

# CREATE Research Webinar

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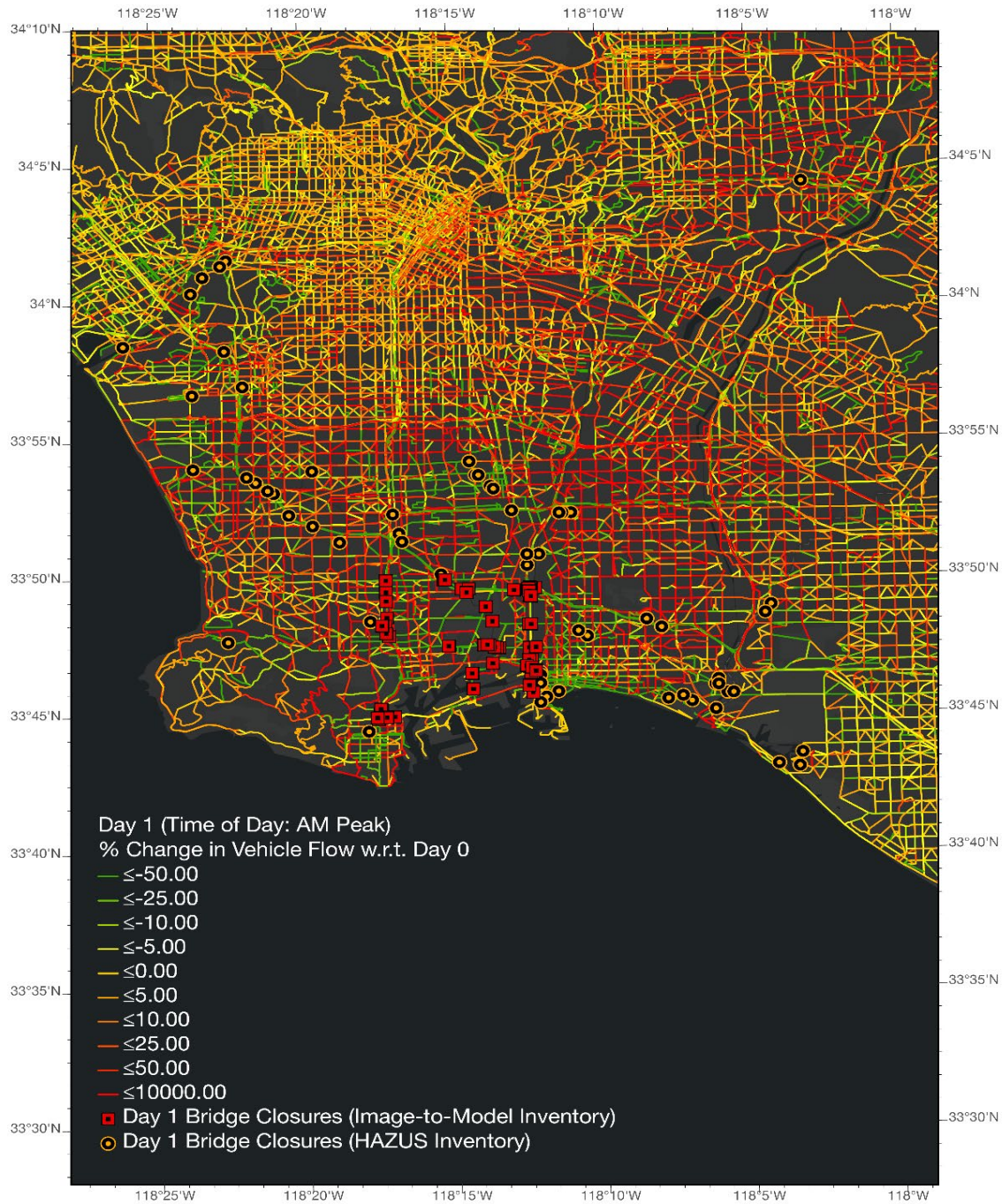
July 30, 2020

# Main Areas of Research Interest

- Economics of Disasters
  - Conduct economic impact analysis of natural or man-made disasters
  - Establish comprehensive analytical framework to formally integrate resilience in disaster impact modeling
  - Evaluate effects of various types of resilience tactics in mitigating economic losses from disasters
- Economic and Distributional Impacts of Energy and Climate Policies
  - Model economic impacts of clean energy and climate change policies and action plans
  - Evaluate burden sharing and equity implications of market-based environmental policy instruments
  - Assess distributional impacts of energy and climate policies

# Example Previous and Ongoing Projects

- Development of a comprehensive modeling framework to evaluate economic impact and resilience to port disruptions
  - USCG Project: Measuring Economic Risk Benefits of USCG Marine Safety Programs (2010-2011)
  - USGS Project: Economic Impacts of the SAFFR Tsunami Scenario (2014-2015)
  - METRANS Project: Development of an Economic Framework to Evaluate Resilience in Recovering from Major Port Disruptions (2015-2016)
  - CIRI Funded Study: Economic Consequences of a Disruption of Oil Imports: The Role of Seaports in U.S. Energy Security (2017)
  - METRANS Project: Socioeconomic Dimensions of Resilience to Seaport and Highway Transportation Network Disruptions (2019-2020)



## Changes in Vehicle Flow from Day 0 to Day 1 after the Scenario Event

# Hazard Characterization & Damage Assessment

Resilience at Physical Level

Component Damage, Functionality and Restoration + Damages to Other Buildings

## Transportation System Analysis

Resilience at System Level

### Model Network Topology

Pre-disaster and post-disaster network topologies for the entire disruption timeline based on estimated component damages and functionalities

Run 4-Step Travel Model  
for each network version

### Initialization

Link capacities, speeds, costs etc.

### Network Skimming

Highway and transit skim matrices.

### Trip Generation

Vehicle availability, trip production and attraction.

### Assignment

Find congested link costs and system level measures (VMT, VHT, delay, etc.)

### User Equilibrium

### Trip Distribution

Utility based destination choice

Time of Day  
Internal and external truck trips, time of day trip matrices, HOV trips.

### Mode Choice

Run nested logit models to find mode choice behavior.

System Level Functionality Indicators,  
System Resilience Curves

## Socioeconomic Impact Analysis

Resilience at Regional Economic Level

for every network version (pre-disaster baseline and post-disaster restoration/recovery) and a set of economic resilience tactics

### Estimate Macroeconomic Impacts

### Multi-Regional Computable General Equilibrium Model

- Aggregate economic impacts on GDP, Employment and Personal Income
- Sectoral impacts on Gross Output, Employment, and Labor & Capital Income

### Estimate Income Distribution Impacts

### Multi-Sector Income Distribution Matrix

Multiply sectoral changes in income by MSIDM to find profile of income changes by income bracket

### Income Distribution Indicators

Changes in Gini Coefficient and/or Atkinson Index between pre-disruption baseline and restoration scenarios including cases for resilience tactics

Macroeconomic and Income Distribution Impacts, Benefits of Resilience Tactics

Integration of  
Transportation and  
Economic Models

# Example Previous and Ongoing Projects

- Economic Impact of Critical Lifeline Infrastructure Disruptions
  - USGS Projects: economic impacts of major disaster scenarios (2010-2019)
    - ShakeOut earthquake scenario
    - ARkStorm severe winter storm scenario
    - HayWired earthquake scenario
  - LAEDC Project: Total Regional Economic Losses from Water Supply Disruptions (2012-2013)
  - NSF Project: Edge Computing to Improve Reliability and Resilience of Interdependent Systems (2018-2020)
  - LBNL Proposal: Economic Impacts of Power Interruption Scenarios in the Commonwealth Edison (ComEd) service territory

# Example Previous and Ongoing Projects

- Coronavirus Related Projects and Proposals
  - CAOE Project: Impacts of the Coronavirus on the Economy of the United States
  - CDC Project: Regulatory Impact Analysis of the Traveler Contact Data Collection Final Rule
  - NASA Proposal: Modeling the Economic Impact of COVID-19 with Earth Observation Technologies
  - IARPA Proposal: Optimization framework to guide re-opening strategies

# Key Publications

- Wei, D., Chen, Z., and Rose, A. “Evaluating the Role of Resilience in Recovering from Major Port Disruptions”, *Papers in Regional Science*, forthcoming.
- Rose, A. and Wei, D. 2019. “Impacts of the Property Assessed Clean Energy (PACE) Program on the Economy of California,” *Energy Policy*  
<https://doi.org/10.1016/j.enpol.2019.111087>.
- Rose, A., Wei, D., and Paul, D. 2018. “Economic Consequences of a Disruption of Oil Imports: The Role of Seaports in U.S. Energy Security,” *Energy Policy* 115: 584-615.
- Lawrence, M., Wei, D., Rose, A., Williamson, S., and D. Cartwright-Smith. 2017. “Macroeconomic Impacts of Proposed Climate Change Mitigation Strategies for Transportation in Southern California,” *Research in Transportation Economics* 61: 56-69.
- Prager, F., Wei, D., and Rose, A. 2017. “Total Economic Consequences of an Influenza Outbreak in the United States,” *Risk Analysis* 37(1): 4-19.
- Rose, A., Sue Wing, I., Wei, D., and Wein, A. 2016. “Economic Impacts of a California Tsunami,” *Natural Hazards Review* 17(2): 1-12.
- Rose, A. and Wei, D. 2013. “Estimating the Economic Consequences of a Port Shutdown: The Special Role of Resilience,” *Economic Systems Research* 25(2): 212-232.
- Rose, A., Wei, D. and A. Wein. 2011. “Economic Impacts of the ShakeOut Scenario,” *Earthquake Spectra* 27(2): 539-557.