

Speed Differences Between Cars and Trucks on Freeways

National Urban Freight Conference
October 22, 2009

Presentation Overview

- Motivation
- GPS Data
- Short and Long Vehicles
- In and Out Lanes
- Discussion

Motivation

Trucks Travel Slower than Cars

- Acceleration
- Deceleration
- Speed Maintenance

Modeling Implications

- Travel Demand Model
- Air Quality Model
- Analysis

Motivation

GPS Data

Short and Long
Vehicles

In and Out Lanes

Discussion

Motivation Continued

Truck Speeds within PSRC's Modeling Framework

- Trucks speeds are not differentiated
- Overestimation of trucks on freeways
- Underestimation of trucks on arterials

Facility Type	Count	Volume	Locations	Difference	Percent Difference
Freeways	552,755	960,468	186	407,714	74%
Arterials	679,012	267,427	581	(411,585)	-61%
Total	1,231,767	1,227,895	767	(3,871)	0%

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GPS Data

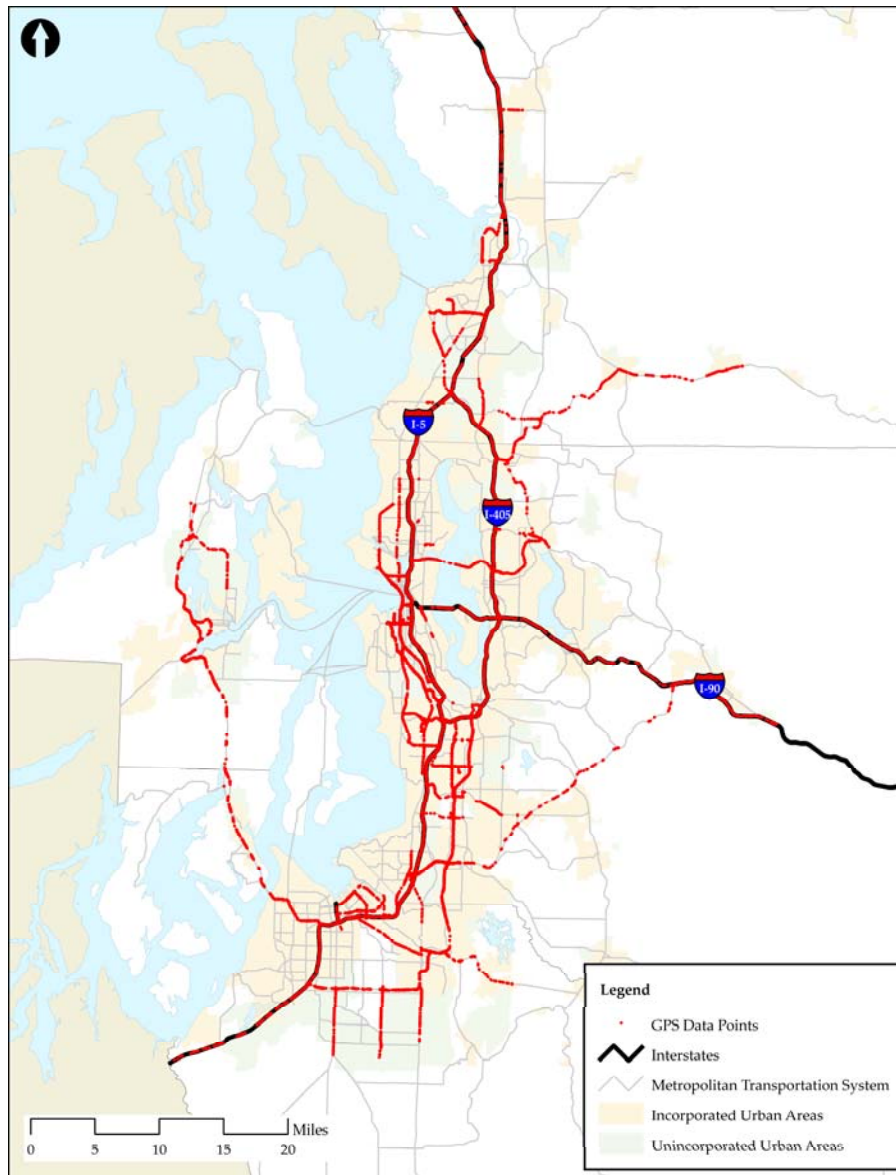
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- Collected in 2003 and 2004
- Nearly ½ million observation points
- From 8 trucking firms and 25 GPS units
- 14 routes considered
- No comparable passenger vehicle data available

GPS Analysis Results

Midday General Purpose (GP) and Truck Speeds



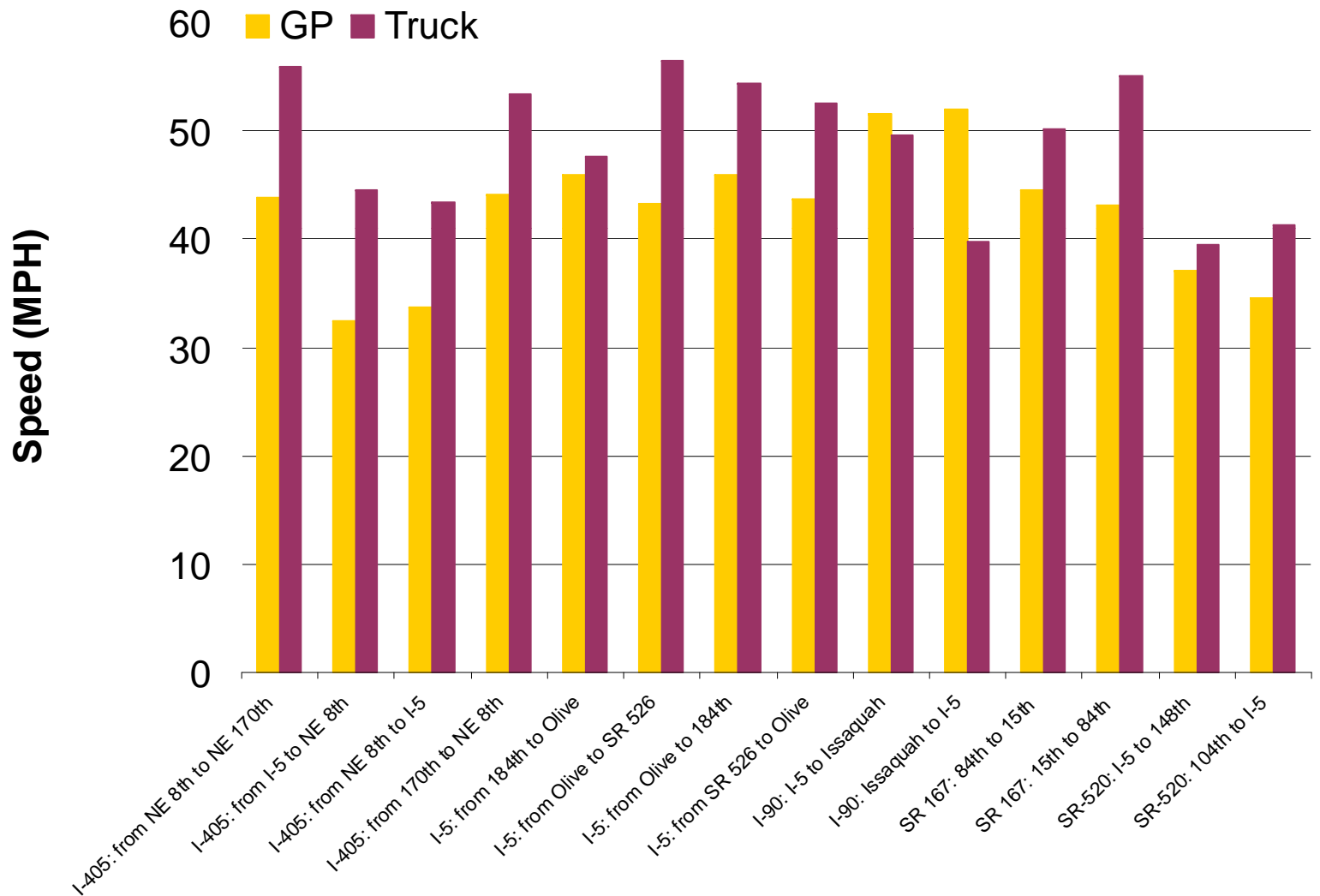
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Short and Long Vehicle Comparison

Data

- 20-second speed trap data from the Washington State Department of Transportation
- 4 vehicle length classes
 - Bin 1: $< 26'$ (short—i.e. cars)
 - Bins 2-4: $> 26'$ (long—i.e. trucks)
- Only consider observations where either cars or trucks are present

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Short and Long Vehicle Analysis

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Comparison of Daily Average Truck GPS and Long Vehicle Speeds

GPS		Long Vehicles	
Speed	Observations	Speed	Observations
45.8	10	44.8	292

Short and Long Vehicle Analysis

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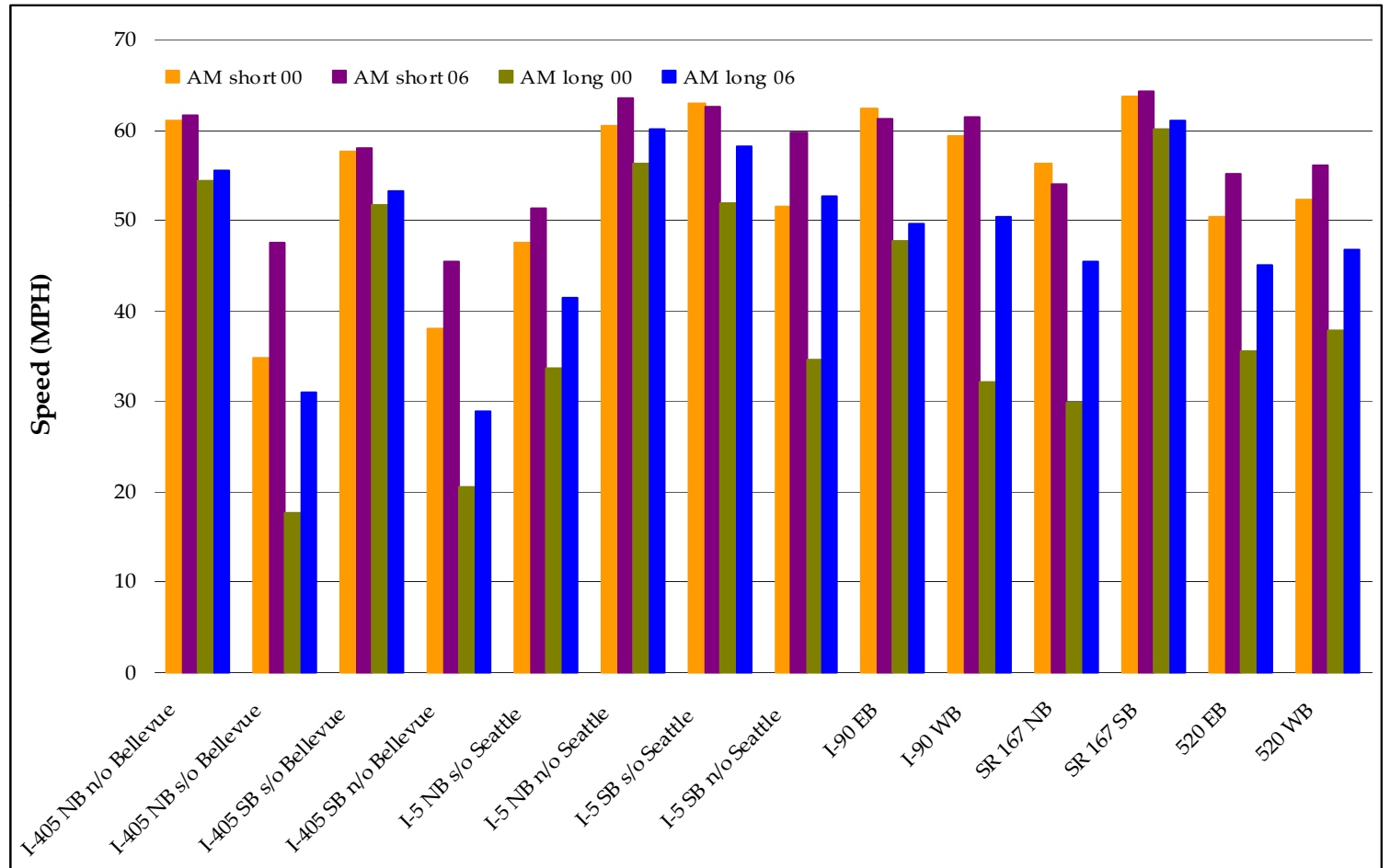
Weighted Average Speed Differences

Time	Short	Long	Difference	Percent Difference
AM Peak	57.1	46.8	10.3	-18%
PM Peak	53.7	42.5	11.2	-21%

Short and Long Vehicle Analysis



Comparison Over Time



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- Short and Long Vehicles
- In and Out Lanes
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Short and Long Vehicle Analysis

Speed and Car Percent at Select Locations

Motivation

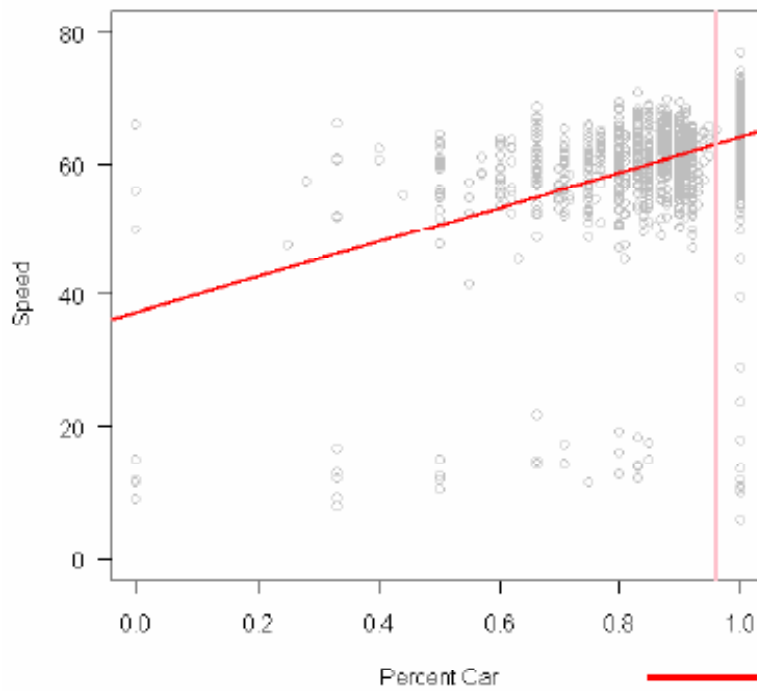
GPS Data

Short and Long Vehicles

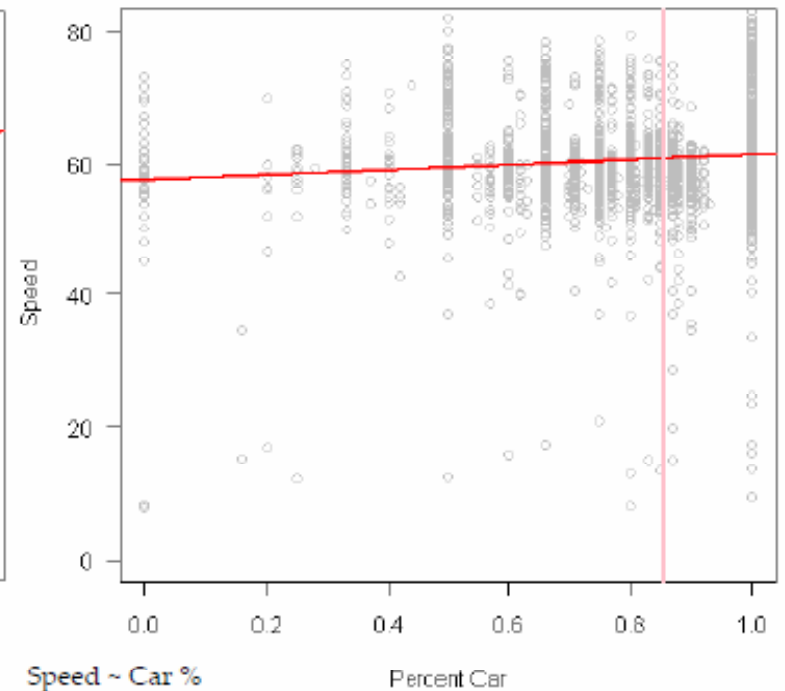
In and Out Lanes

Discussion

I-5 AM NB: E69



I-5 AM NB: E124



In and Out Lane Comparison



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Data

- 5-minute speed trap data from the Washington State Department of Transportation
- Innermost non-HOV lane as proxy for car speeds
- Second to outermost lane as proxy for truck speeds

In and Out Lane Analysis



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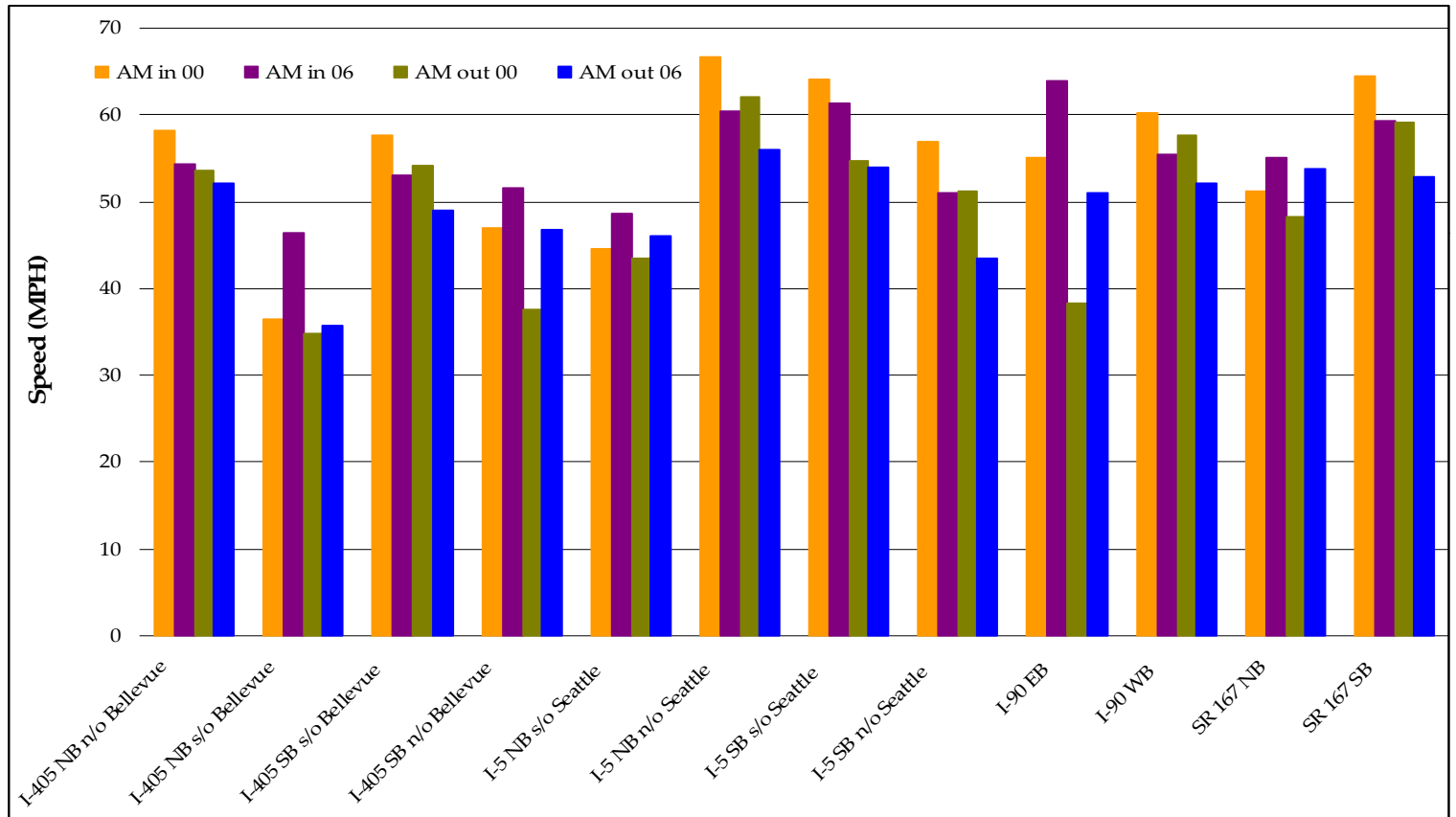
Weighted Average Speed Differences

Time	Short	Long	Difference	Percent Difference
AM Peak	54.7	48.6	6.1	-11%
PM Peak	54.7	50	4.7	-9%

In and Out Lane Analysis



Comparison Over Time



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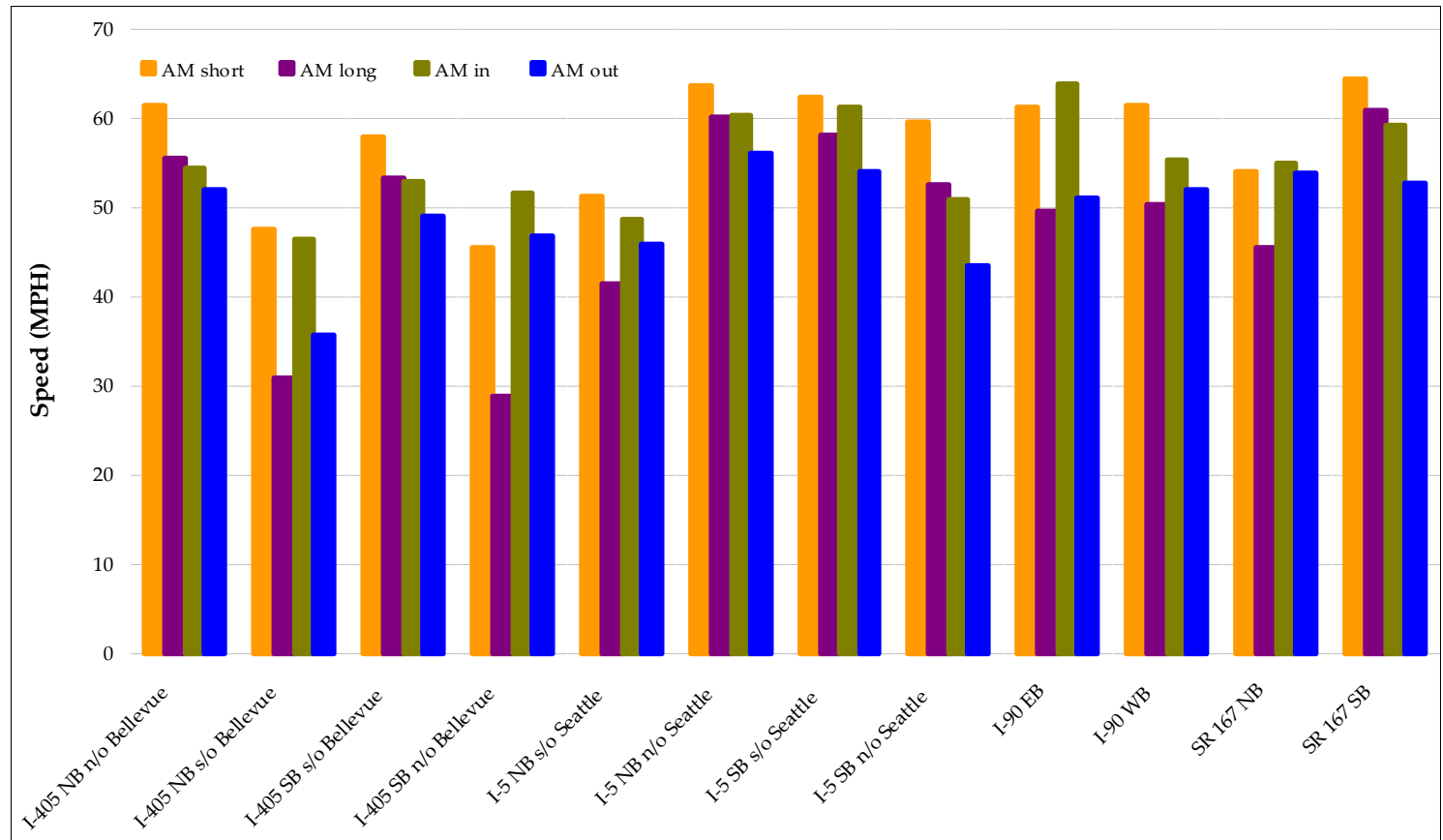
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Method Comparison



Discussion

- The in and out lane method yields the most promising results and is simple to implement
- In 2006 trucks traveled by an average of 10% slower than cars, virtually unchanged from 2000
- Future truck model will account for 10% difference on freeways
- The short and long vehicle comparison could be useful if disaggregate classification data is available
- Continued need for truck count information for model validation

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Thank You

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