

Modeling Risk and Disruptions on Transportation Networks

Panel 18

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Transportation Security
Administration
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Panelists

Jeffrey Short: American Transportation Research
Institute

*Assessing the Impact of Major Interstate System Disruptions on
Freight Movement Using GPS Data From Commercial Vehicles*

Alexei Kolesnikov: Towson University

*Risk Analysis: Toxic Materials Transportation
Security*

Adel Sadek: University of Buffalo

*Advanced Transportation Simulation Modeling for
Transportation System Evaluation and Management During
Emergencies*

Highlights of Key Points

- ❖ **Significant advances are underway in truck location databases that will enhance the nation's capacity**
 - **To close information gaps**
 - **To reduce response time in case of an incident**

Highlights of Key Points (cont)

- ❖ **Agent based models facilitate improvements in our ability to add the complexity of the components**
 - **Human responses**
 - **System variables**
 - **Environmental elements**

Highlights of Key Points (cont)

- ❖ **Massive databases of truck GPS information can be used as follows:**
 - **to identify vulnerabilities within the national transportation system**
 - **to assess the consequences of major system disruptions**
 - **to analyze system resiliency**

Highlights of Key Points (cont.)

- ❖ **Simulation is applied to a test network to assess level of risk with movement of a hazardous material.**
 - **More than 500,000 potential routes are compared with population centers.**
 - **Concept is to designate the route that minimizes the risks.**

Improving Transport of Toxic Materials

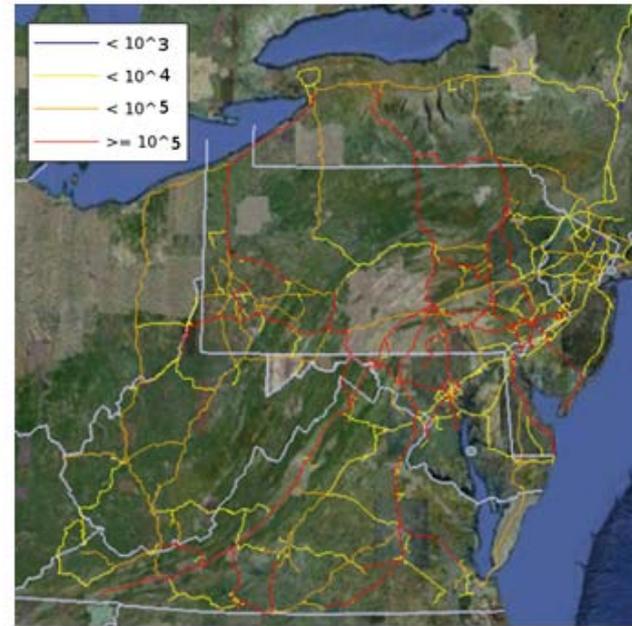


Figure 2. A possible graphical representation of model output: Mid-Atlantic sites only.

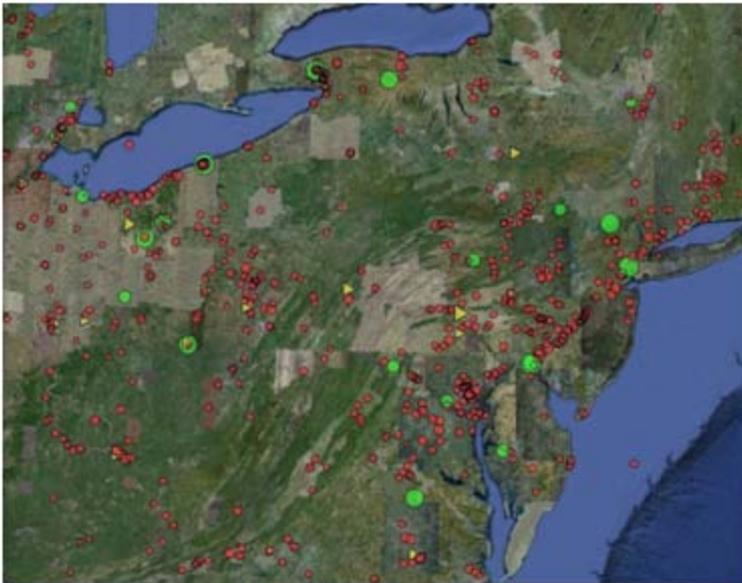


Figure 1. A snapshot of nodes in the chlorine network.

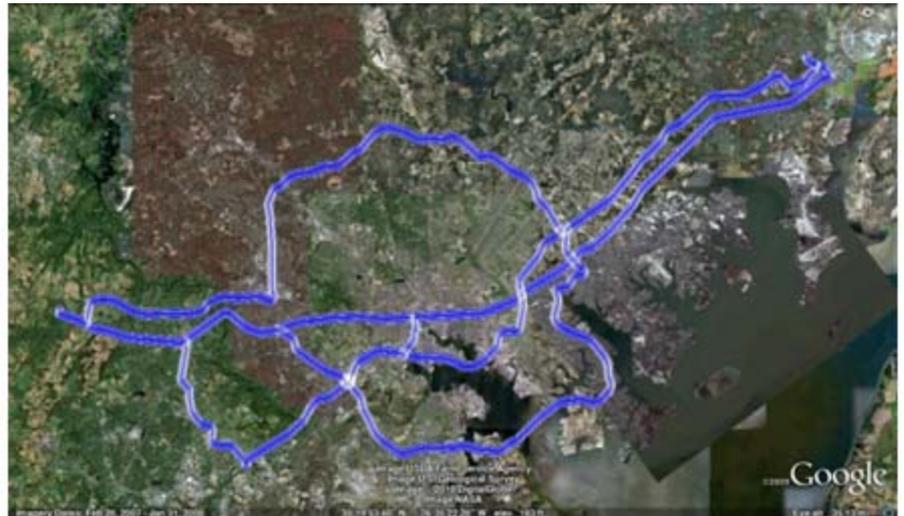
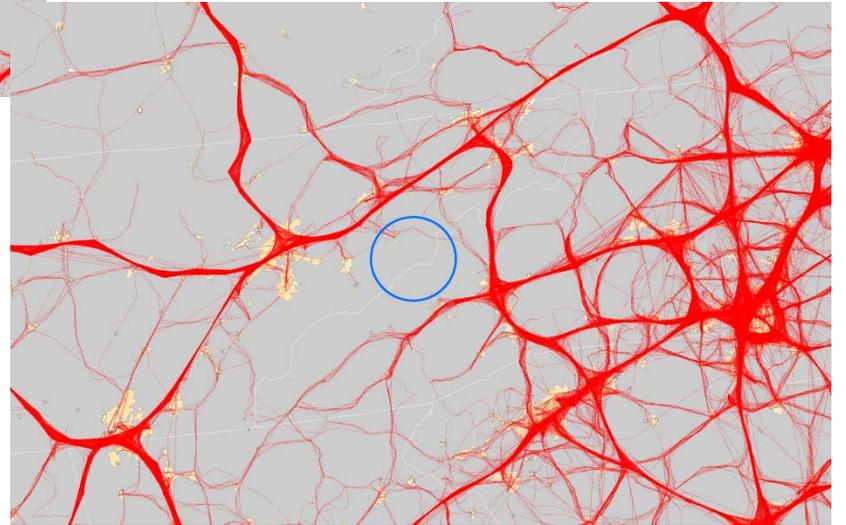
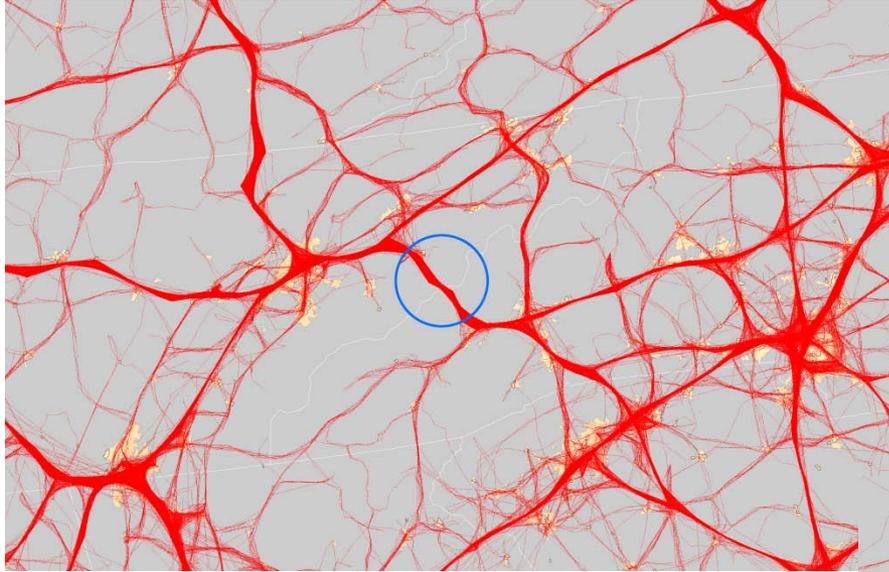


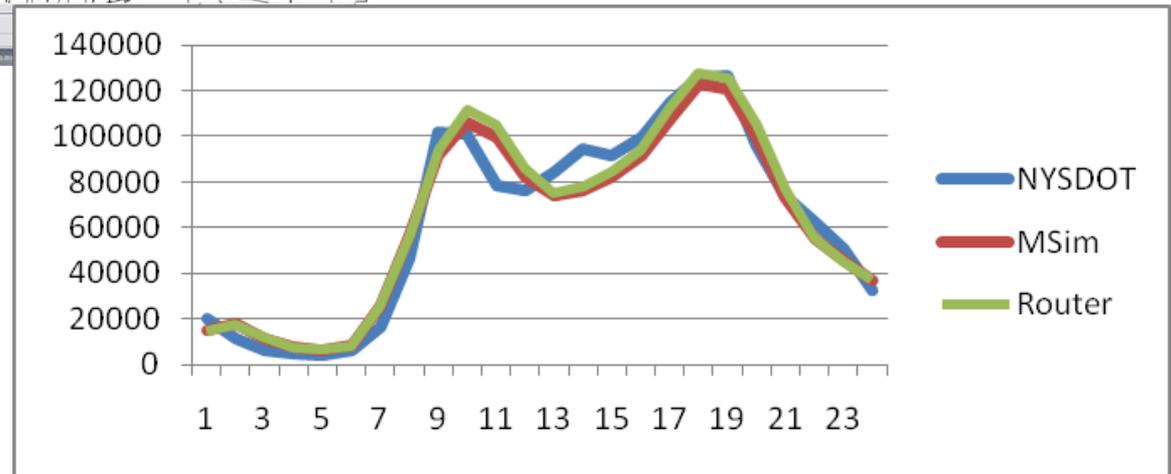
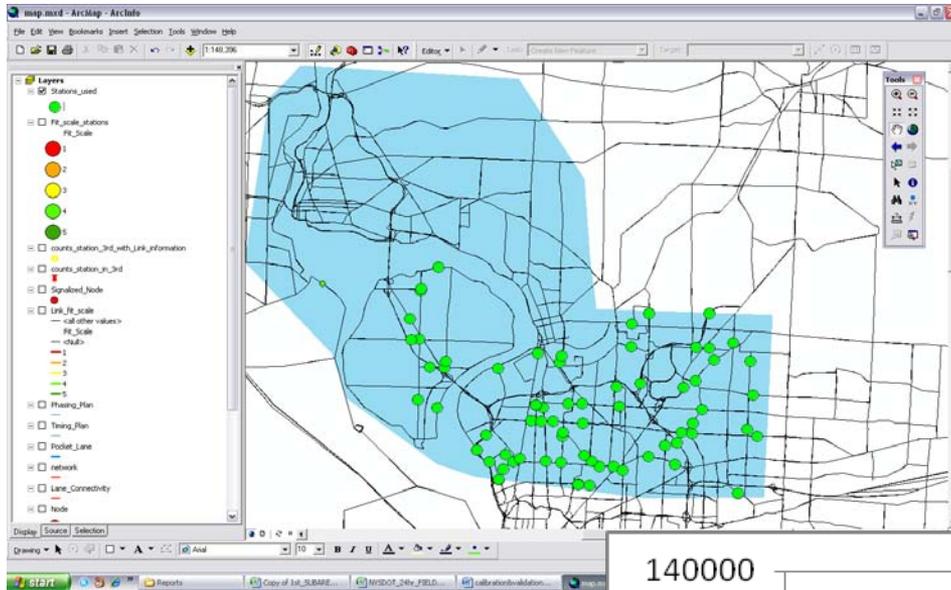
Figure 3. Neighborhoods of routes.

Major System Disruption





Model Calibration: Buffalo



Summary and Future Direction

- ❖ **This research designed to address Threats and Consequences**
- ❖ **These models are needed to advance the state-of-the-practice and overcome limitations in existing models.**
 - **Problems are different than just building and sustaining the network**
 - **Next areas of sustainability, vulnerability, etc.**

❖ **Research facilitates:**

- **Identification of major vulnerabilities where infrastructure failures will cause significant disruptions**
- **Data can be used to answer how resilient is the system**
- **Data can be used to assess how users adjust/adapt**