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FloodS
Online flood simulation tool

2023-07-25

Hitachi, Ltd.

Project Overview

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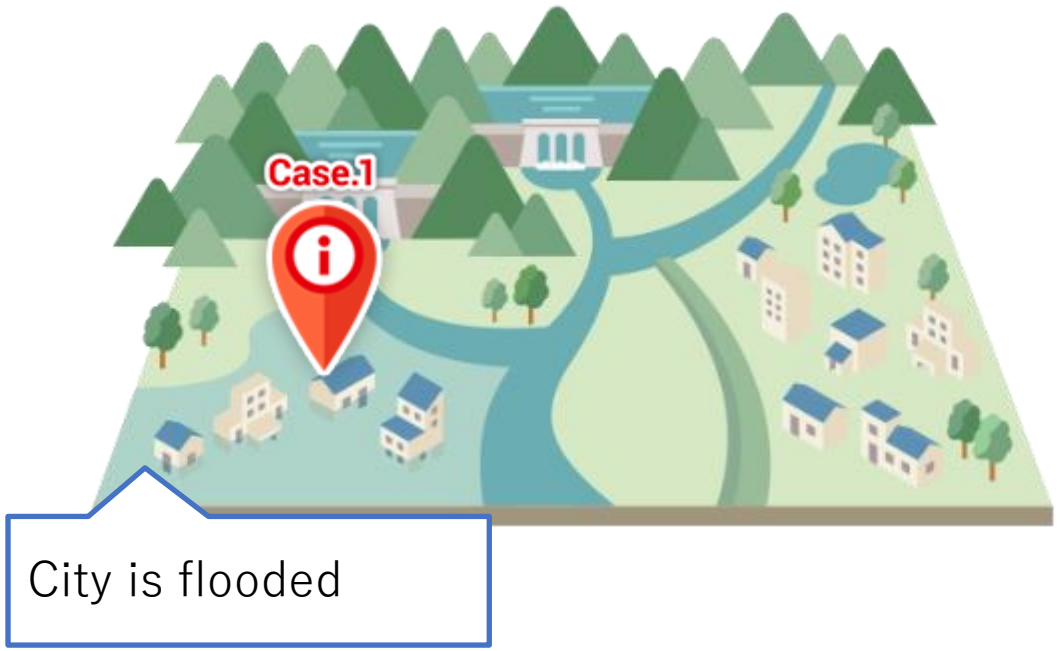
- Urgent issues
  - Adapting to climate change
  - Implementing adequate flood disaster response
  - Support for flood disaster prevention
- What government needs
  - Tools for flood hazard mapping and decision-making

- Our goal
  - To develop flood simulation system with excellent usability & visibility
  - Intended users: Government officials involved in
    - adaptation planning
    - disaster prevention planning
    - river management
    - Urban planning
    - etc.

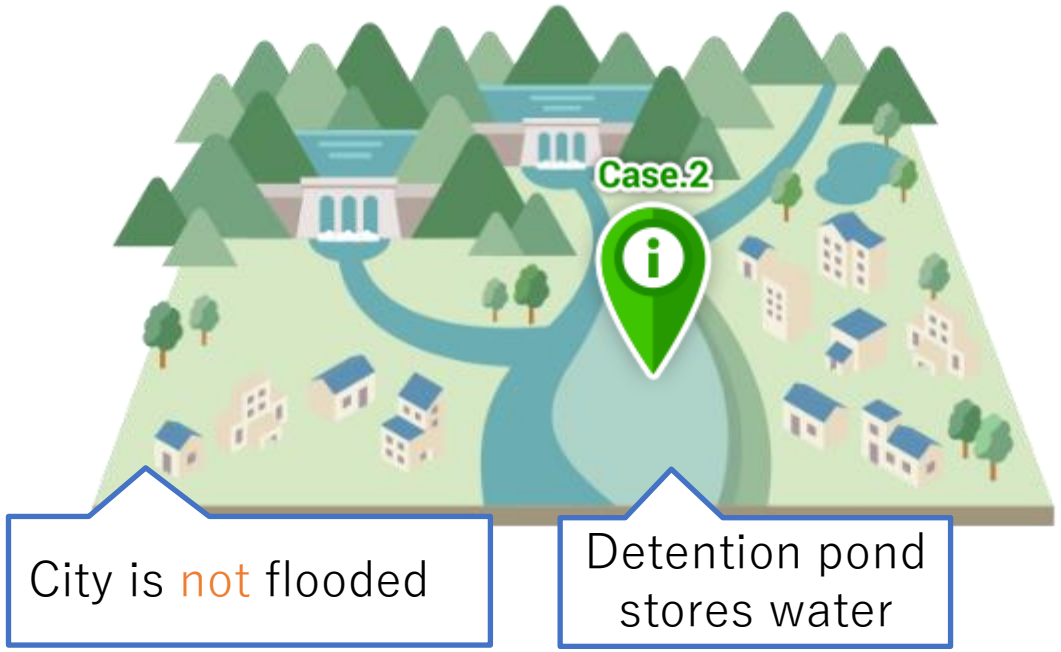
Use case

When you plan flood mitigation, you need flood simulation.

Case 1: without detention pond



Case 2: with detention pond



Use case

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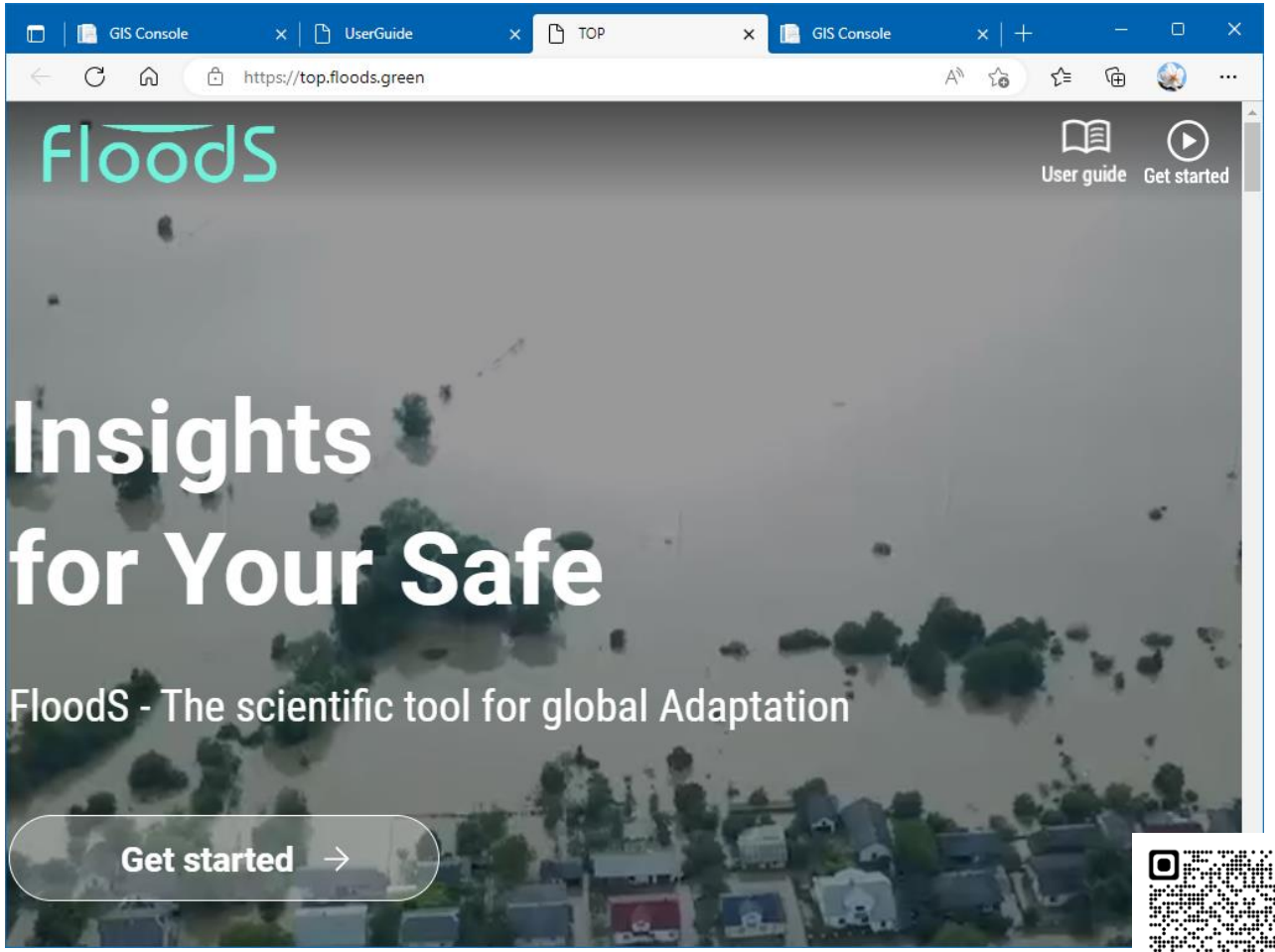
- FloodS helps
  - Mitigation planning by evaluating effect of flood flow control measures (e.g., detention pond)
  - Because FloodS can simulate floods that have not occurred in the past

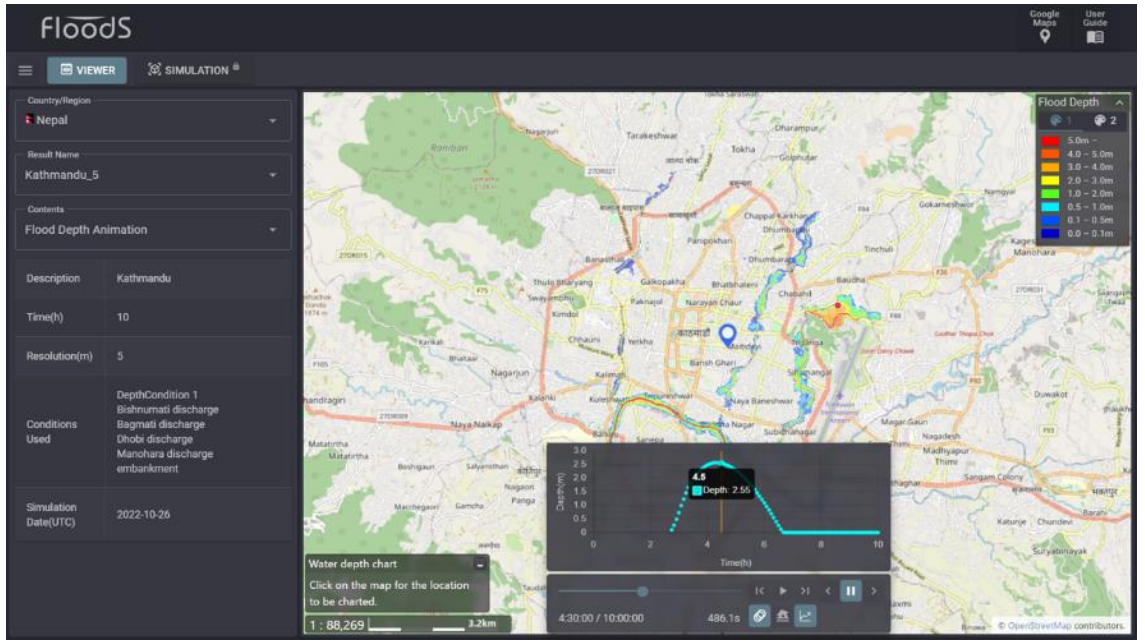
About FloodS



https://top.floods.green/

About FloodS

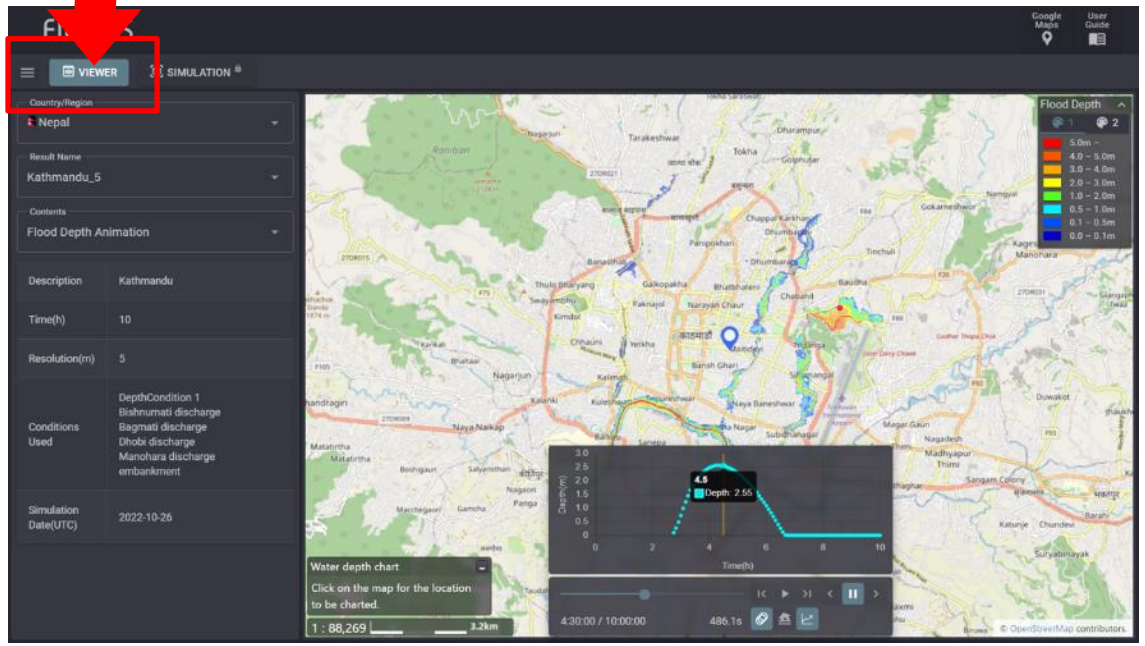
- FloodS is:
  - For non-experts & experts
  - Can simulate water depths & flows
  - Can evaluate countermeasures such as embankment
  - Can share simulation results with stakeholders
  - Topographic data is pre-loaded



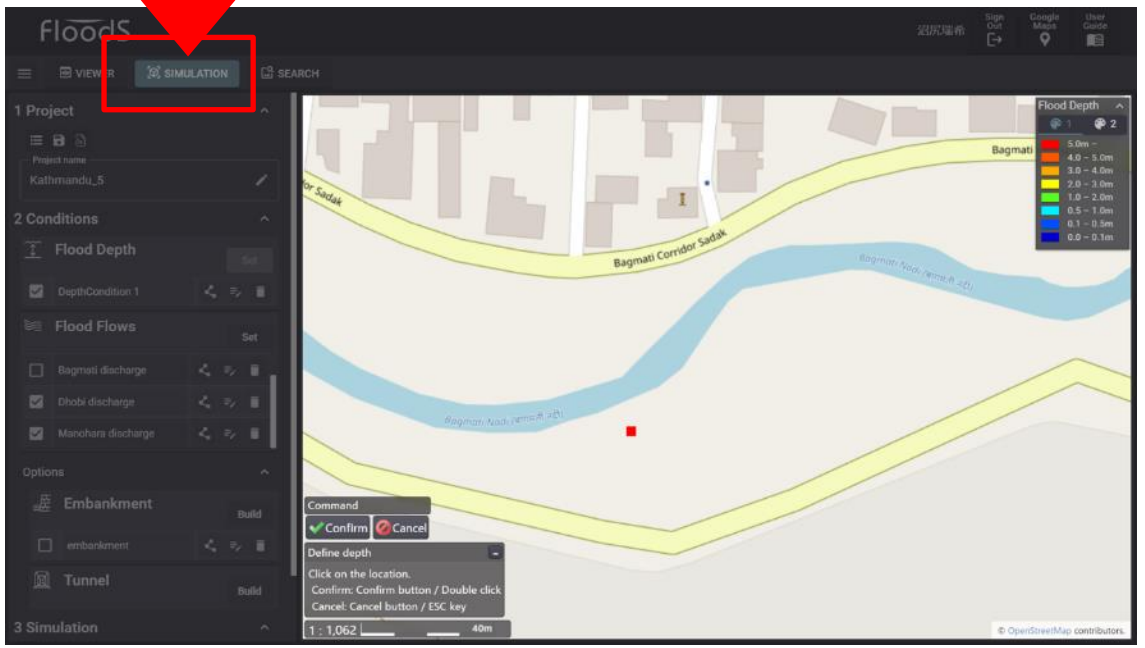
Functions

FloodS has 2 functions: Viewer & Simulation

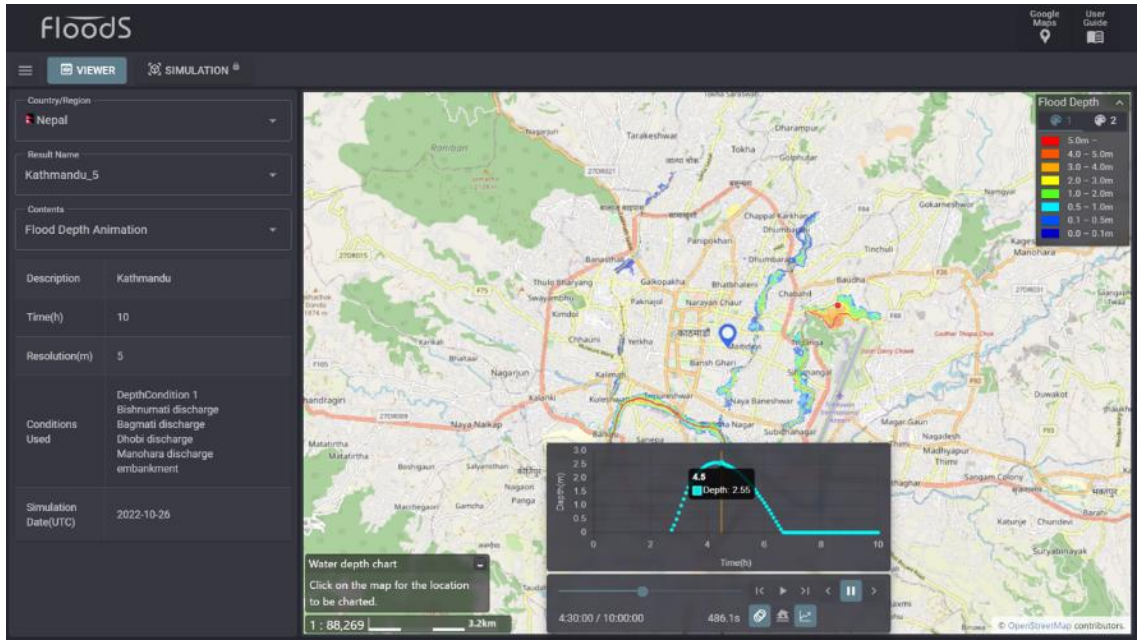
VIEWER



SIMULATION

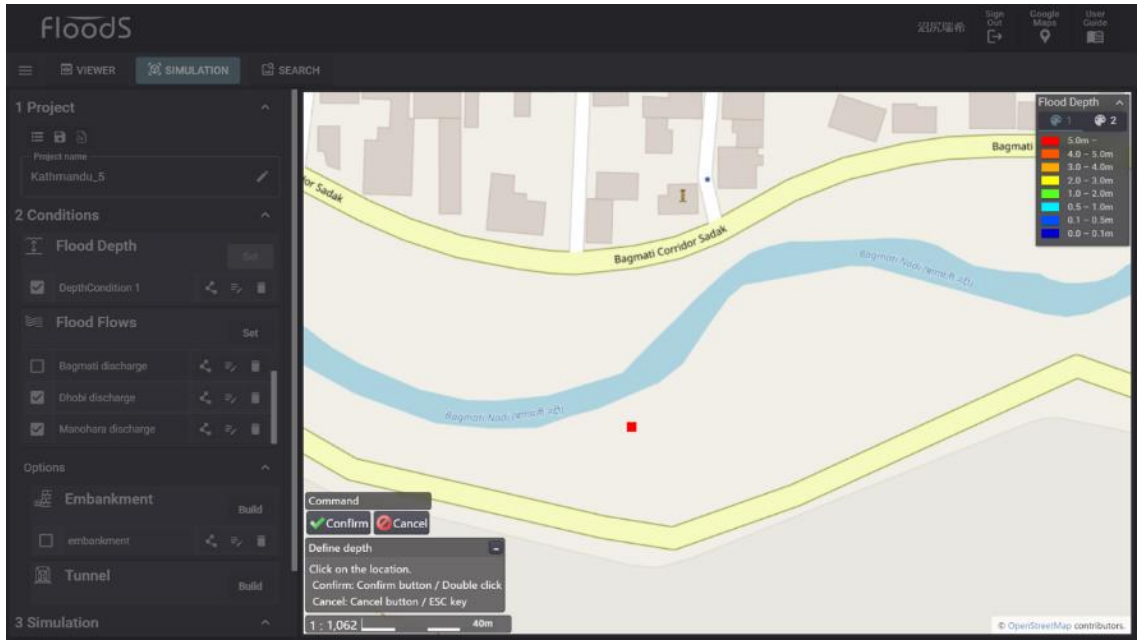


Viewer



- User can view simulation results in several cities
  - Select a simulation case
  - Show flood depth animation on map
  - Show max flood depth
  - Show flood depth time series chart at a clicked point

Simulation



- User can
  - Simulate flood
  - Edit simulation conditions such as:
    - Flood flow
    - Flood depth
    - Embankment
    - Tunnel
  - Share results with stakeholders

Insights from FloodS

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- Insights from FloodS
  - Flooded area: extent of water spread
  - Flood depth: closely related to human safety and property damage
  - Change in depth over time: timing of evacuation and recovery

Case Study: A Flood in Japan

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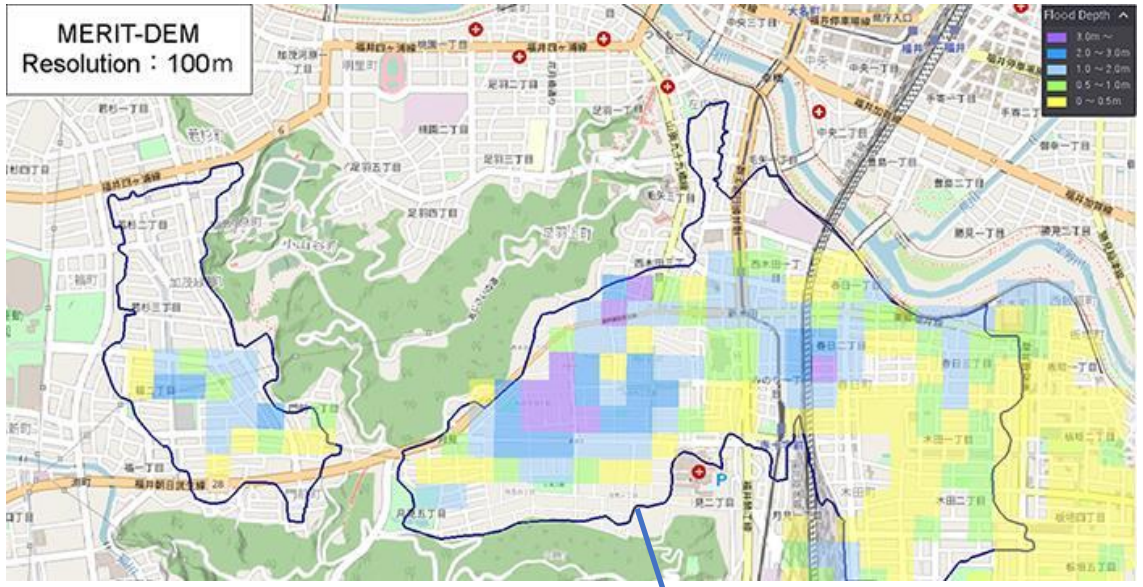
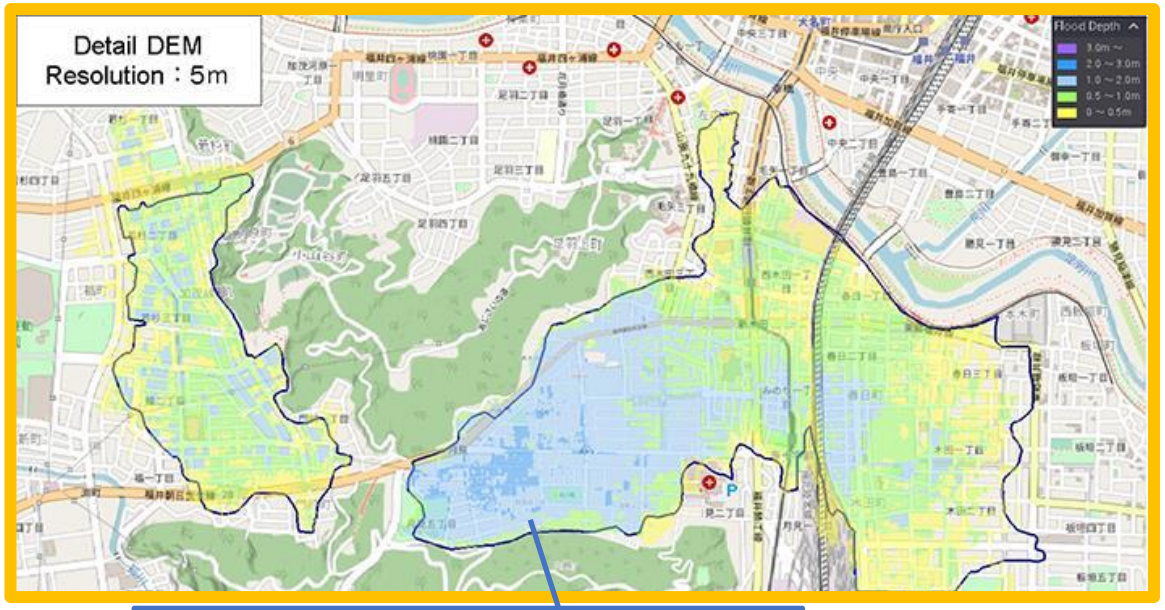
Resolution: 100 m



Actual flooded area

Resolution: 5 m



Simulation corresponds well with actual flooded area

Case Study: Assess measures

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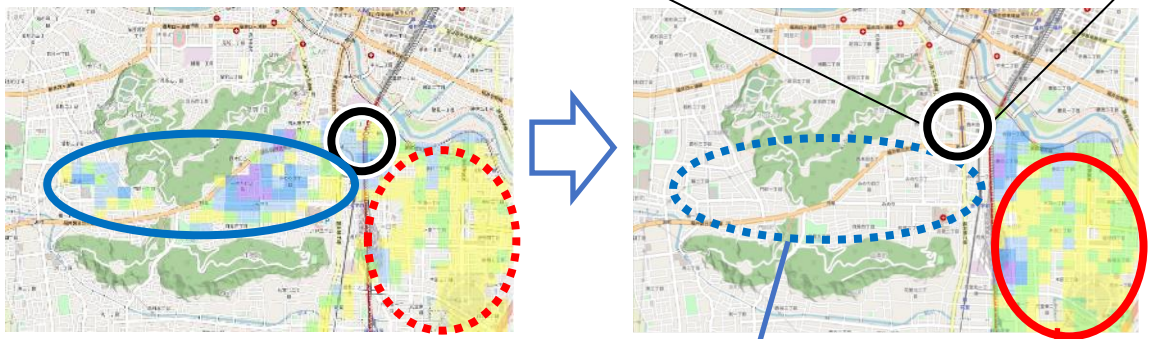
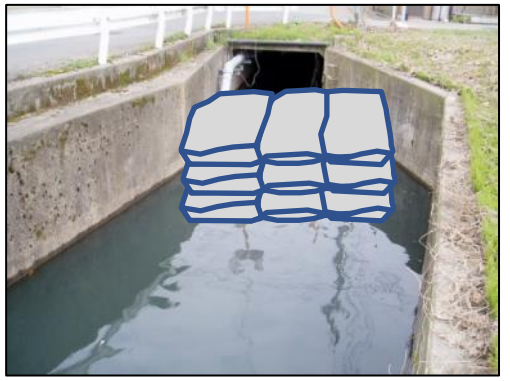
Measure 1: Underpass

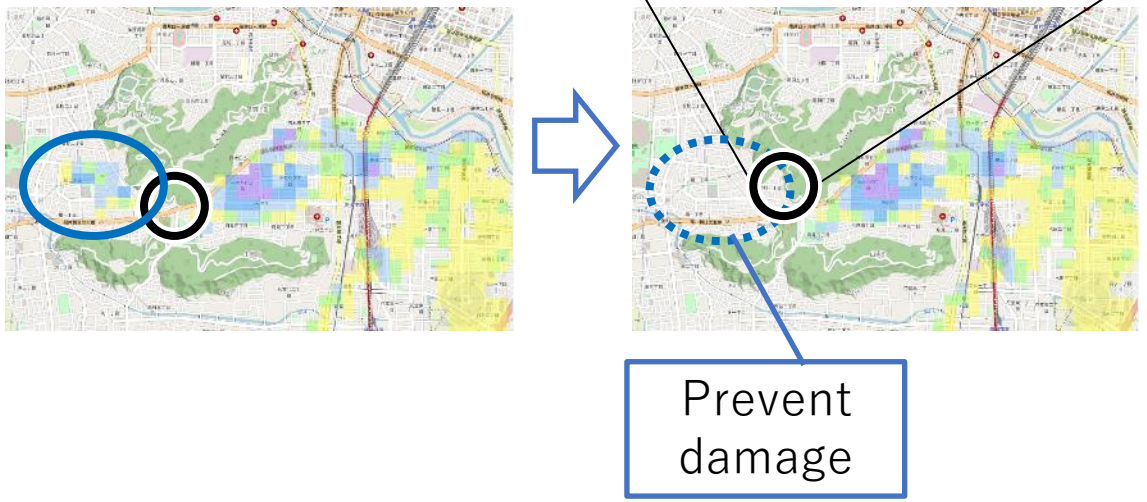
Sandbag wall at entrance of underpass



Measure 2: Channel

Sandbag wall at entrance of channel





Terrain Data by AW3D

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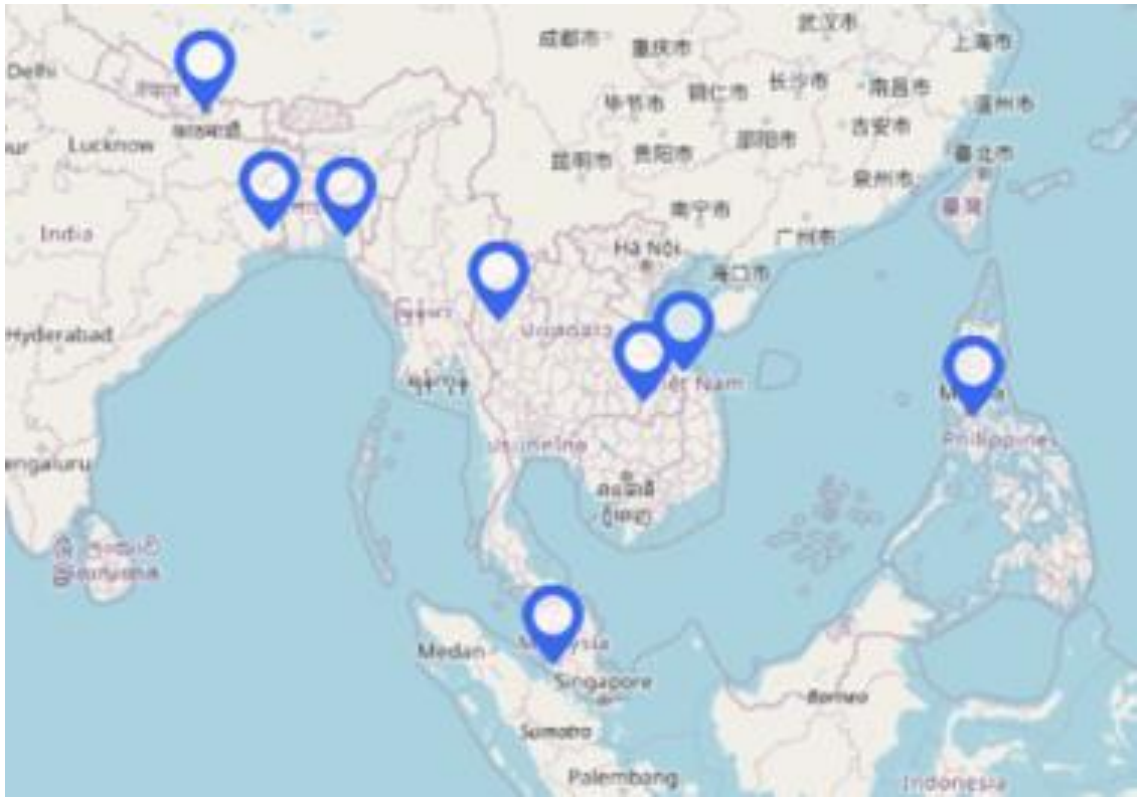
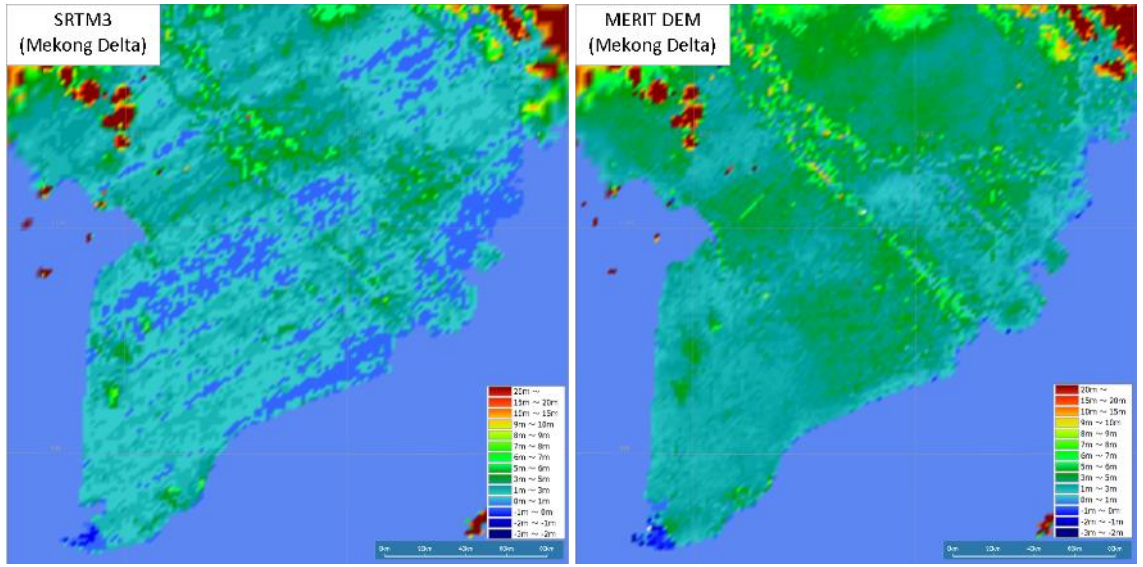
- FloodS uses high resolution (2m) digital elevation data
- Provided by RESTEC and NTT DATA as product ‘AW3D’
- Available in 8 cities
  - Chattogram, Bangladesh
  - Chiang Mai, Thailand
  - Hue, Vietnam
  - Kathmandu, Nepal
  - Kolkata, India
  - Manila, Philippines
  - Pakse, Laos
  - Shah Alam, Malaysia



Terrain Data by MERIT DEM



- FloodS uses global digital elevation data (resolution: 90m)
- Provided the University of Tokyo as product ‘MERIT DEM’
- Globally available

Simulator by DioVISTA

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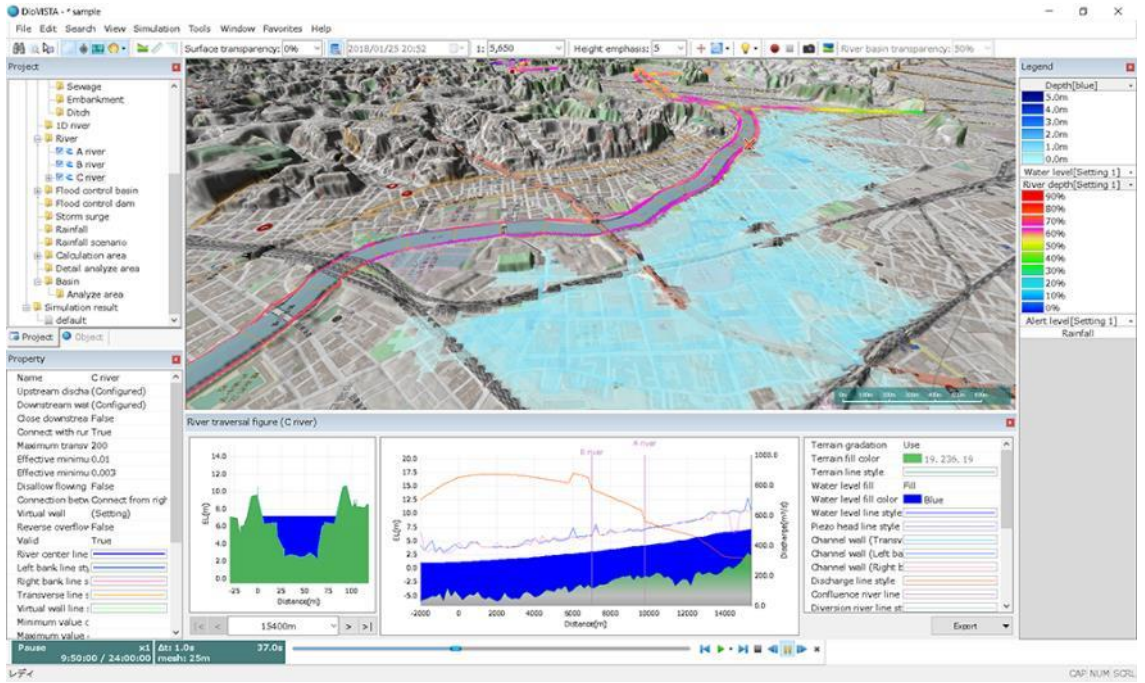
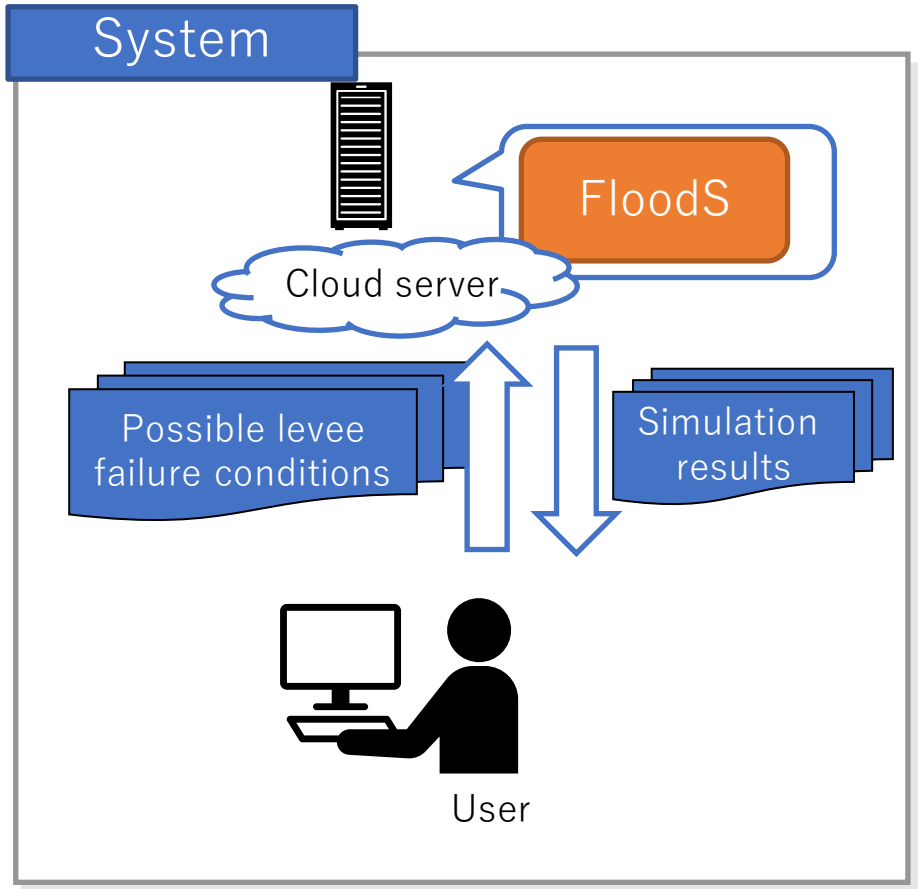
- FloodS uses fast flood simulator
- Provided by Hitachi Power Solutions as product ‘DioVISTA Flood’
- DioVISTA is used for
  - Flood hazard mapping by local governments
  - Flood risk assessment by insurance companies
  - Business continuity planning by private enterprises

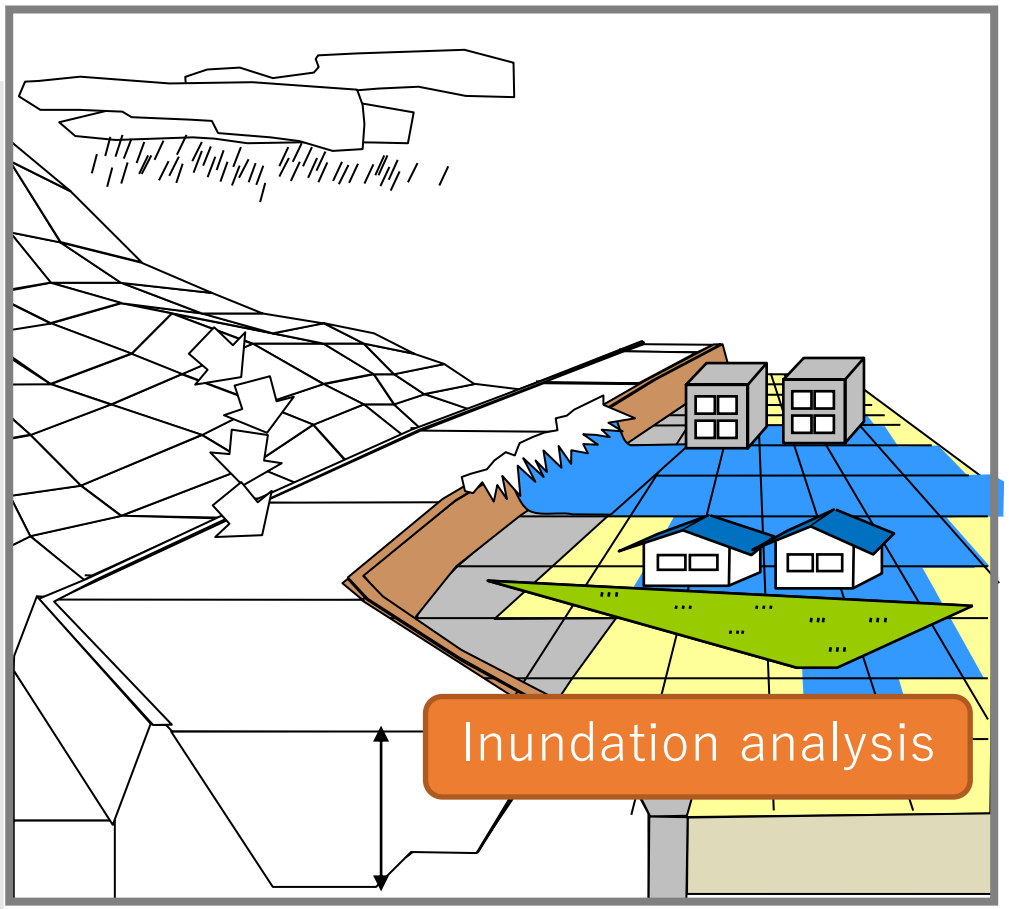


Working screenshot of DioVISTA

Functions of FloodS

- Simulate flood based on given levee breach point
- Easy operation for flood risk analysis in a certain city





Functions of DioVISTA

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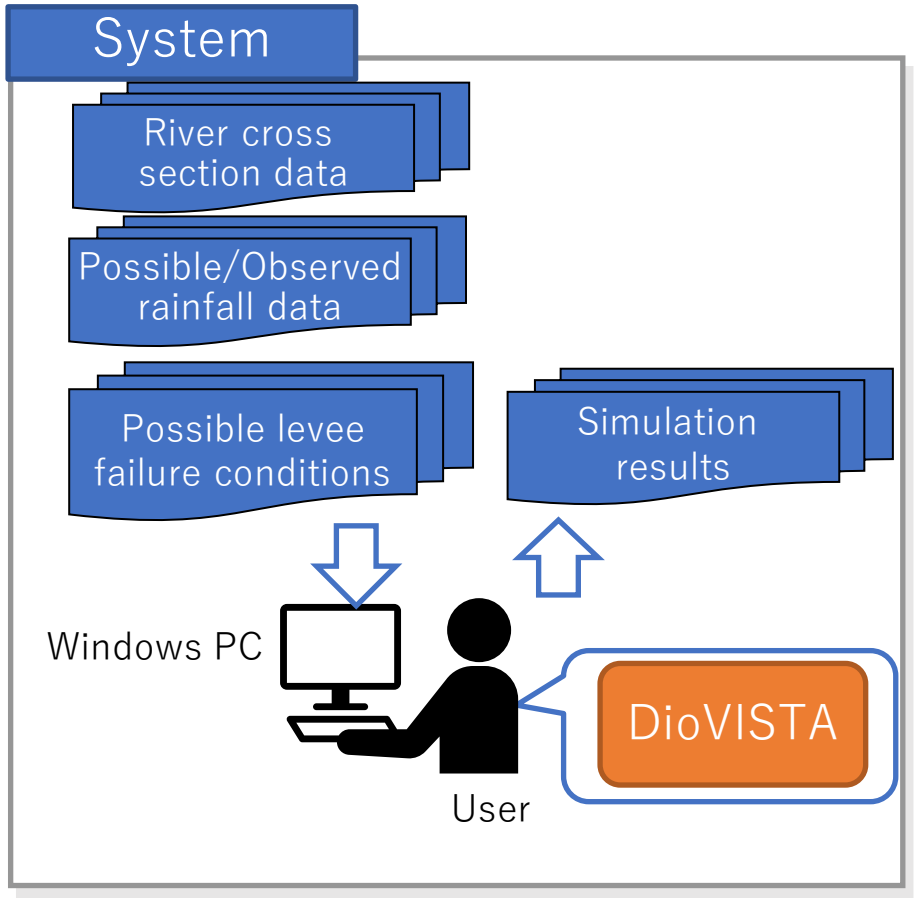
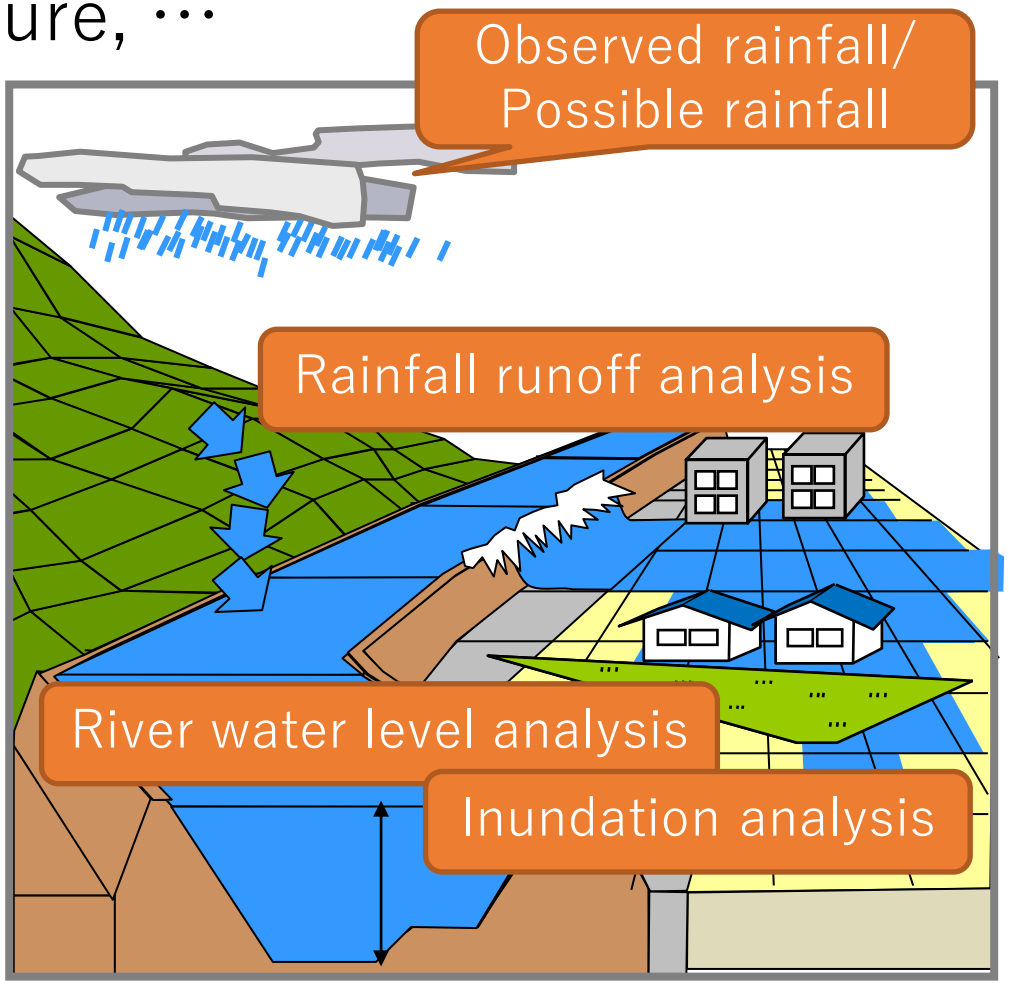
- Simulate flood with considering not only terrain but
  - River cross sections, Rainfall time series, Reservoir operations, Detention ponds, Soil moisture, …





DioVISTA for prediction

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- Predict flooded areas and river water levels
  - Based on rainfall forecast
  - Update the prediction regularly
  - Issue early warning