

Mobile phone location data for disaster response and recovery

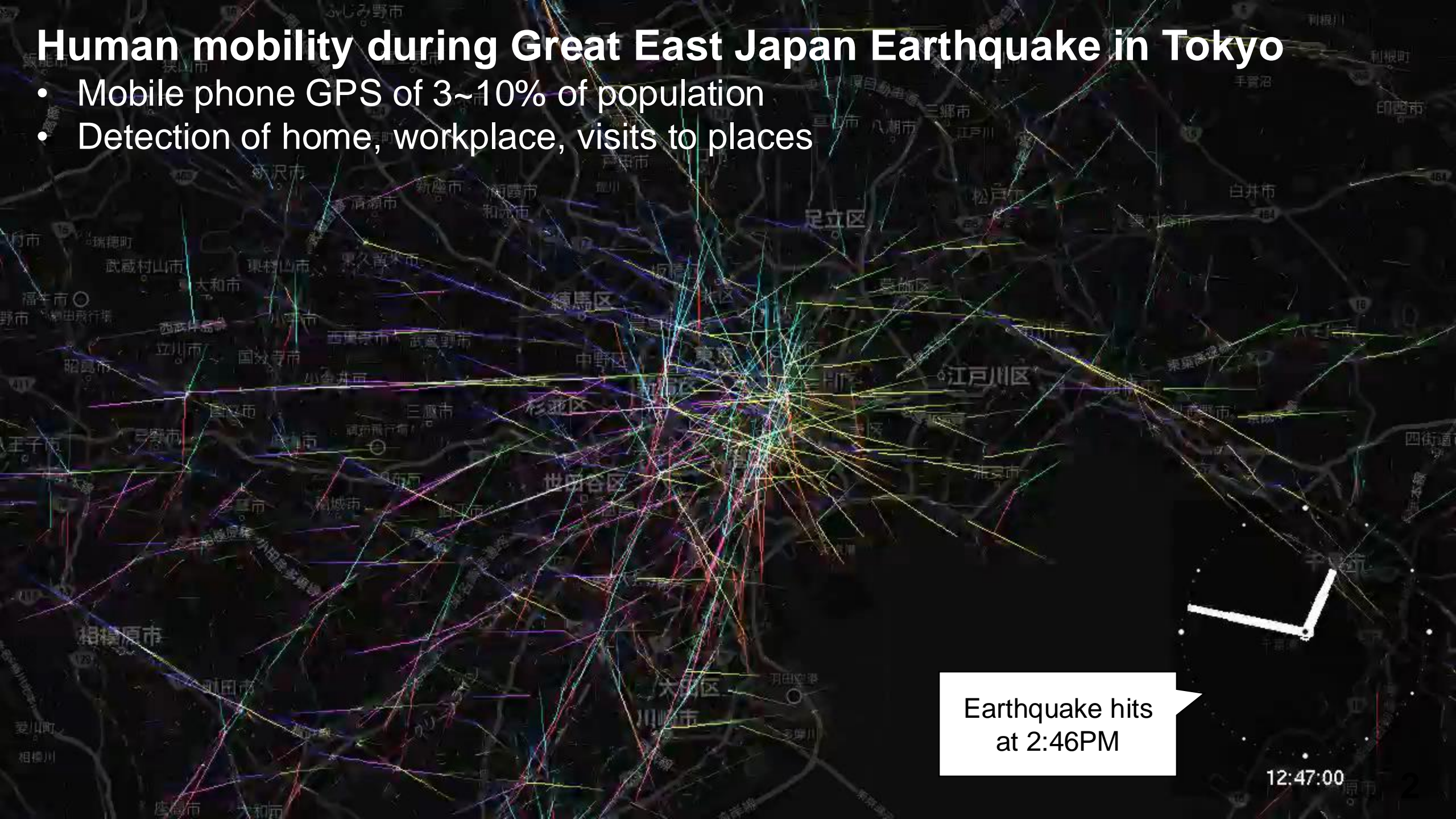
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Assistant Professor, New York University



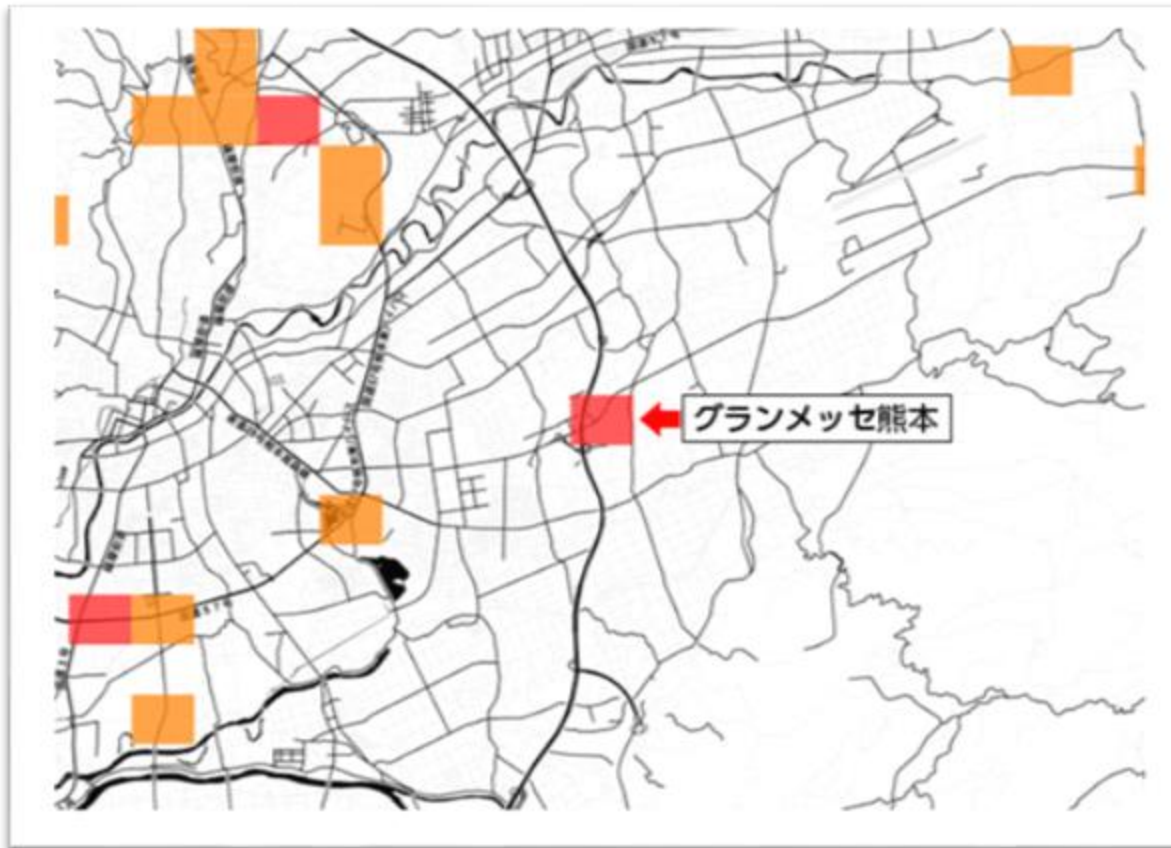
Human mobility during Great East Japan Earthquake in Tokyo

- Mobile phone GPS of 3~10% of population
- Detection of home, workplace, visits to places



(Near-)Real time mapping of evacuation hotspots

- Joint effort with Yahoo Japan, long-time collaborator (3 day turnaround)
- Identified 'hidden' evacuation shelters during Kumamoto Earthquake (2016)

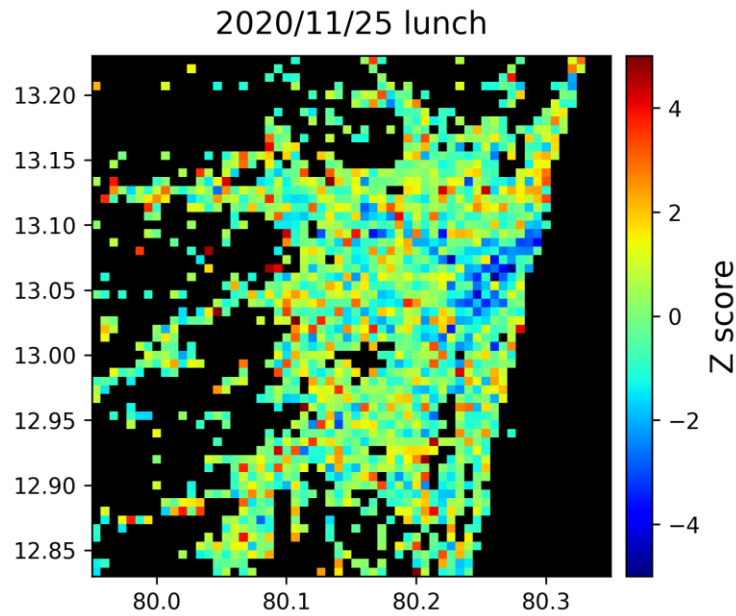


“Essential Infrastructure” (Cabinet Office)

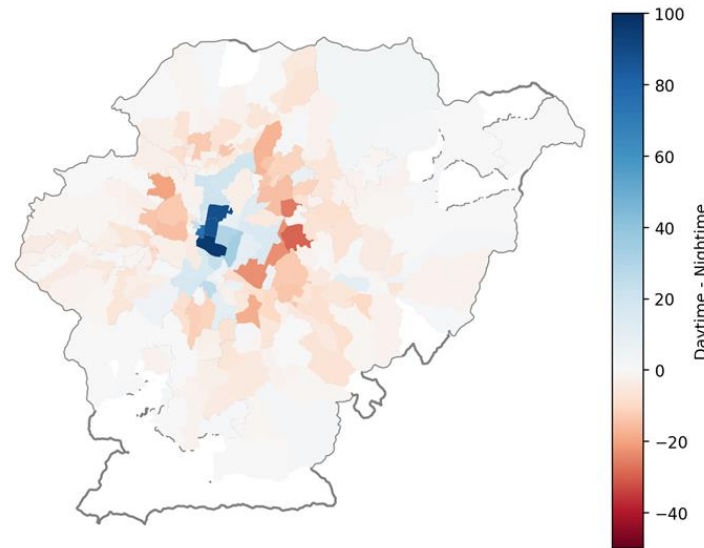
... Scaling the efforts globally



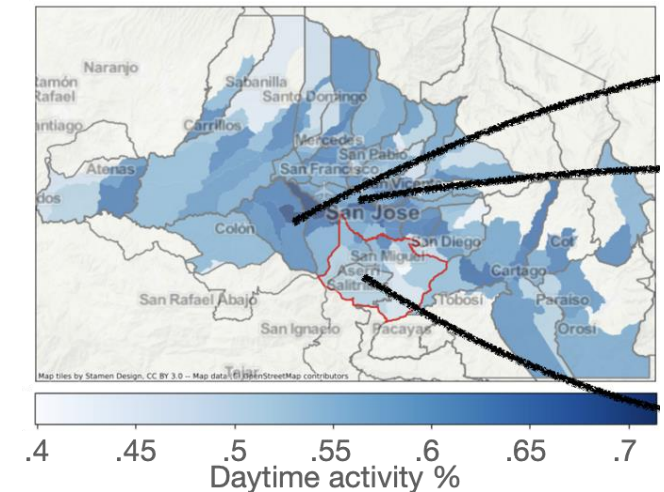
Nicholas Jones
GFDRR, World Bank



Cyclone impacts on
transportation in
Chennai, India



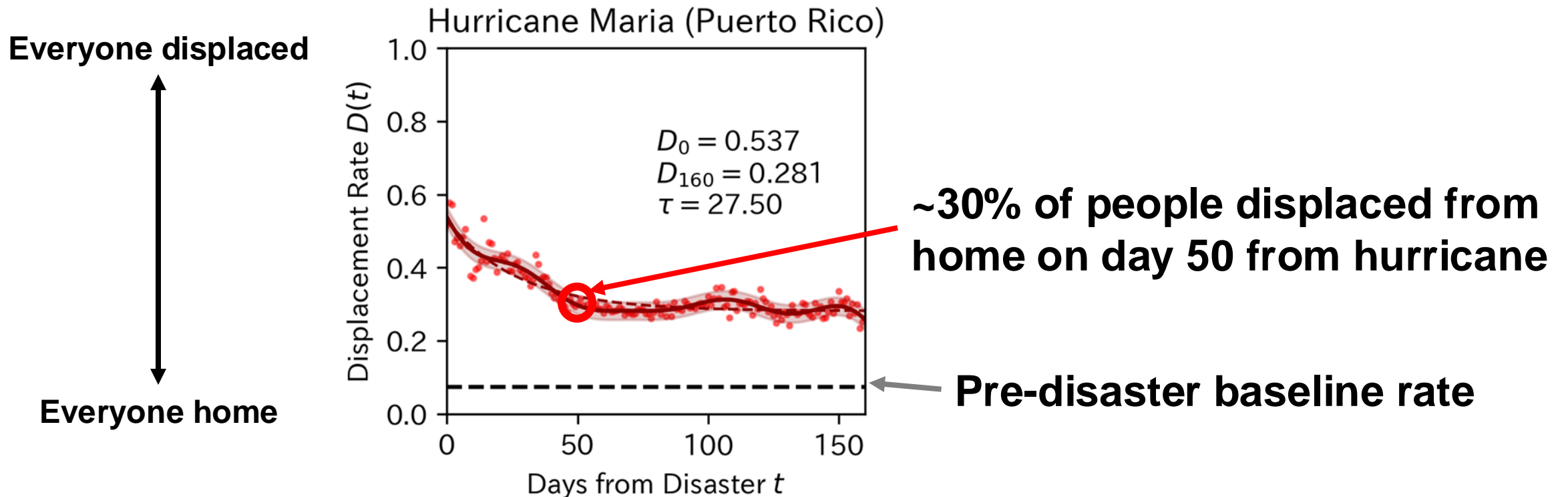
Commute analysis in
Kathmandu, Nepal



Land use analysis in
San Juan, Costa Rica

Going more longer-term: displacement and return

- “Displaced” = individual stayed the night away from home area

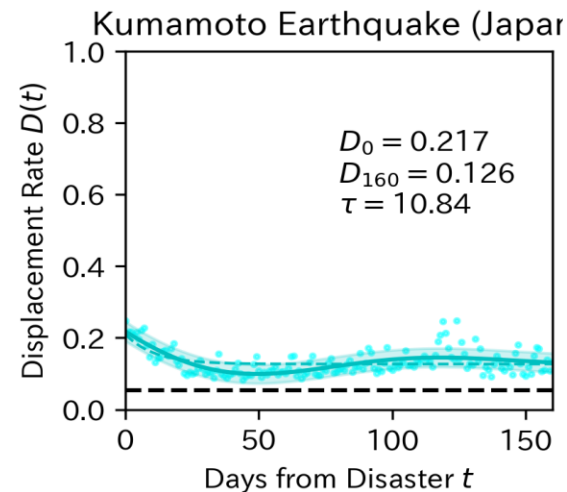
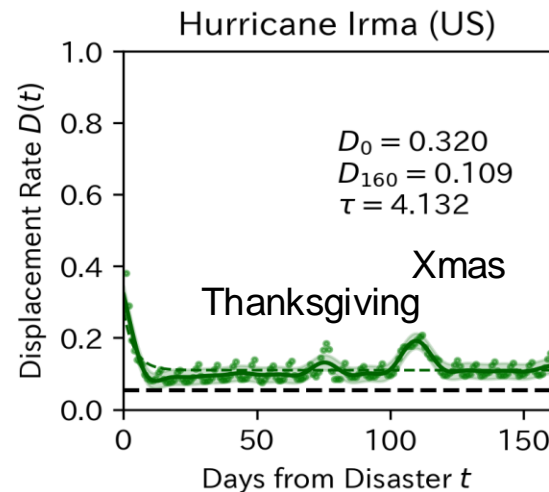
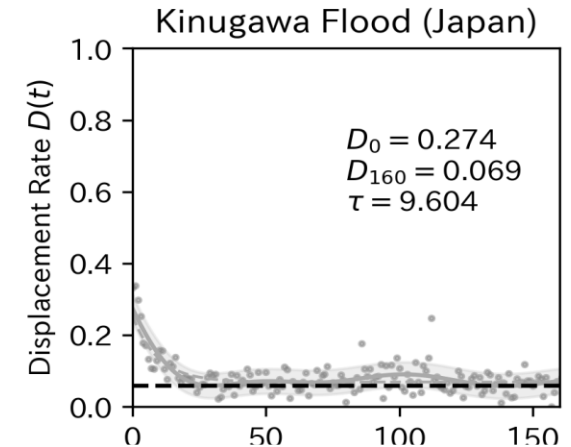
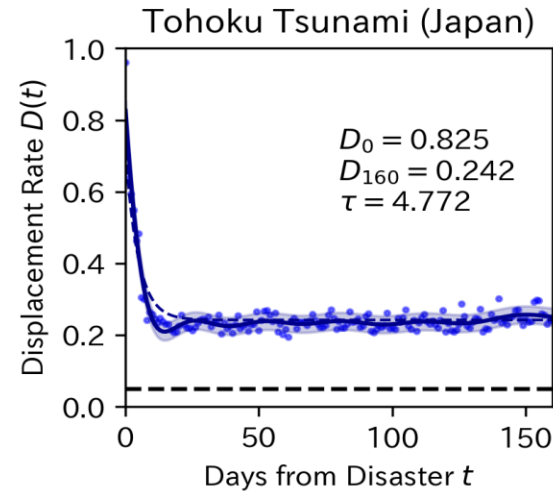
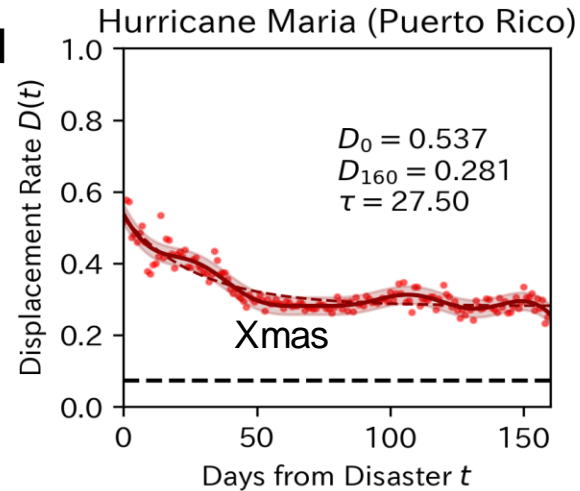


Universal patterns of population recovery

Everyone displaced



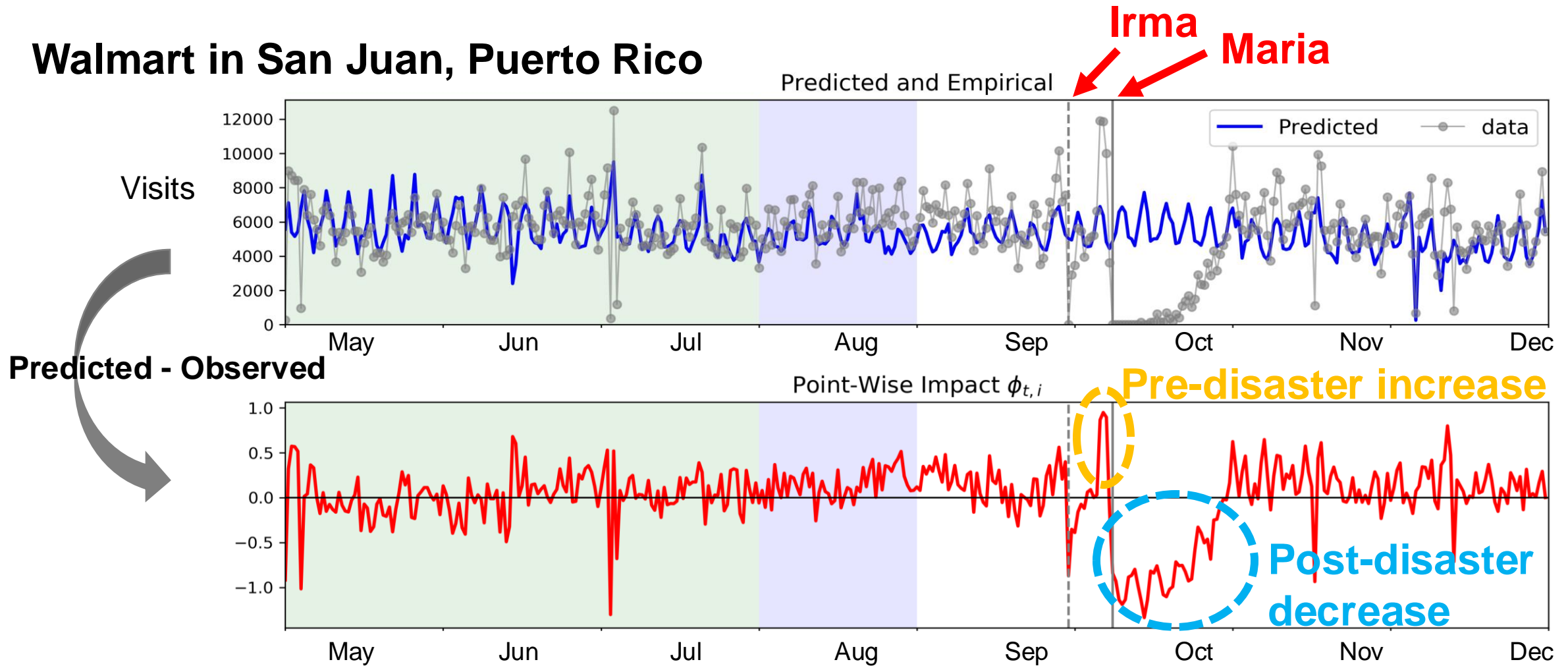
Everyone home



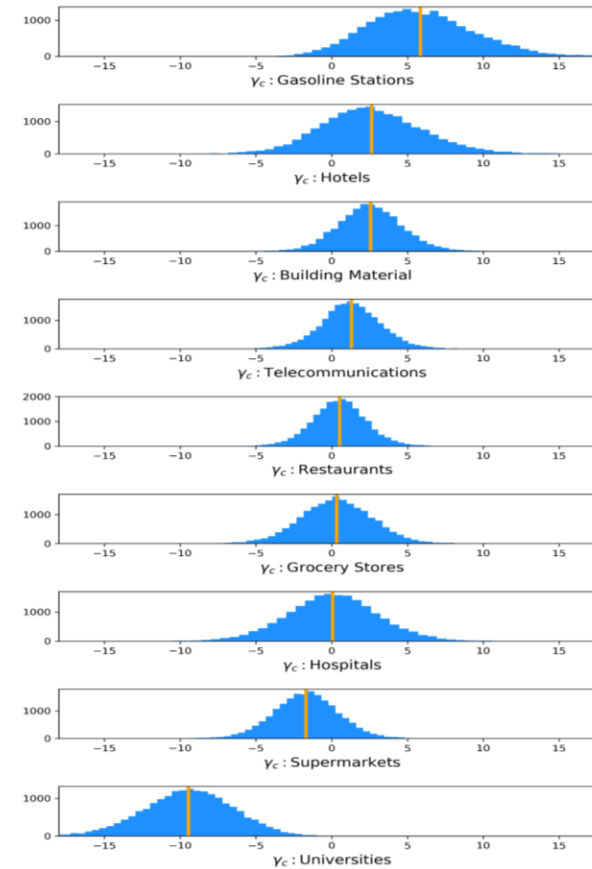
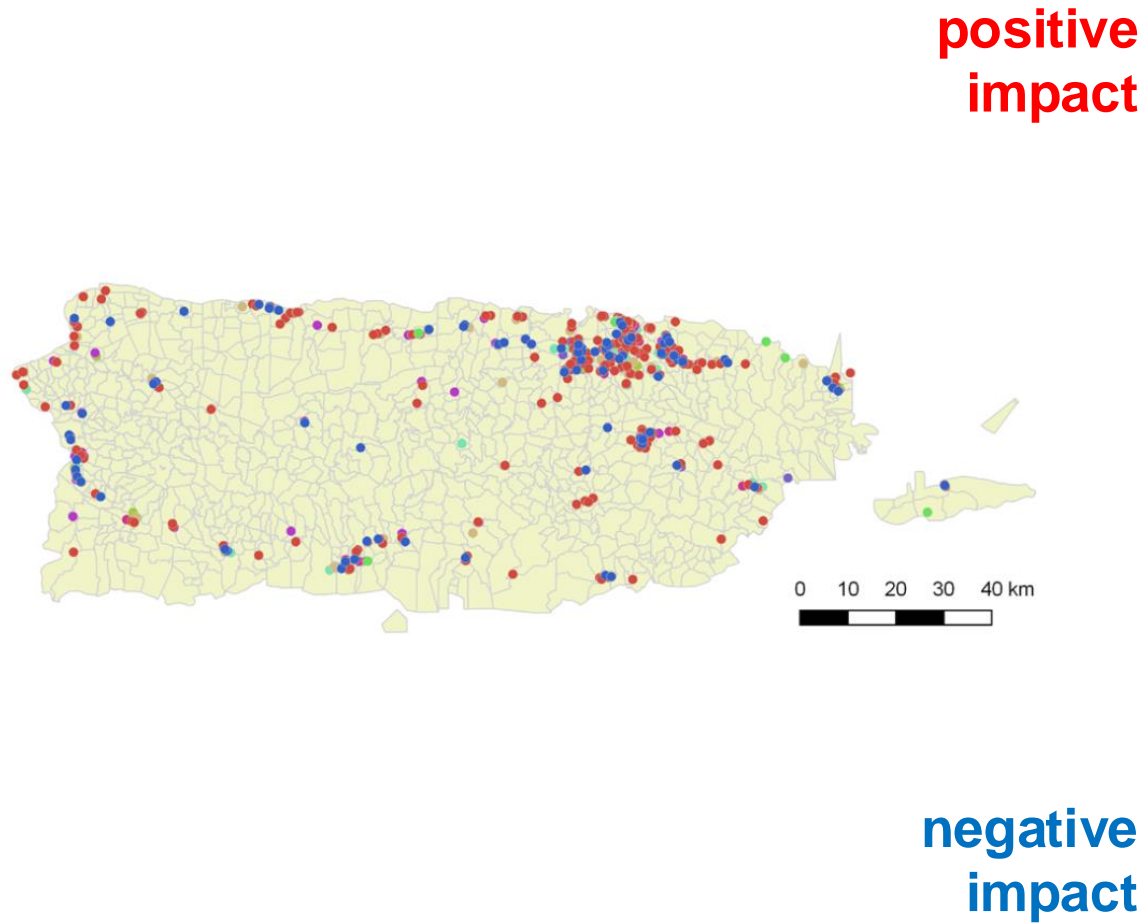
+ Analysis on *why* & *how* some regions recovered quicker than others!

Impacts of disasters on businesses

Walmart in San Juan, Puerto Rico



Impact assessment by industry sector, region



Gas stations

Hotels

Building material

Telecommunications

Restaurants

Grocery stores

Hospitals

Supermarkets

Universities

Open-source development of code

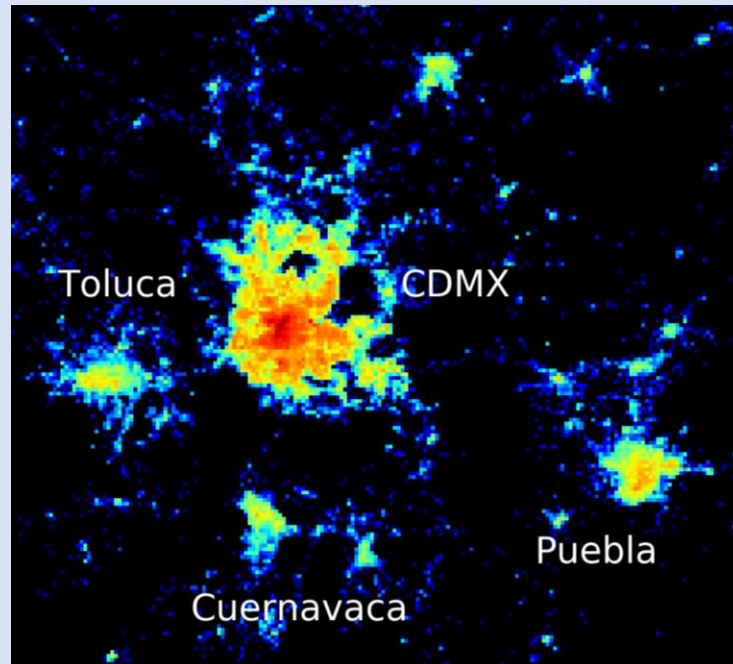


MindEarth



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

Rapid assessment in Mexico City after Puebla Earthquake



Open-source toolkit 'Mobilkit'



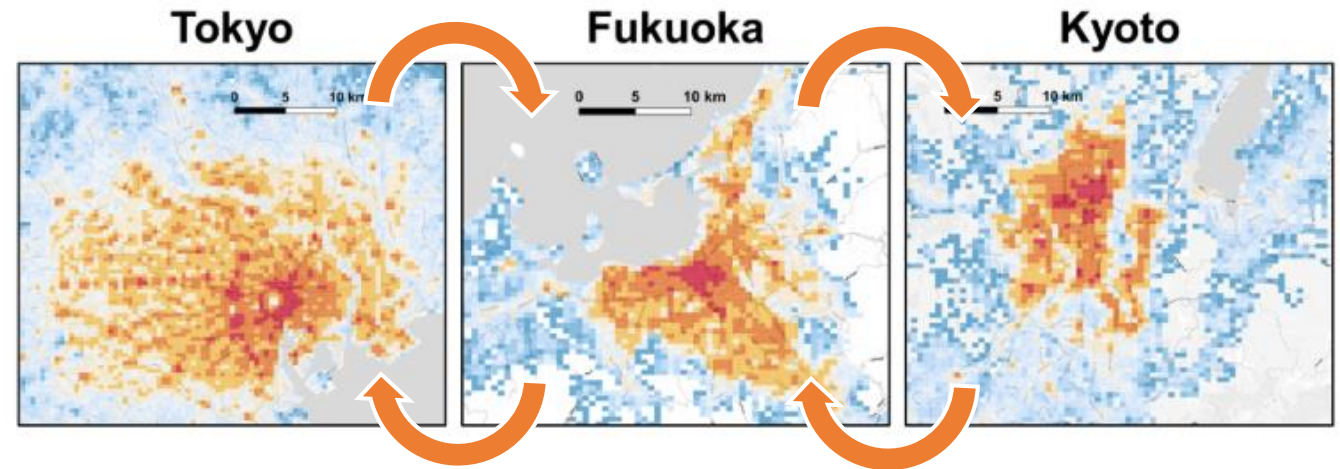
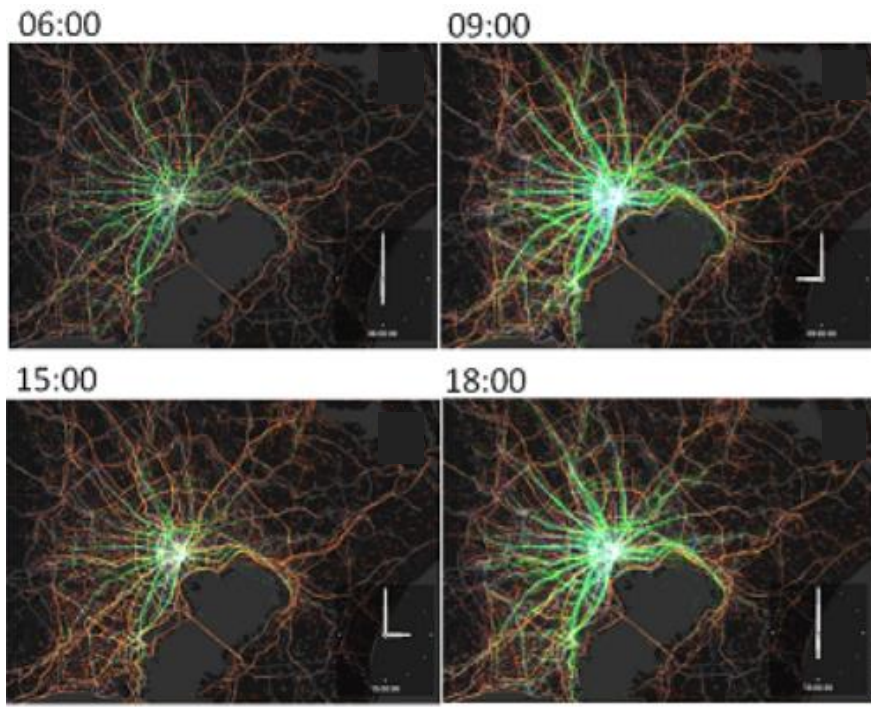
mobilkit

```
pip install mobilkit
```

<https://github.com/GFDRR/mobilkit>

Synthetic human behavior data generation

- Issue with current data: proprietary ownership & privacy risks
- So far ... creation of synthetic & open data of people movement
 - Inverse reinforcement learning to learn behavior from past data



How can we ‘translate’ mobility data across cities to predict unprecedented disaster events?

Open questions

- How can we scale and further ‘democratize’ the use of mobility data for disaster response/recovery?
 - Can LLMs/AI help us achieve that goal?
- Balancing utility of data vs unintended risks and consequences
- Towards a more collaborative pipeline with communities, than a top-down approach?

Thank you!

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