RFC Short-Term Ensemble Workshop

Future of operational flood mapping: incorporating probabilistic prediction and data assimilation

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Contents

1. **Hazard mapping (multiple events)**
   - Used for long-term (pre-event) planning
   - Flooding of urban areas is a key challenge
   - Requires high space-time resolution (2D + time)
   - Probabilistic prediction is expensive
2. **Near-real-time prediction (one event)**
   - Used for flood warning and disaster mitigation
   - Technological barriers, but also different needs

Hazard mapping

Hazard mapping

Advantages of probabilistic mapping

- Fundamental uncertainties (esp. extremes)
- E.g. coastal storm tracks, defence failures
- Must reflect these uncertainties in mapping
- Also, more information in probabilistic maps

Challenge applying to urban areas

- Complex terrain, hazard varies in space/time
- Detailed info. is useful for planning

Hazard mapping

Goals

1. Dynamic forcing for different return periods
2. Estimation of uncertainties

- Input uncertainties (strategy for defences)
- Model uncertainties (e.g. 1D models)

3. Efficient ‘propagation’ of uncertainty….

- ….efficient models (e.g. for urban areas)
- ….efficient sampling of models (Monte Carlo)

Hazard mapping

Goals (cont.)

4. Best-use of observations

- Data assimilation (point, RS, public obs.)
- Verification (insufficient data?)

5. Useful measures of ‘hazard’

- Many indices (e.g. frequency, flood force)
- Different indices for different applications

Near-real-time prediction

Near-real-time prediction

Goals

1. **Efficient ensemble generator**
   - **Many variables can be pre-generated**
2. **Data assimilator for forcing inputs**
   - **Storm tracks, precipitation amounts etc.**
   - **Defence failures**
3. **Data assimilator for overland flows**
   - **SAR (low time res.), gauges (low space res.)**

Near-real-time prediction

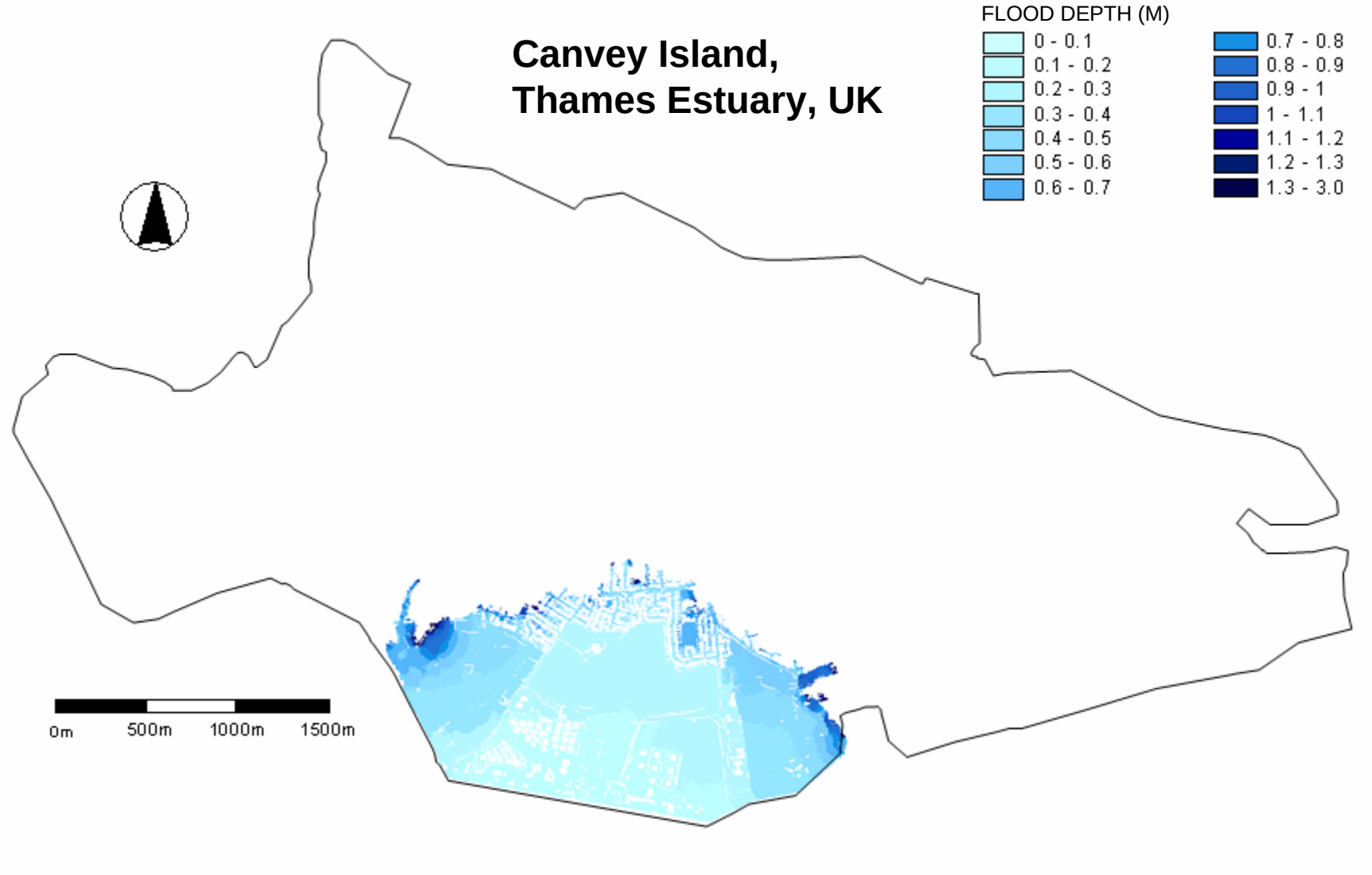
Goals (cont.)

4. **Timely/effective communication**

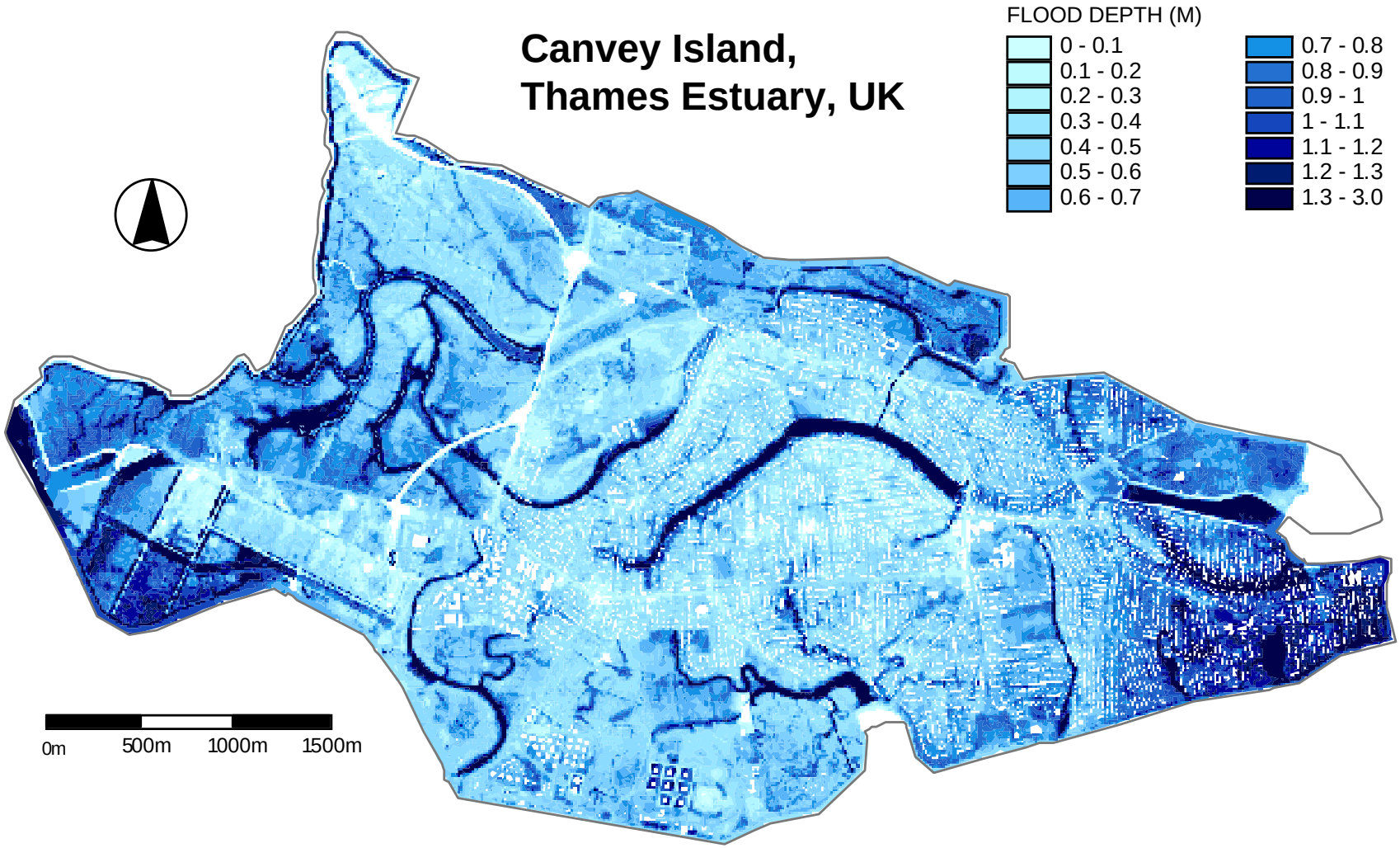
- **Online maps/animations of flood parameters**
- **Integrated within online GIS to allow space-time queries (e.g. which major roads will be inundated 12 hours from now?)**
- **Move towards Decision Support System**

???

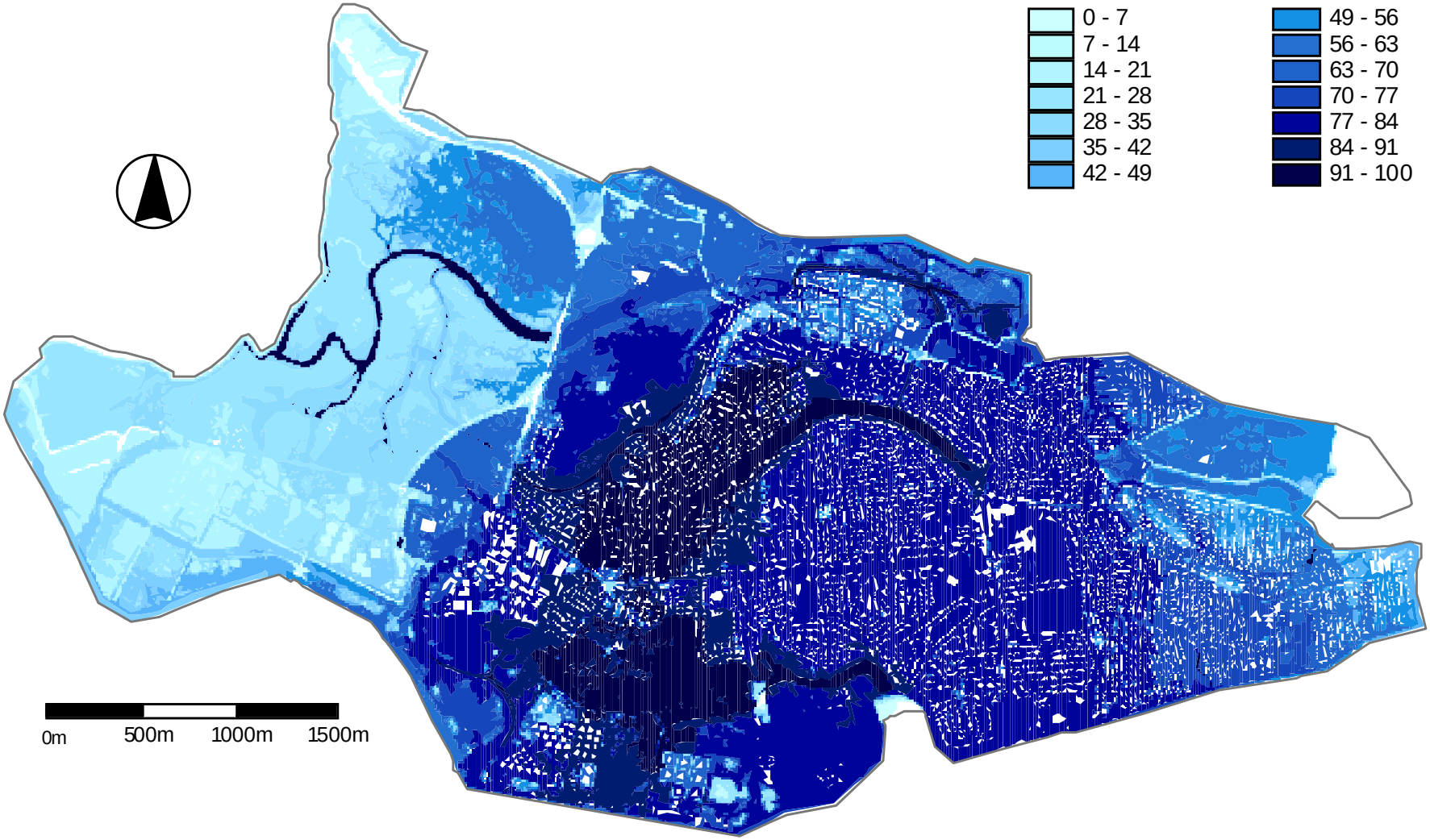
Single-valued prediction



Ensemble prediction



Flood frequency



Force (depth * velocity)