

Calibration of Region-Level Traffic Simulation for Evacuations



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Components of Regional Scale Model

- Modeling of large geographical areas, with large number of vehicles
- The model should be able to model traffic over multiple days
- The model should be able to accurately model vehicular dynamics
- Calibration and validation of the model to ensure that the spatio-temporal patterns of traffic observed in the simulation are realistic.



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Gap in Literature

- Most studies were limited in their geographical scales and time durations.
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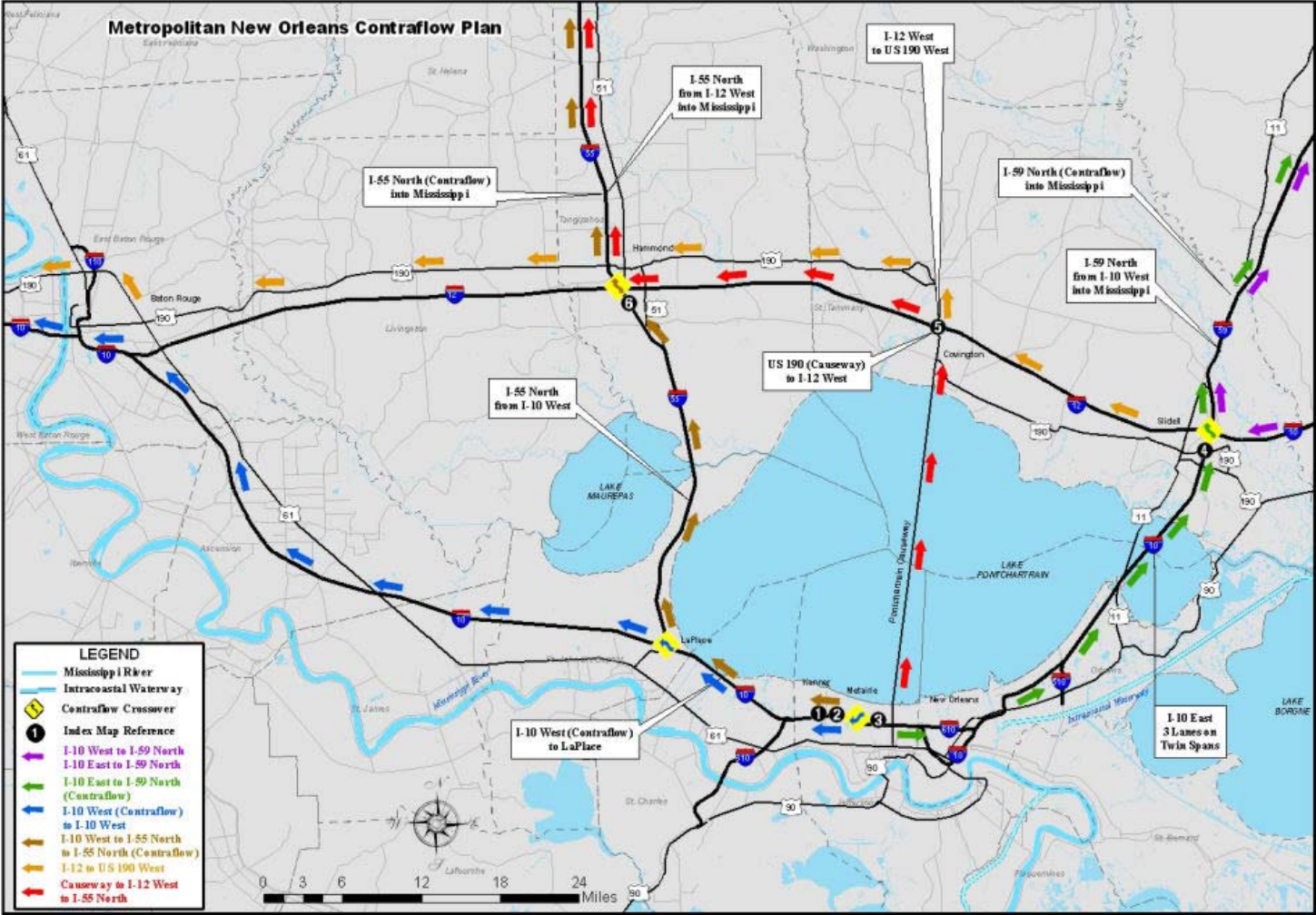


Challenges of Calibrating Evacuation

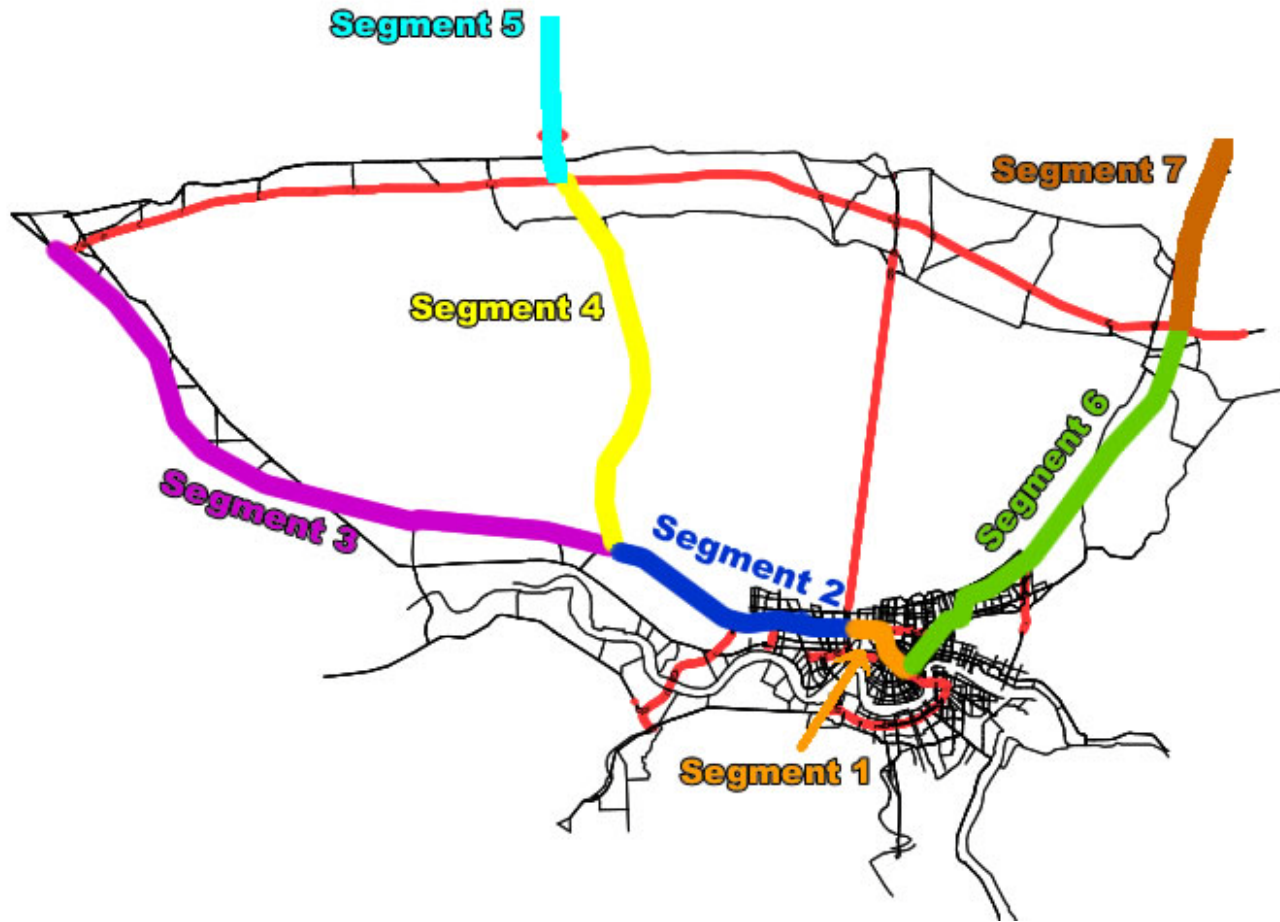
- Vast geographical scale of the network and long duration of the evacuation.
- Level of Detail vs. Effort
- Identification of evacuating traffic.



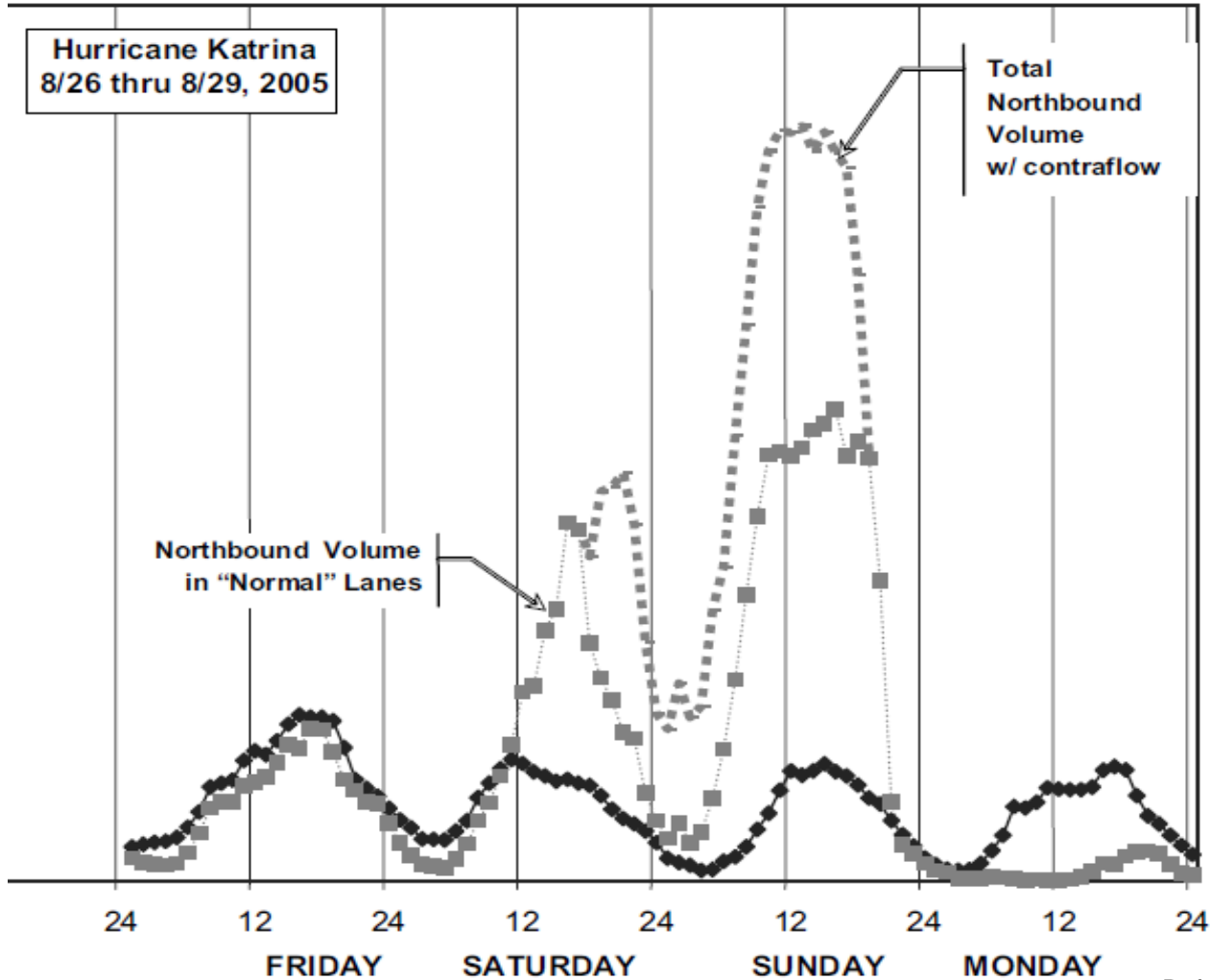
New Orleans Evacuation Plans



New Orleans Evacuation Model



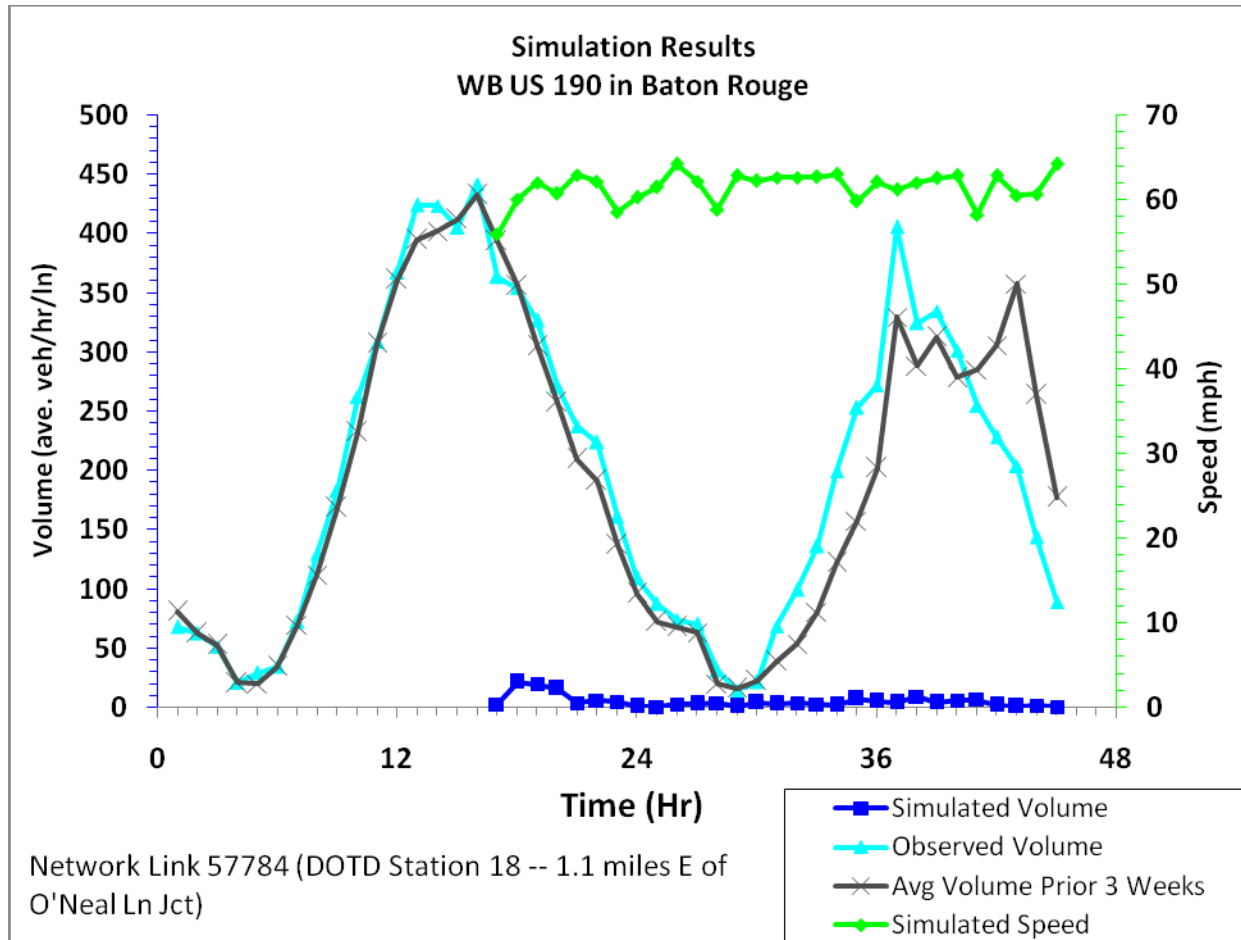
Identification of Evacuating Traffic



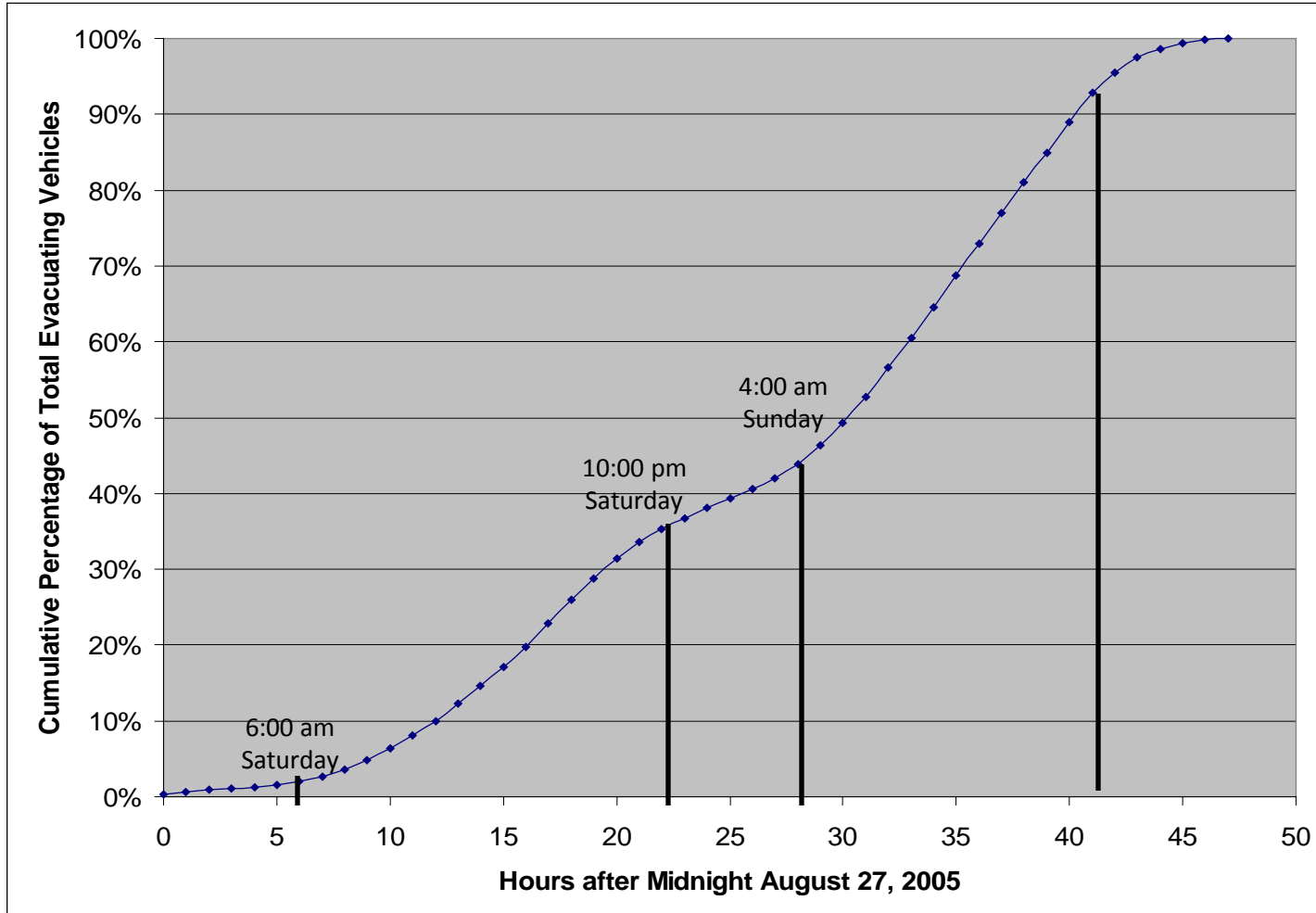
Ref: Wolshon and McArdle 2009



Identification of Evacuating Traffic



Evacuation Behavior



Calibration Statistics

- ***Percentage Error***

- Analysis performed utilizing percent errors are found to be sensitive to the level of the observed values.
- Error percentages are larger at small values



Calibration Statistics

- ***T-test***

- A t-test assumes that the observations are obtained from an identically and independently distribution (iid).
- Volumes observed during an evacuation are time dependent, and therefore a time series data.



Calibration Statistics

- ***U-statistic***
 - It is used to compare time series data.
 - It is very sensitive to differences. A consistent one percent error in volumes would result in the rejection of the model.



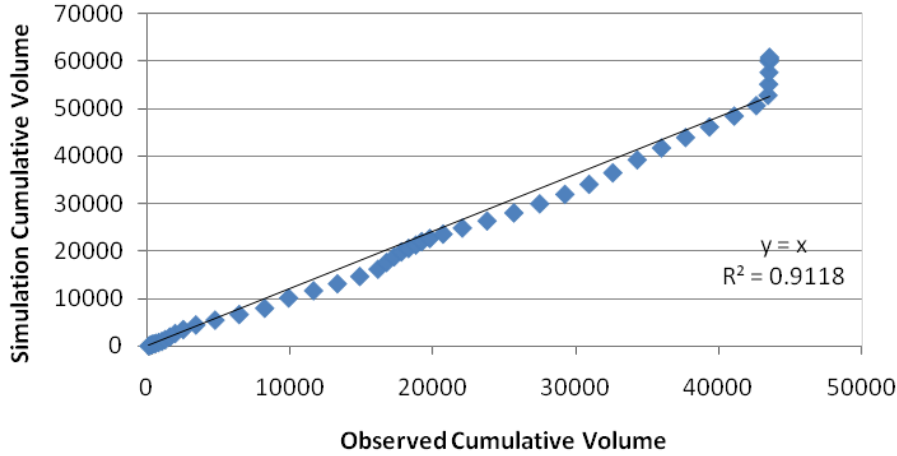
Calibration Statistics

- ***Regression***
 - It is used to compare time series data.
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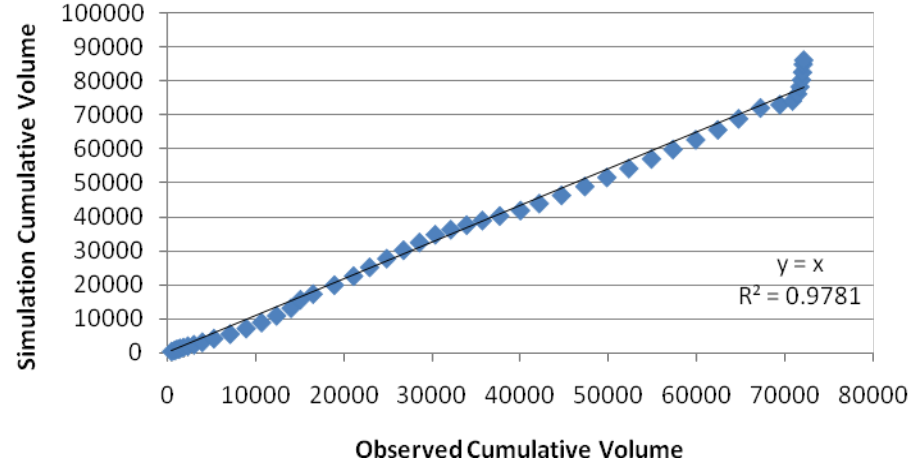


Calibration Statistics

Westbound US-61 in Laplace

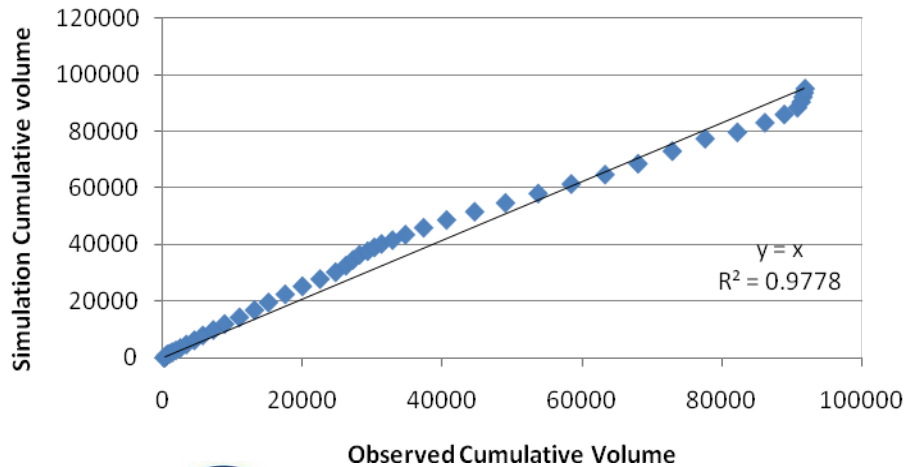


Westbound I-10 in Laplace

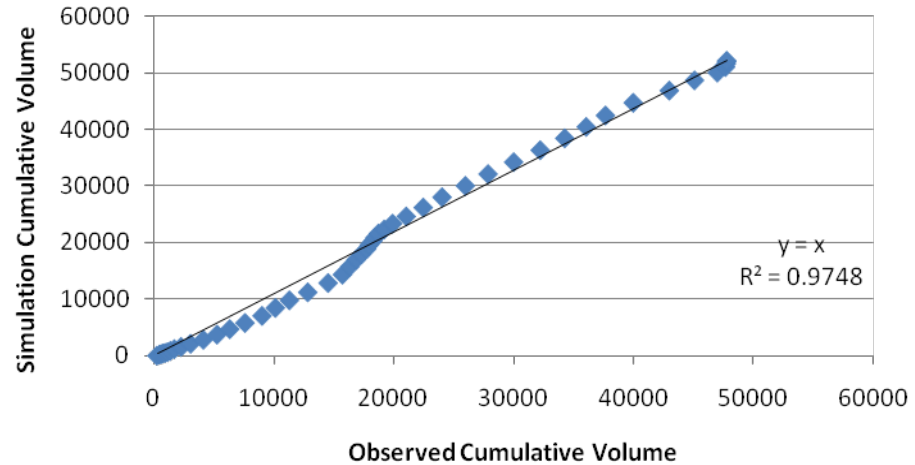


DOTD station 27

Northbound I-55 in Fluker



Northbound I-59 in LA/MS Border

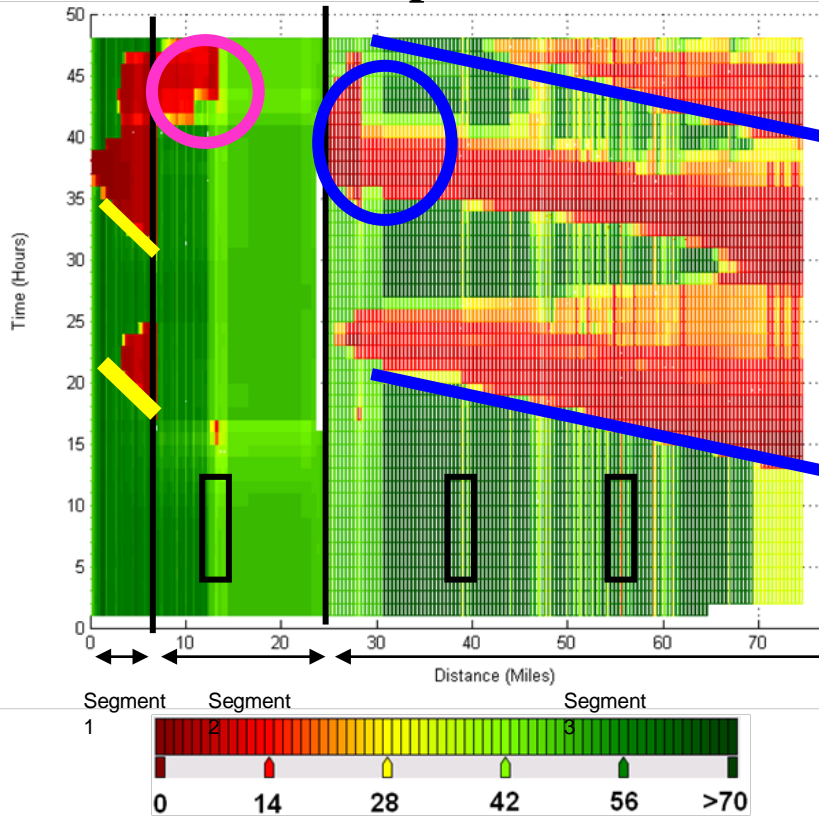


DOTD station 67

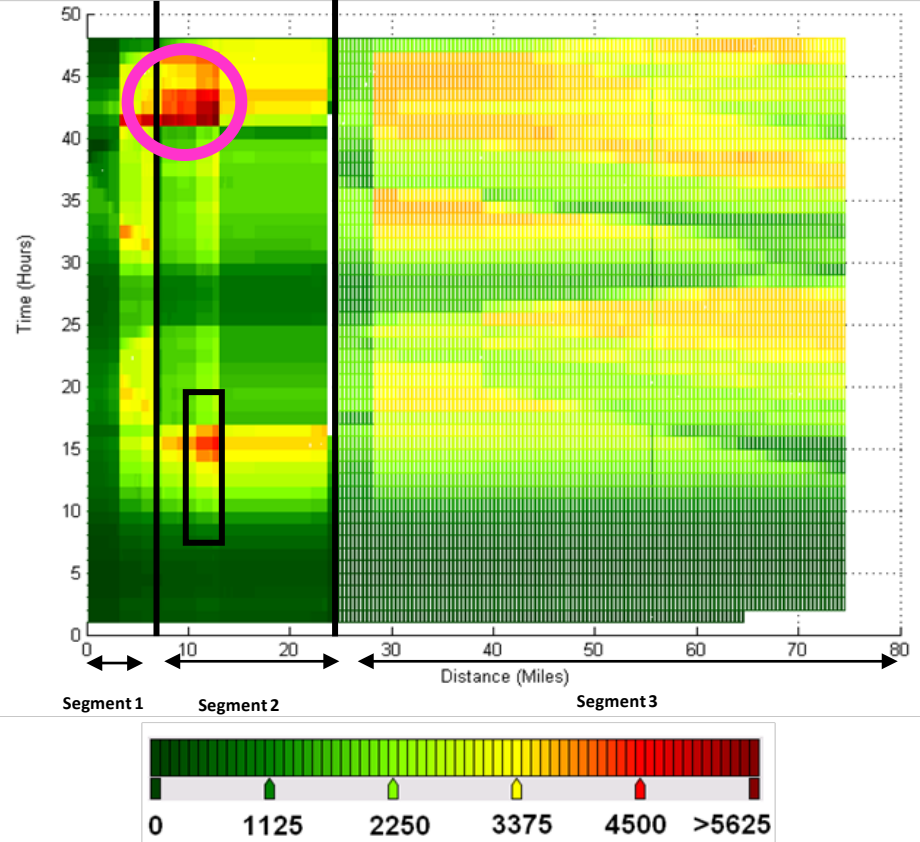


I-10WB

Speed



Volume



Conclusion and Future Work

- A comparison based on regression is the ideal statistic to compare observed quantities with simulated ones for large scale simulation.
- Spatio-temporal speed and volume profiles are helpful to determine bottlenecks.
- Determine efficient placement of fuel containers.

