

# Crowd-Aided Data Assimilation for Extreme Weather Prediction

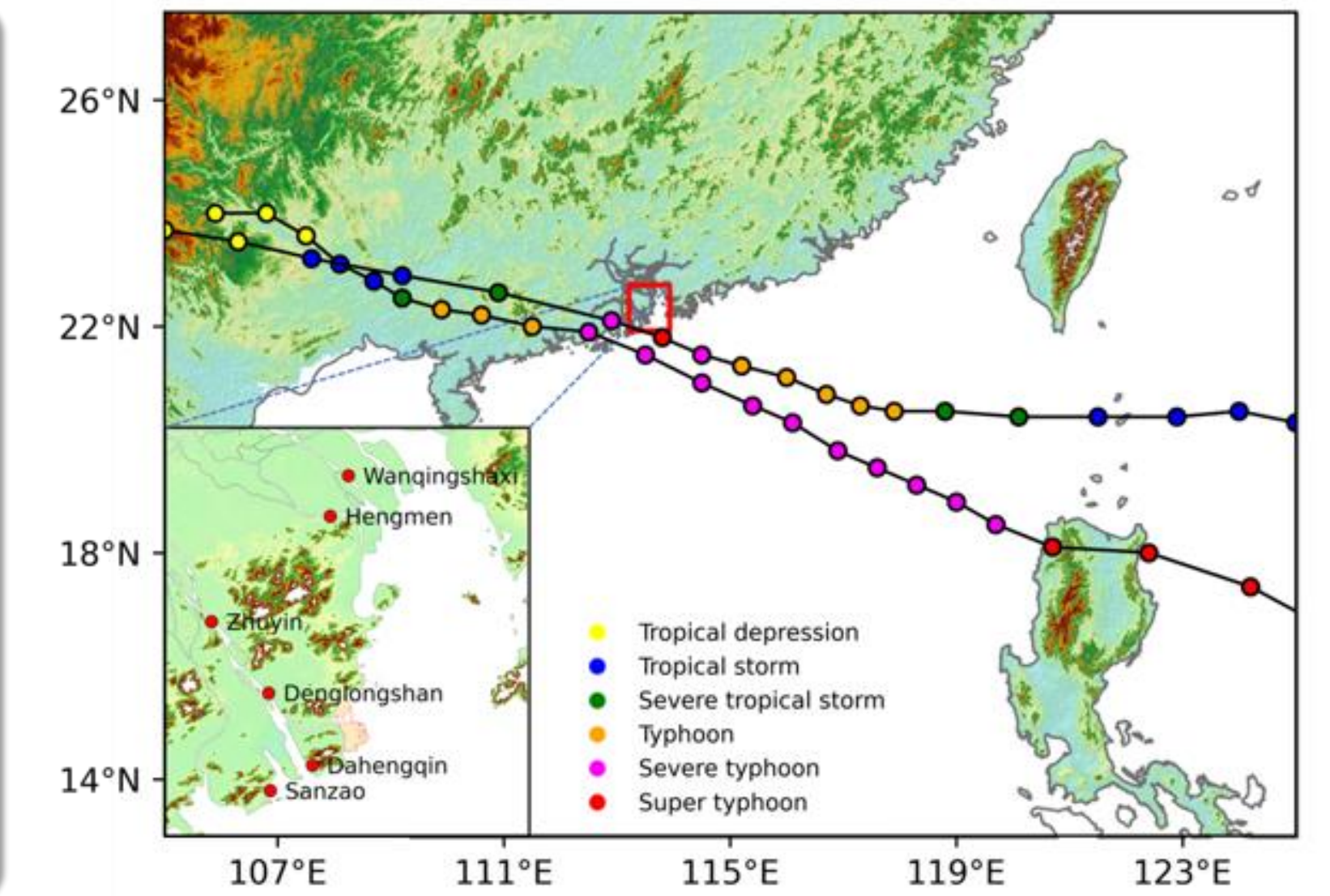
Xiaohui Wang<sup>1</sup>, Yan Chen<sup>1</sup>, Huizan Wang<sup>1</sup>, Weimin Zhang<sup>1</sup>, Sihang Qiu<sup>2</sup>

<sup>1</sup>College of Meteorology and Oceanography, National University of Defense Technology, China

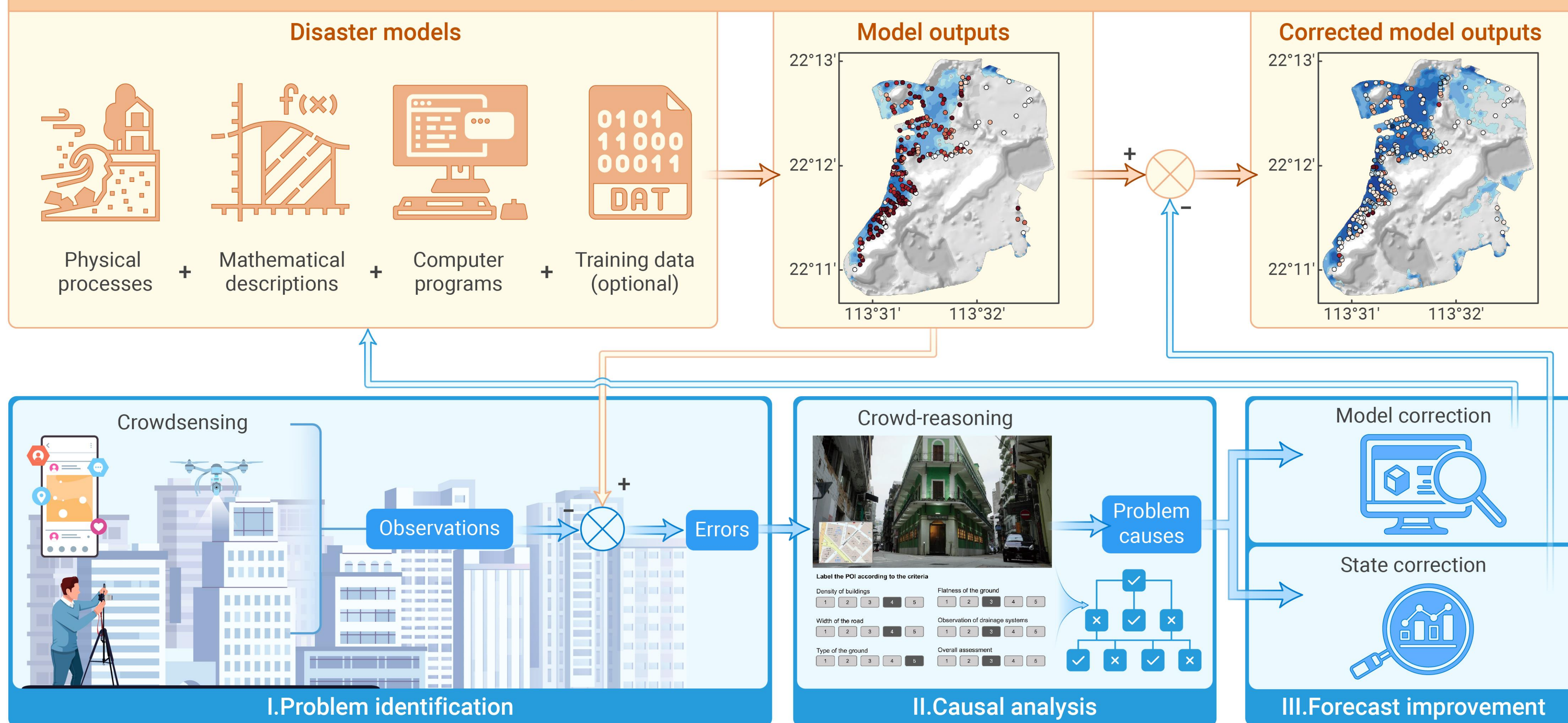
<sup>2</sup>College of Systems Engineering, National University of Defense Technology, China

## Background

- Extreme weather events such as coastal floods have been causing massive casualties and economic loss to human societies.
- Existing research has comprehensively studied physical processes, but we still face the challenges of inaccurate predictions, insufficient information, and imprecise management.



## The process of disaster forecasts



### Model Correction

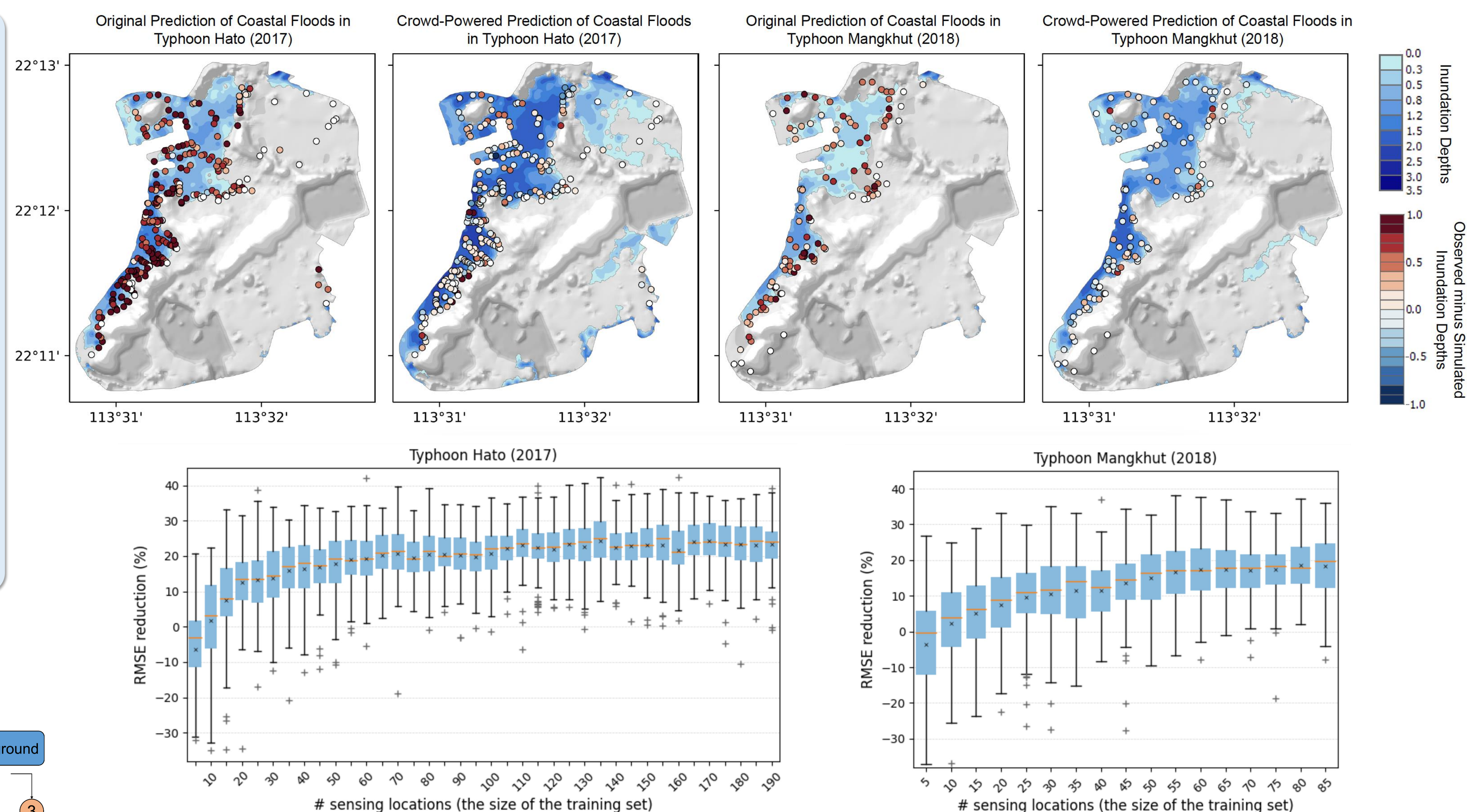
- Parameter Estimation
- Parameterization scheme
- Model resolution
- .....

### State Correction

- Data Assimilation
- Artificial Intelligence
- .....

## Case Study

- Simulation for Typhoon Hato (2017) and Mangkhut (2018)
- Crowdsensing for inundation data collection.
- Crowd-mapping for environmental information collection
- Decision-tree to find the important causes
- Parameter estimation for model correction
- SVR for state correction



## Insights

Crucial considerations for flood prevention:

- Narrow or steep urban canyons
- Low-altitude areas distant from water
- Huge artificial structures (e.g., nearshore seawalls)

A small sample of crowd-mapping data (e.g. only around 50 locations) could achieve an effective error correction.

Related work has been published at: Wang X., Dao F., Ji Y., et al., (2024). Crowdsourcing intelligence for improving disaster forecasts. The Innovation 5(4), 100647. (<https://doi.org/10.1016/j.xinn.2024.100647>)

Contact: Xiaohui Wang([wangxiaohui11@nudt.edu.cn](mailto:wangxiaohui11@nudt.edu.cn))