

# **Using GPS Speed Data to Understand the Cost of Incidents: Benefit-Cost Analysis for Missouri DOT**

Cecilia Viggiano, Research Associate

Presentation to the Committee on Geospatial Data Acquisition Technologies

Jan. 14, 2019

---

# Agenda

---

- Context and objective
- Data sources
- Defining and identifying incidents
- Application
- Conclusions and cautions

# Context

---

Missouri DOT INFRA grant application for several projects on I-70 and I-44

Included **Incident Management Systems (IMS)** on both highways

- ◆ CCTV
- ◆ Portable Communication Pads
- ◆ Dynamic Message Signs (DMS) boards
- ◆ New median crossovers
- ◆ New/improved outer roads and slip ramps

# Our objective

---

Develop a compelling grant application including:

- ◆ Narrative: What problems will the projects solve?
- ◆ Benefit-cost analysis

# Data Sources

---

## Incident Reports

- Incident type, location, and duration based on police records

## GPS Speed data

- HERE data from vehicle sensor data, smartphones, PNDs, road sensors, and connected cars
- Accessed via online interface at [ritis.org](http://ritis.org)
- 5 years of data at 15-minute intervals, median TMC 0.4 miles

tmc_code	measurement_tstamp	speed	average_speed	reference_speed	travel_time_seconds	confidence
119+05298	1/1/2012 0:00	33.44	64	70	112.08	0.74
119P05298	1/1/2012 0:00	33.44	64	70	37.87	0.74
119+05299	1/1/2012 0:00	33.01	64	70	110.7	0.76
119P05299	1/1/2012 0:00	33.01	64	70	58.74	0.76
119+05688	1/1/2012 0:30	51.64	63	70	106.6	0.86
119P05688	1/1/2012 0:30	51.64	63	70	32.49	0.86

# What is an incident?

---

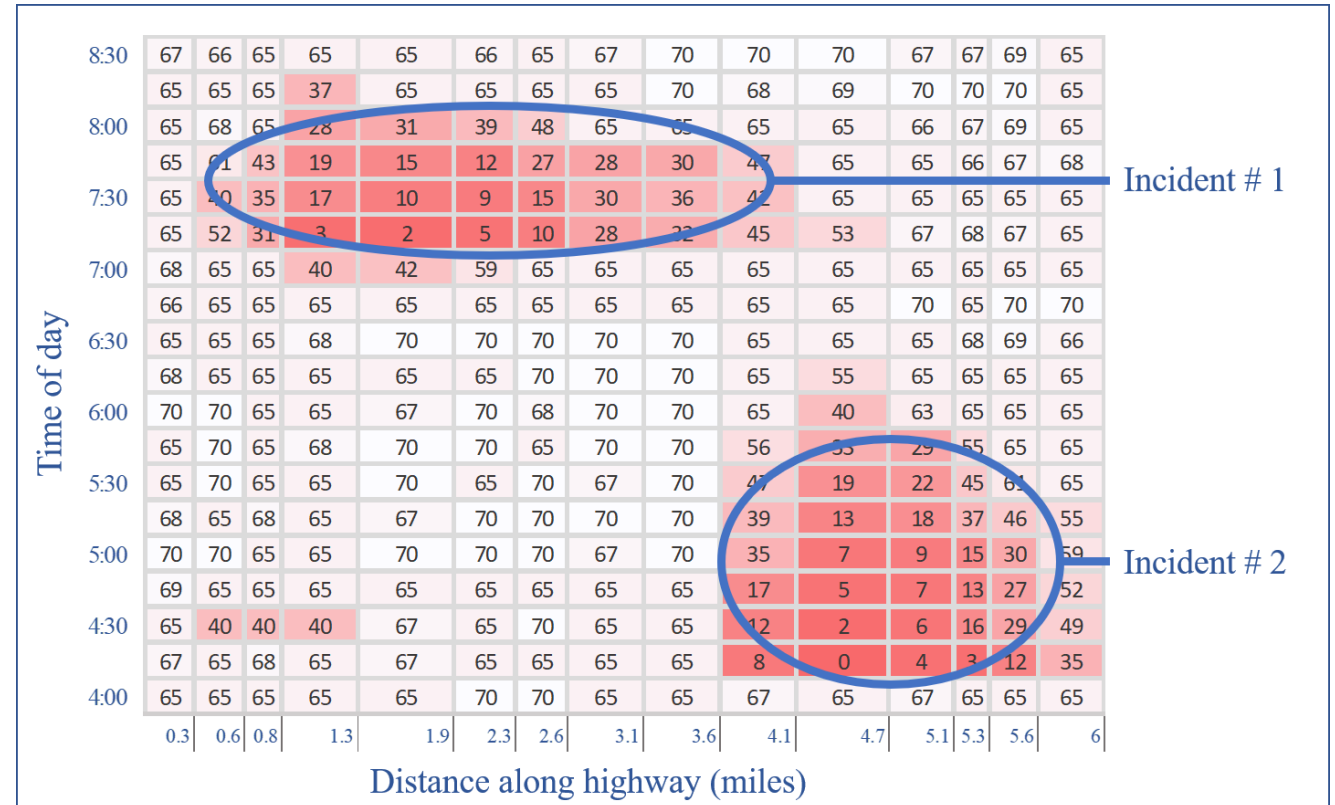
- Speed threshold (absolute or relative to posted or average speed)
- Minimum duration
- Minimum extent (miles)

Incidents unfold over time and space. Each incident has impacts in three dimensions:

- ◆ speed
- ◆ extent
- ◆ duration (miles)

# Identifying incidents

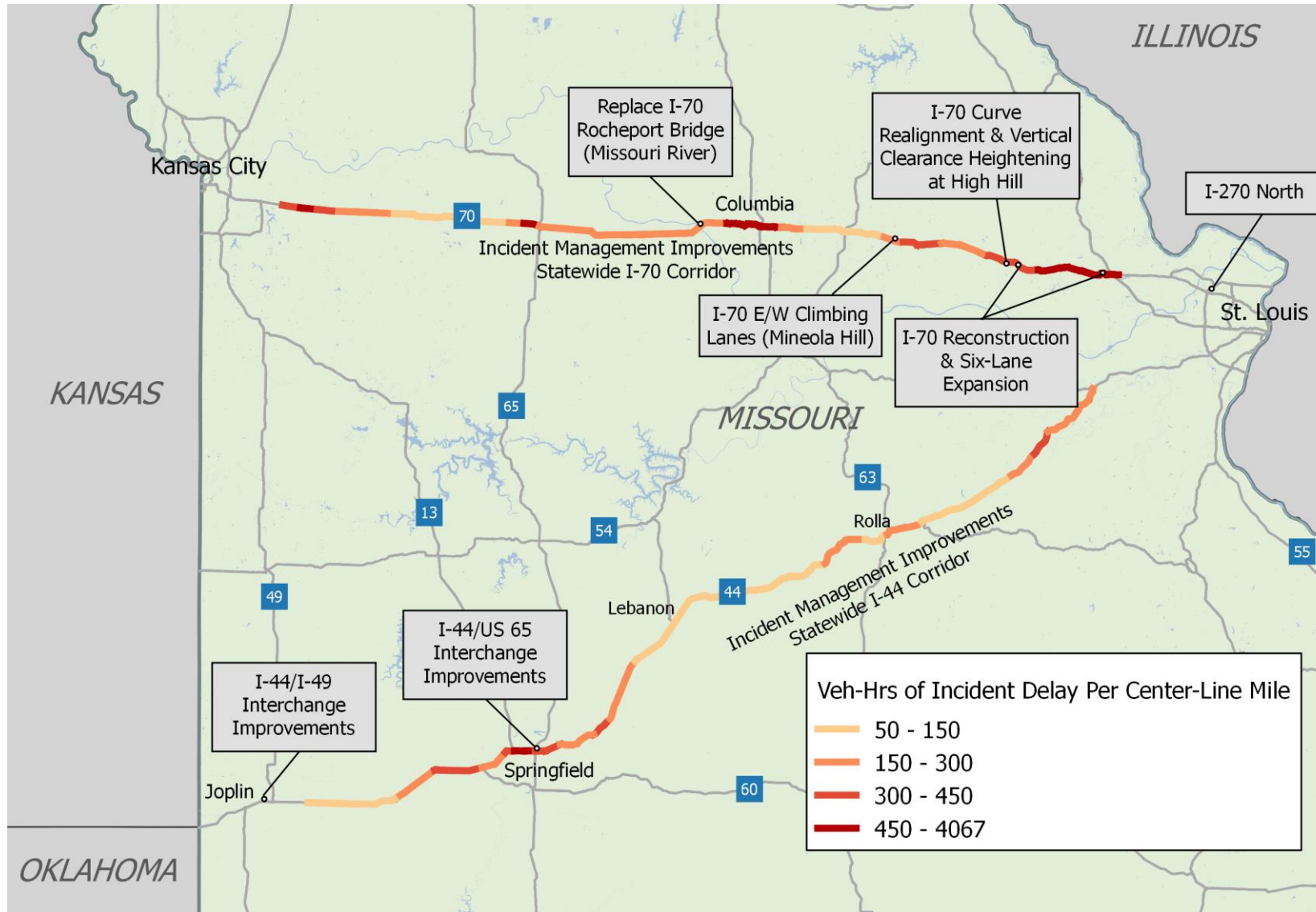
- First, filtered based on difference between observed and reference speed
- Then, clustered using a spatial clustering algorithm



# Application



# Map of incident delay

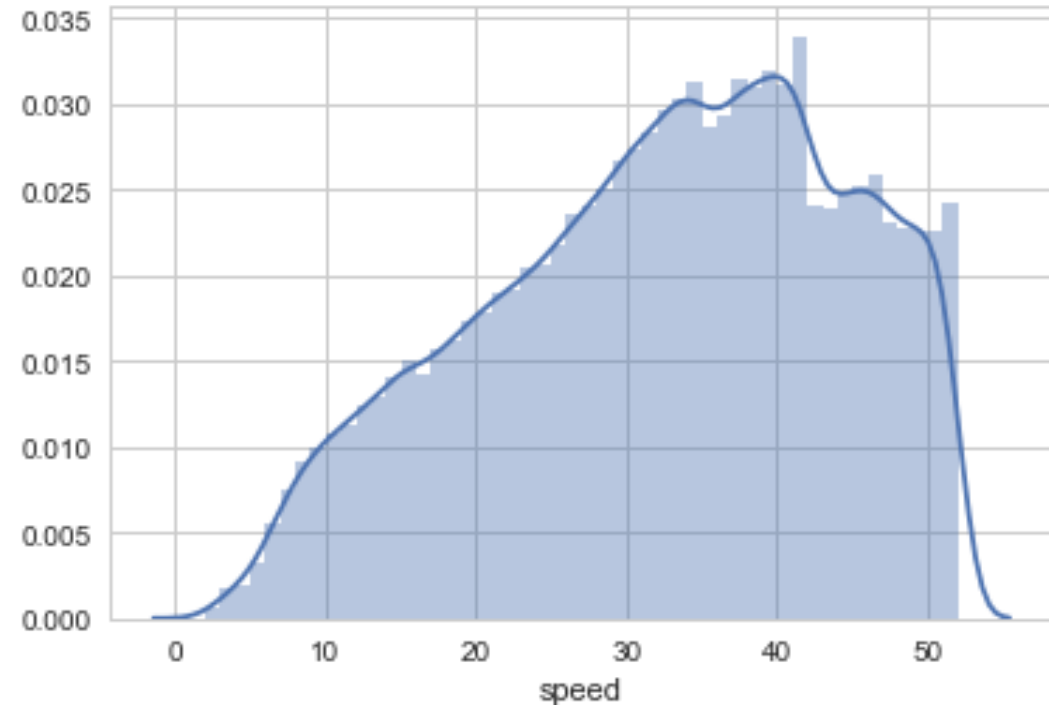


# Impacts of IMS

---

- Shorter incident durations
- Increased diversion
- Shorter incident extent
- Change in speed distribution
- Reduced secondary crashes due to reduced incident duration

**Distribution of speeds during incidents**



# Conclusions and cautions

---

- HERE data allows for very detailed analysis of incidents, with the right tools
- Contradictions between HERE data and MoDOT incident logs
- Skepticism regarding GPS speed data

# Thank you

---

Cecilia Viggiano

[cviggiano@edrgroup.com](mailto:cviggiano@edrgroup.com)