

Catastrophic Tsunami Disaster - Its Impact, Disaster Response, and Mitigation -

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The 2011 Great East Japan Earthquake Tsunami

15:59:24;28

Inundation of 561 km² , highest run-up of 40 m

18,549 fatalities (3 % in the inundation zone)

120,000 buildings destroyed

Economic loss 25 trillion JPY, $\frac{1}{4}$ of annual budget (250 billion \$)

Anticipated Nankai Trough Earthquake Tsunami

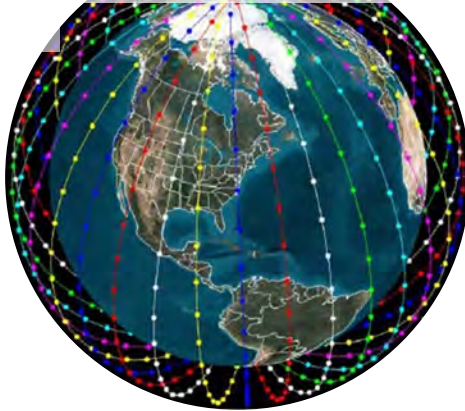


Backcasting from Inevitable Future

Personal Smart
Devices



Mega Satellite
Constellation



Computing Capability



John D/Getty

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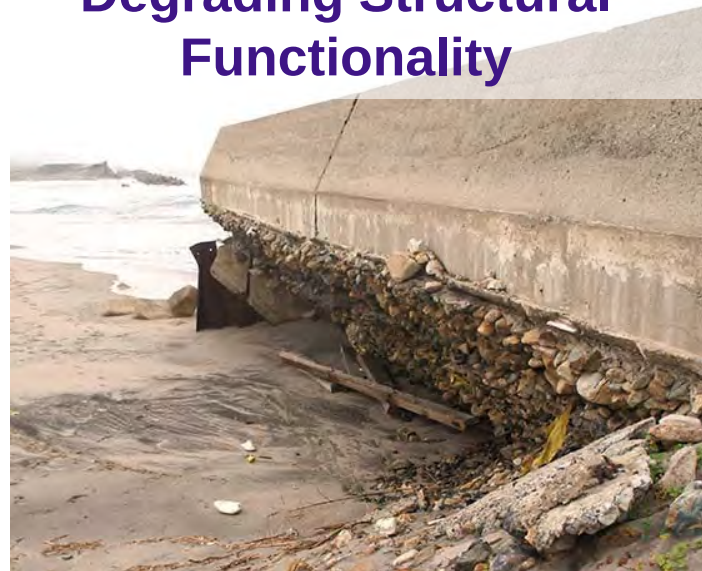
Connected &
Autonomous Vehicles

Aging



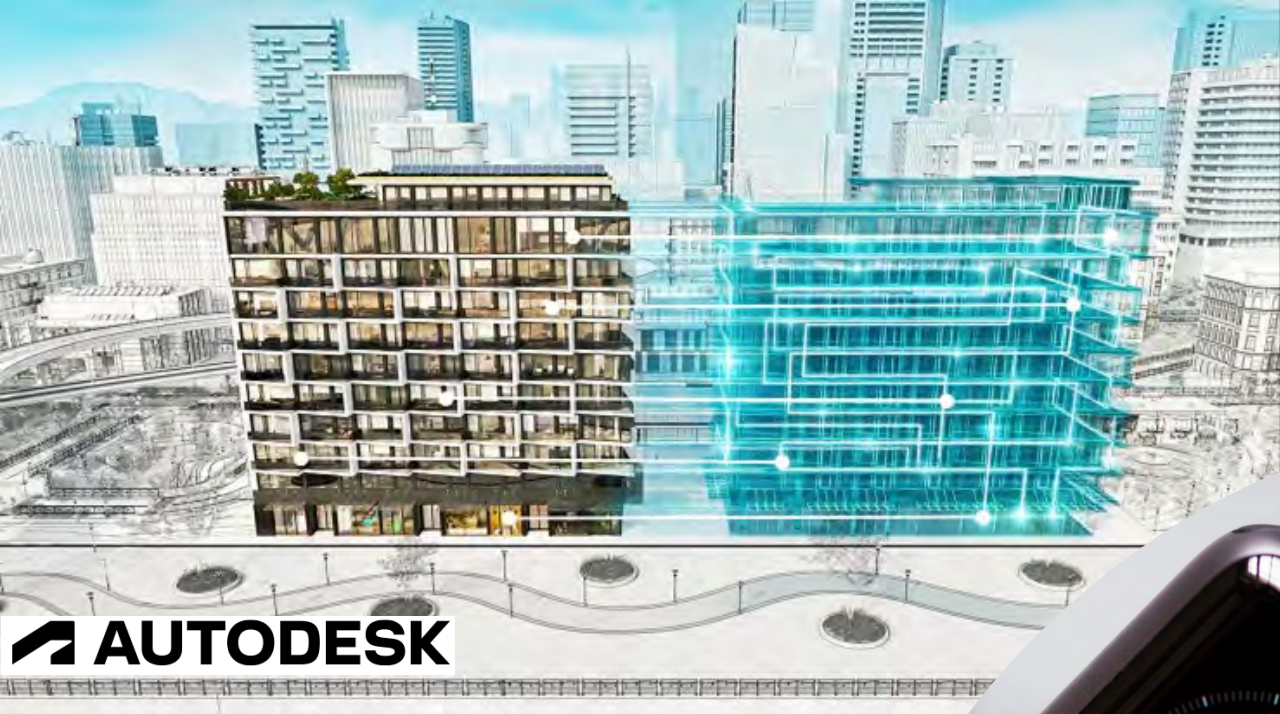
Vulnerability

Degrading Structural
Functionality



Sea Level Change

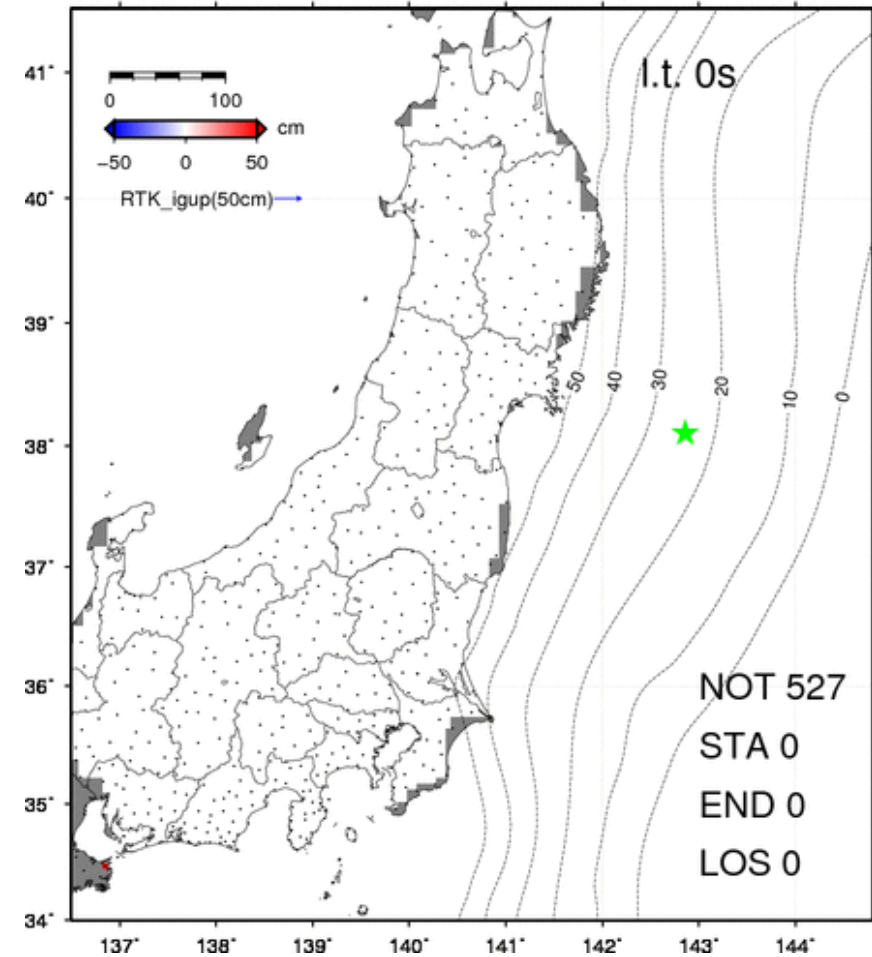




Digital Twin



Current Status : Nation-wide Real-time Tsunami Inundation Forecast

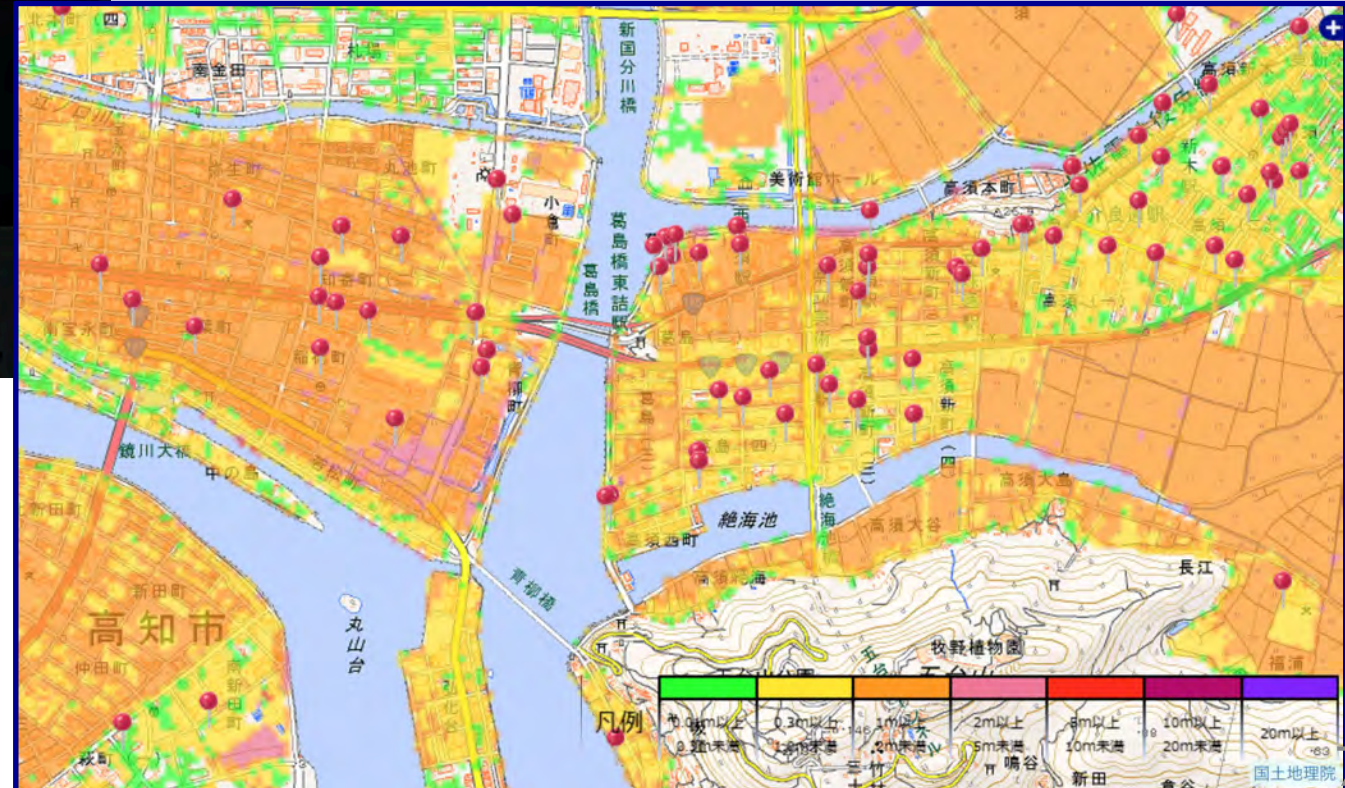


Ohta et al. (2012)



Current Status : Nation-wide Real-time Tsunami Inundation Forecast

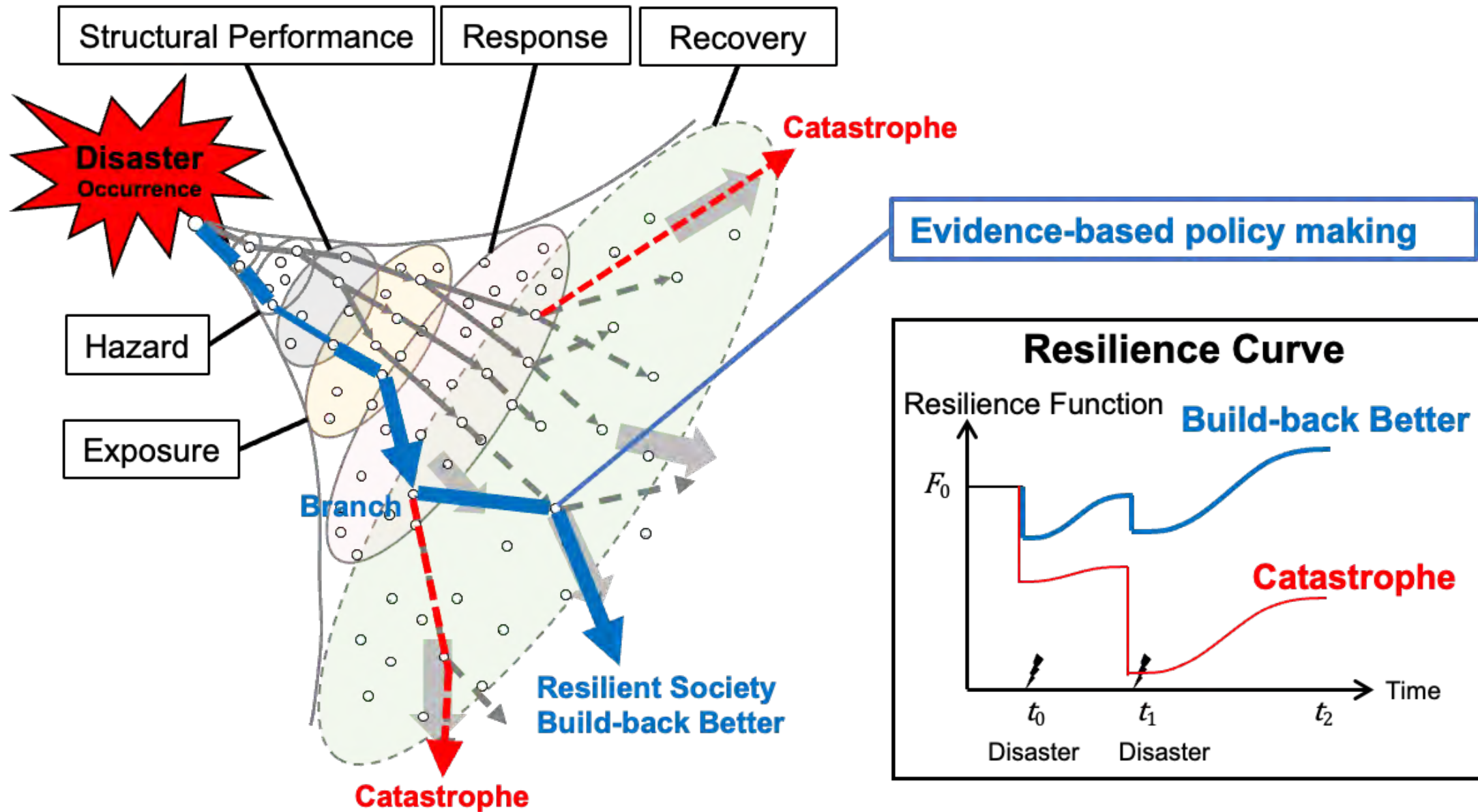
- Inundation depth
- Building Damage
- Exposed Population



- Search & Rescue Operations
- Medical Services
- Road Network Recovery
- Supplies



Complex Disaster Process and Great Uncertainties

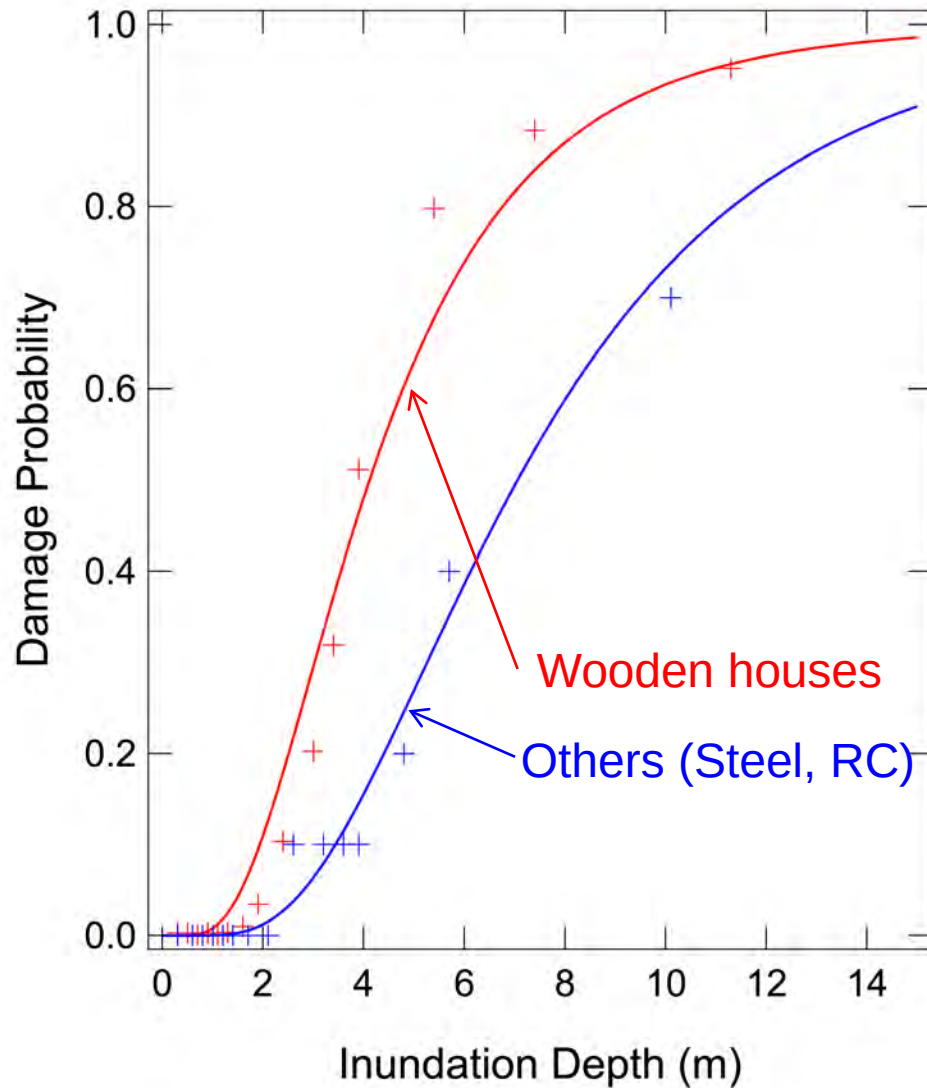


Pathways to Overcome Catastrophic Disasters

- Revisiting sequences and consequences of tsunami disaster – cascades of disasters
- Backcasting from inevitable future
 - Advances of new technologies
 - Growing concern about vulnerability
- Elucidating complex disaster processes and great uncertainties
- Utilizing “convergence of knowledge” towards resilient society

Tsunami Fragility Curves

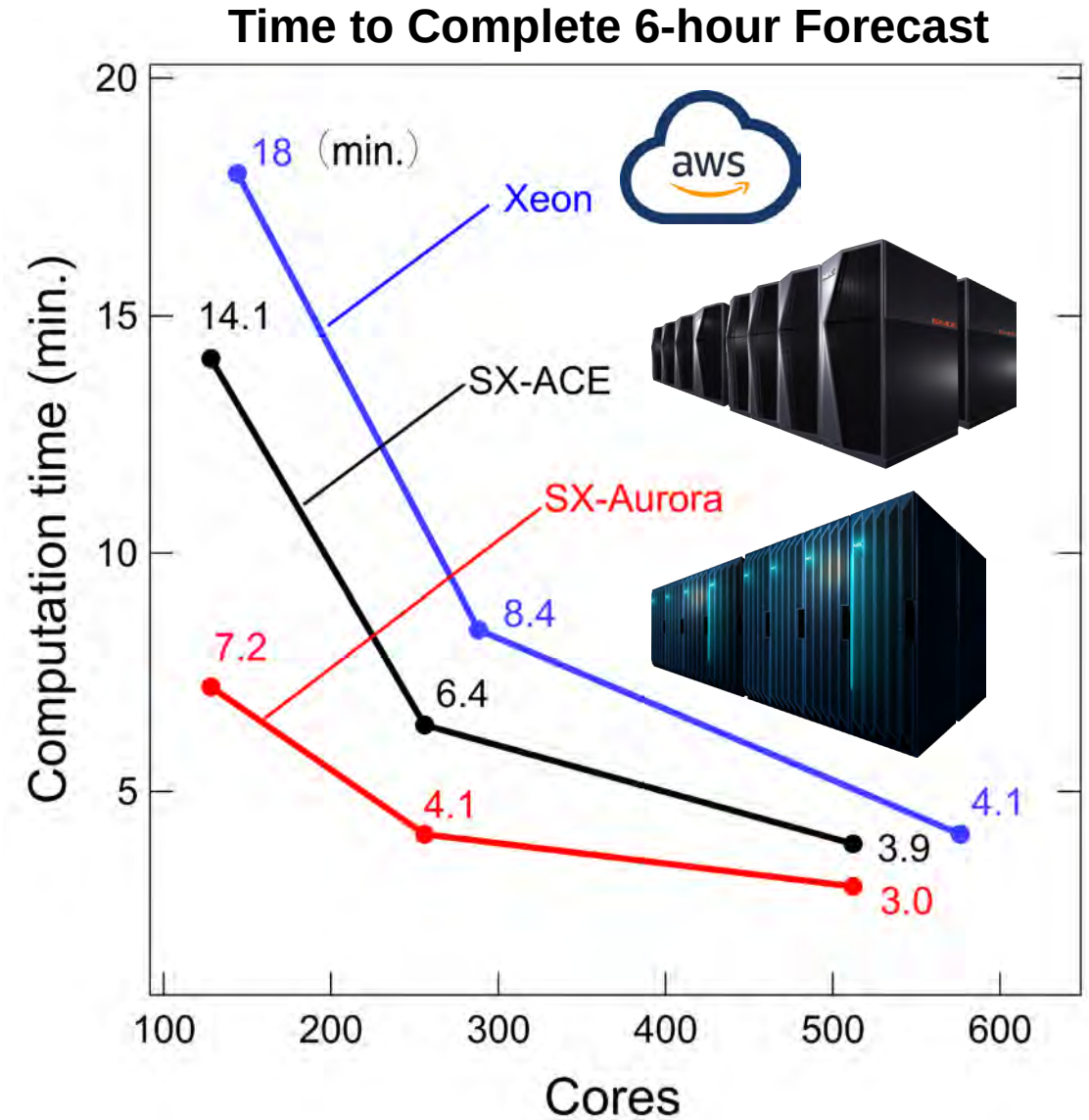
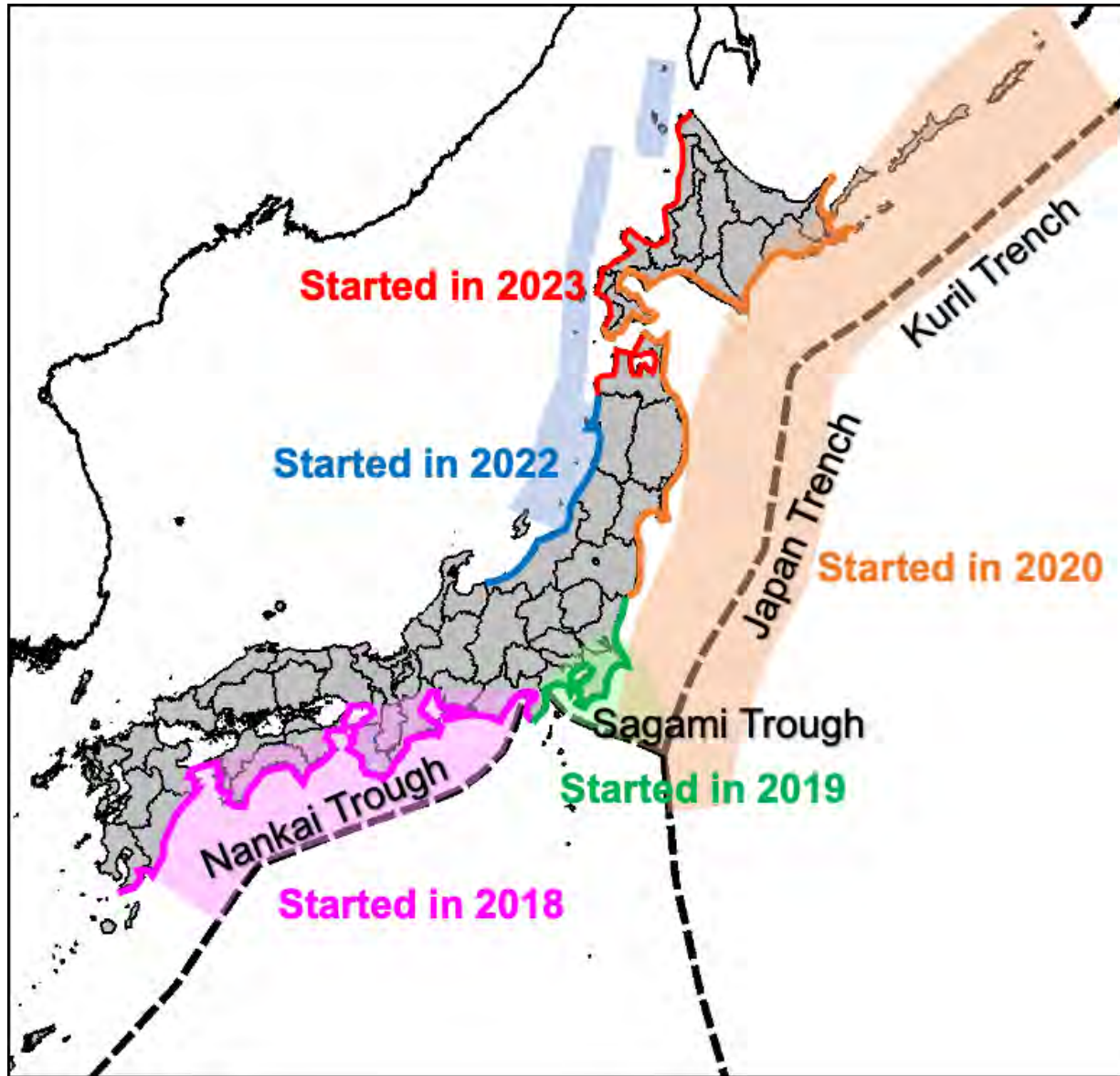
Structural Vulnerability



Koshimura et al. (2014)



Nation-wide Real-time Tsunami Inundation Forecast



Driving is not a good idea

