accurate and then standardize the provision of water-level forecasting information for small and medium-sized rivers, along with creating a manual for the system.

# **Methods**

10/25 0:00

### **1.Build a basic model.**

### [Hydrological model]

>RRI model (Rainfall Runoff Inundation) which is a distributed model that can simultaneously calculate infiltration capacity, surface runoff, river flow, and inundation. **[Topography data]** 

- >MERIT Hydro: global hydrography datasets (Grid size: Approx.150m) [Land-use]
- Land use: Classified into 5 types (Mountain, Paddy, Crop, Urban, Water area) [Rainfall]
- Observation Rainfall: Radar/Raingauge-Analyzed Precipitation by JMA



## 2. Optimized for model parameters by SCE-UA method

- > The SCE-UA method was applied to the RRI model as an automatic adjustment function for model parameters. (Roughness of river and slope, soil porosity, hydraulic conductivity)
- $\succ$  In order to obtain high reproducibility for medium as well as large floods, optimization is applied to at least two multiple events and validation is applied to the events not used in the optimization.

- 1. Build a basic model.
- hydrological models into DIAS.
- 4. Validate the model by selecting 200 that are under diverse climatic and runoff conditions.
- 5. Developed a manual that summarizes the knowledge obtained and covers everything from data preparation to model calibration and validation methods.









- station is highly affected by backwaters from the main river and tidal waves.



- River bed fluctuation, etc.









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https://www.pwri.go.jp/icharm/research/articles/project-prism\_manual\_j.html