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# Heavy Duty Diesel Vehicle Emissions Collected Using the **O**n-Road **H**DDV **M**onitoring **S**ystem (OHMS)

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# Acknowledgments

California Environmental Protection Agency
Air Resources Board

CALIFORNIA Highway Patrol

TraPac
Trans Pacific Container Service Corp.

UNIVERSITY of DENVER

# OHMS

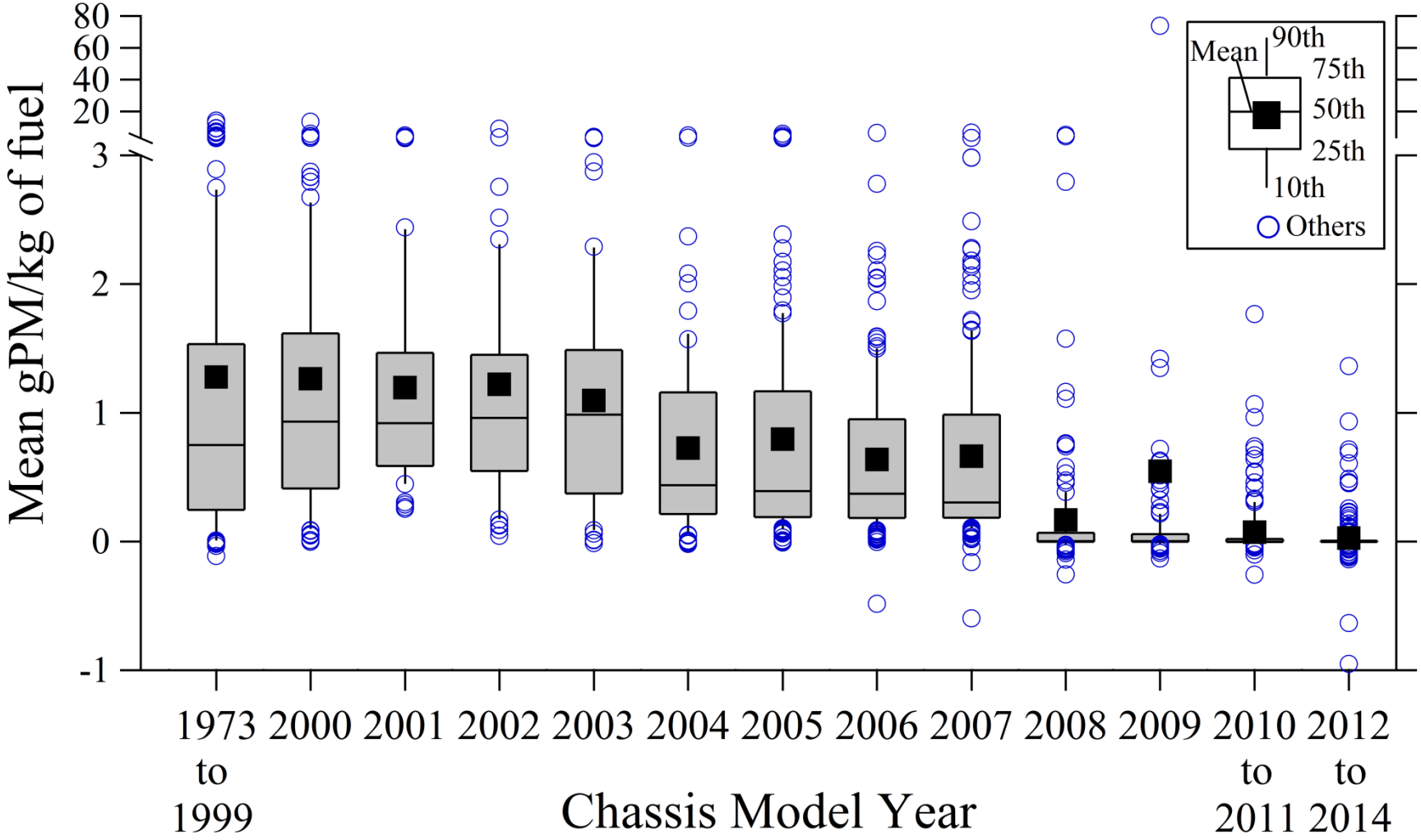
- Pipe 50ft long
- Measurements of 15-20 sec
- Speed & Acceleration
- License Plate
- IR Exhaust Pipe Temperature

- Horiba AIA 240; NDIR – $CO_2$ & CO
- Horiba FCA 240; FID/Chemi – HC & NO
- Horiba FCA 240; Chemi – Total $NO_x$
- Droplet Measurement Tech PAX – Black Carbon
- Dekati Mass Monitor (DMM 230A) – PM mass & number

# California Measurements

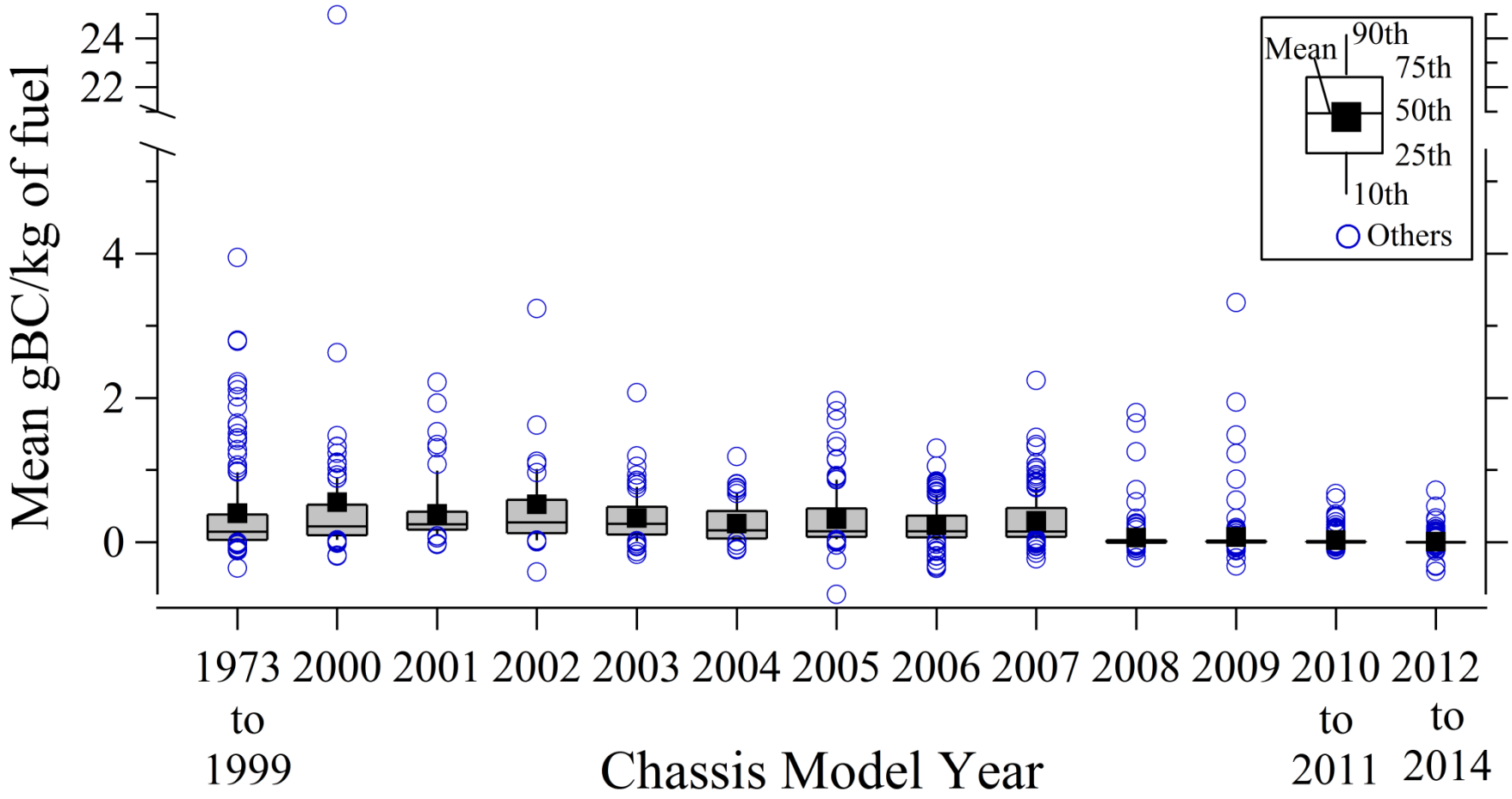
| | Port of Los Angeles | Cottonwood I-5 |
|---|---|---|
| Dates of Study | April 21-26, 2013 | May 6-10, 2013 |
| Records | 1,222 | 1,866 |
| Mean MY | 2009.1 | 2005.6 |
| Mean Speed 1<br>Mean Speed 2<br>(mph) | 4.8<br>5.8 | 9.8<br>10.5 |
| Mean Accel 1<br>Mean Accel 2<br>(mph/s) | 0.2<br>0.3 | 0.7<br>0.5 |
| Mean Exhaust Pipe Temp (°C) | 176 | 210 |

# Cottonwood PM (N=1824)



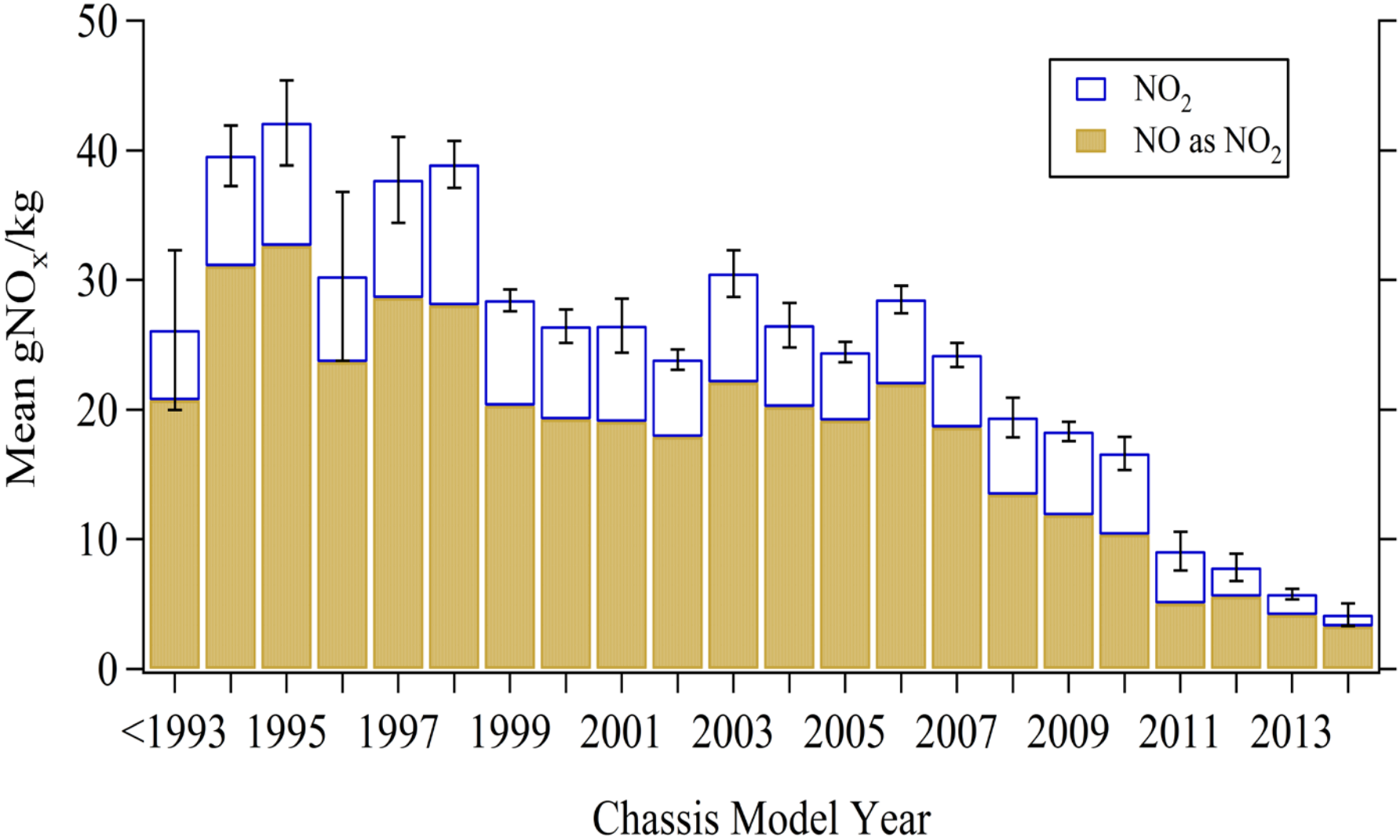

2010 PM Standard 0.01 g/bhp-hr = 0.07 g/kg assuming 0.15 kg of fuel/bhp-hr

# Cottonwood Black Carbon (N=1860)



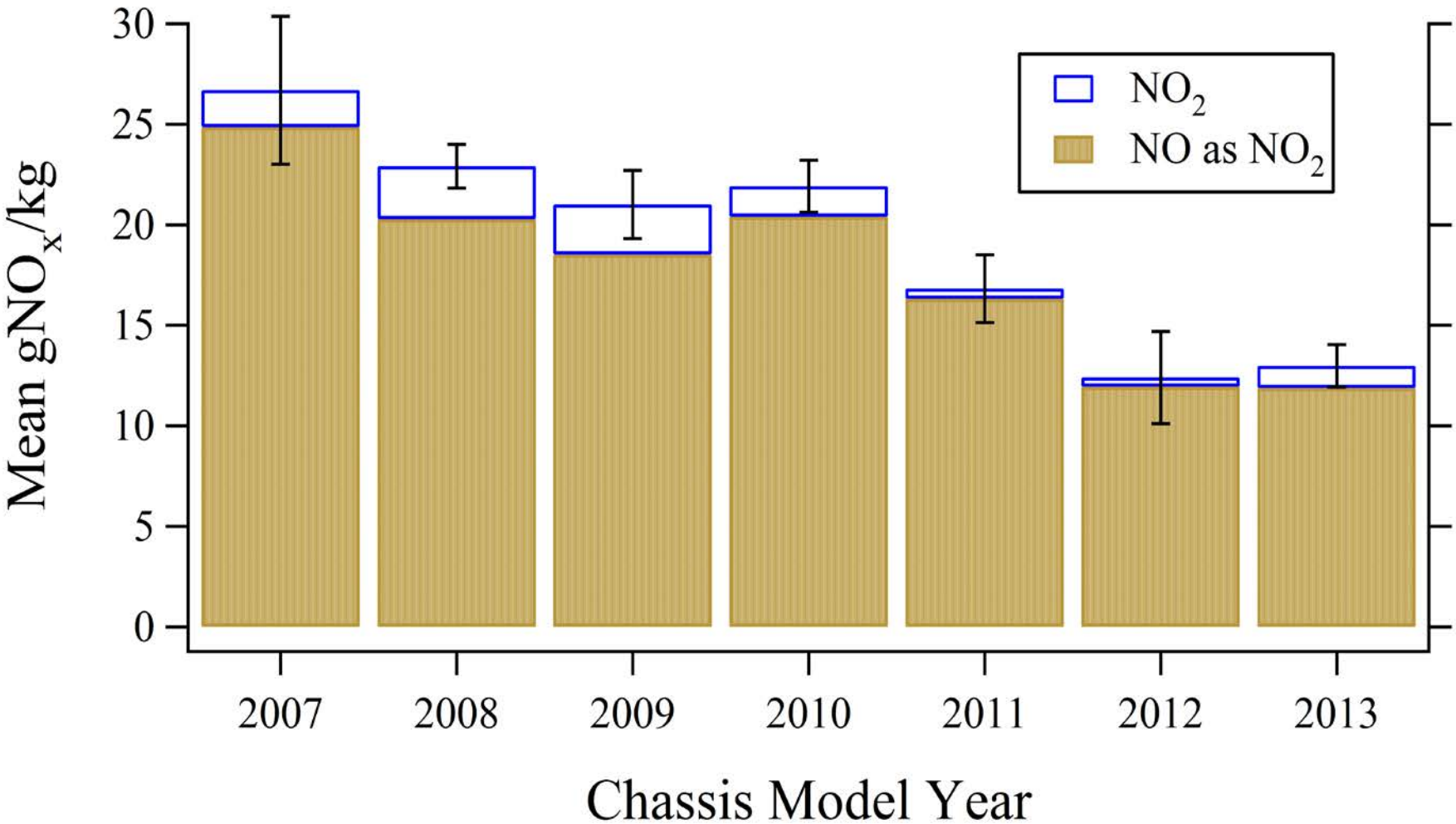

2010 PM Standard 0.01 g/bhp-hr = 0.07 g/kg assuming 0.15 kg of fuel/bhp-hr

# Cottonwood $NO_x$ (N=1835)



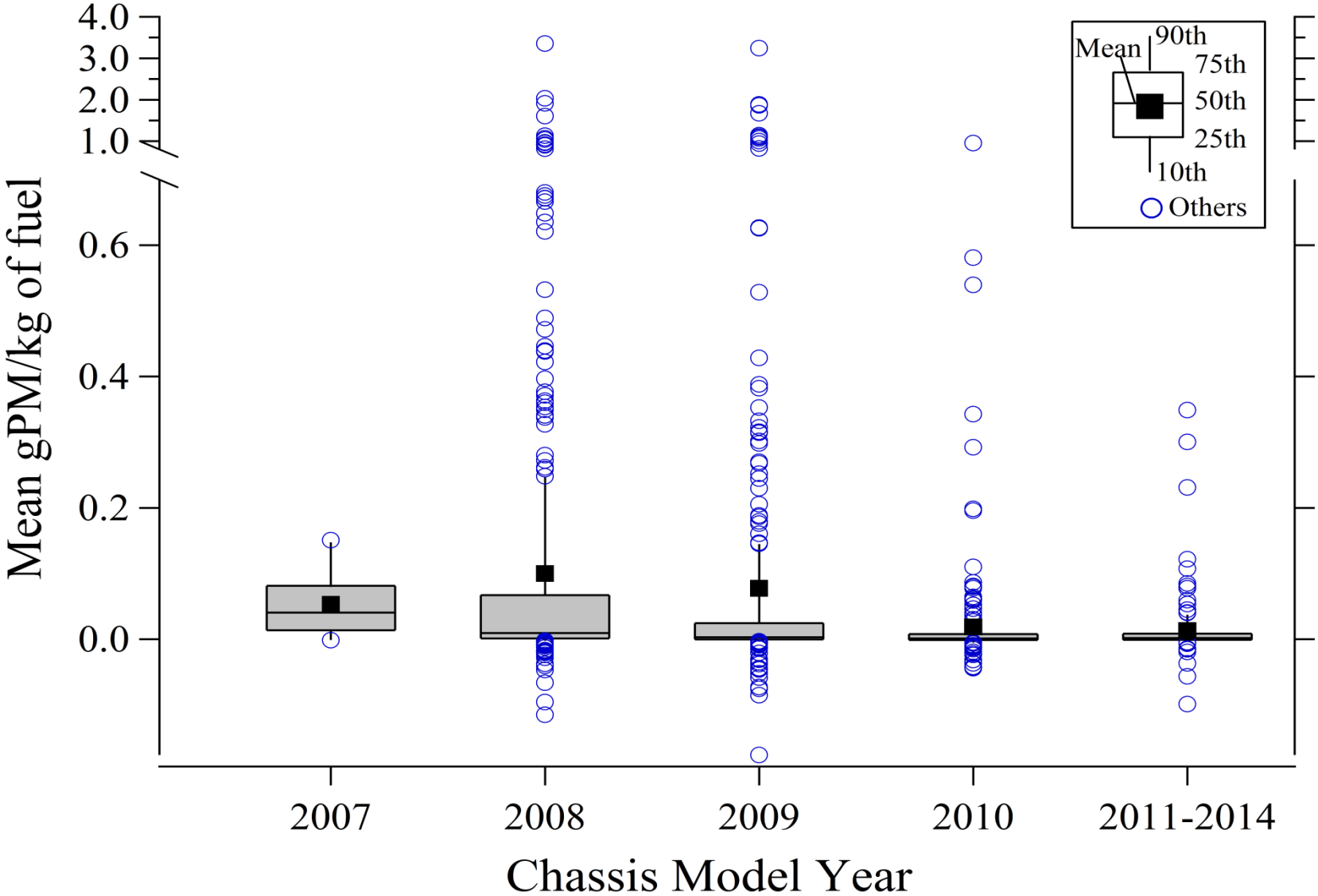

2010 $NO_x$ Standard 0.2 g/bhp-hr = 1.3 g/kg assuming 0.15 kg of fuel/bhp-hr

# Port $NO_x$ (N=1185)



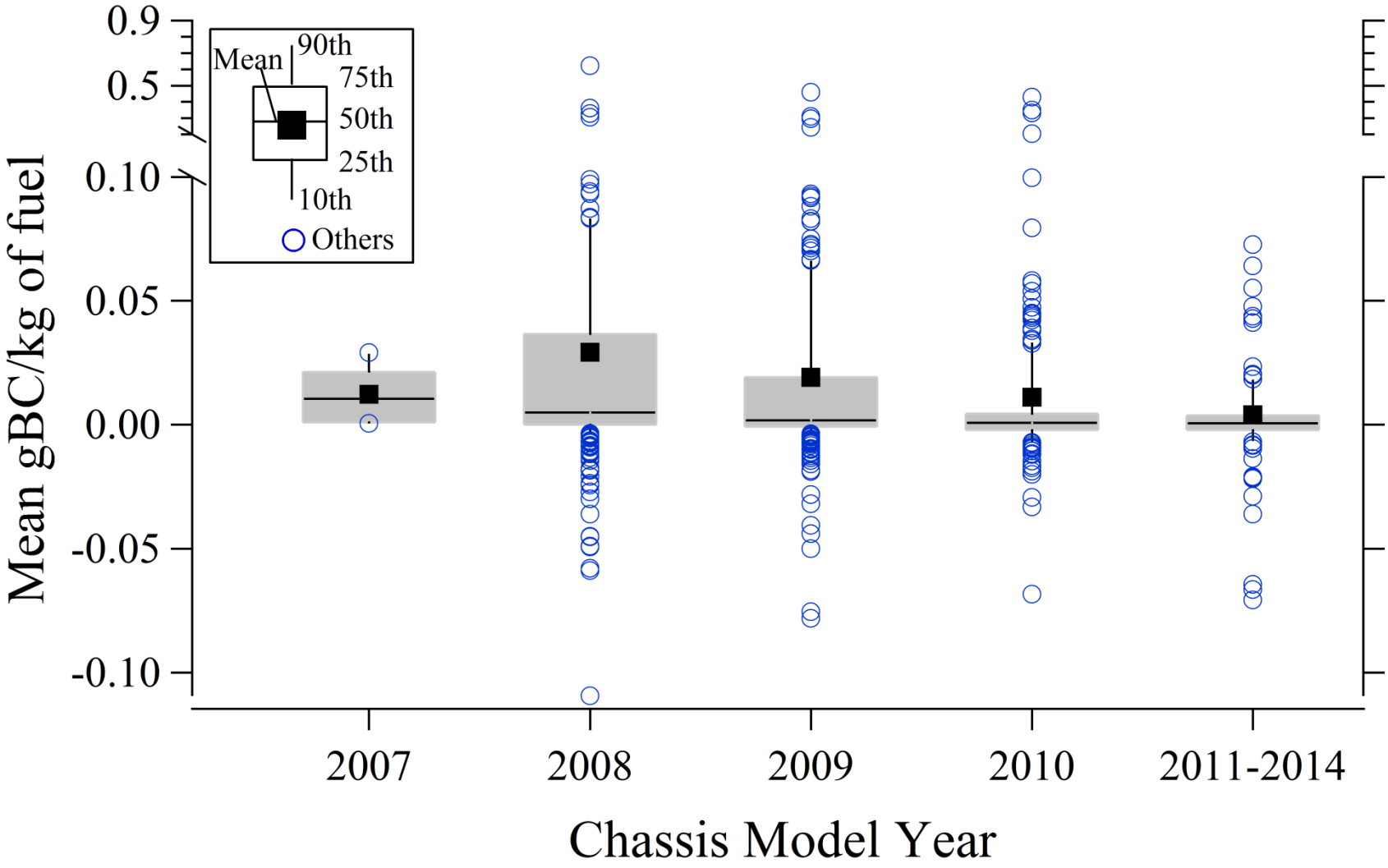

2010 $NO_x$ Standard 0.2 g/bhp-hr = 1.3 g/kg assuming 0.15 kg of fuel/bhp-hr

# Port PM (N=1215)




2010 PM Standard 0.01 g/bhp-hr = 0.07 g/kg assuming 0.15 kg of fuel/bhp-hr

# Port Black Carbon (N=1219)




2010 PM Standard 0.01 g/bhp-hr = 0.07 g/kg assuming 0.15 kg of fuel/bhp-hr

# Conclusion

- All readings for 2010 and newer for PM and BC are less than 3 times the standard emissions
- Top 1% of 2008-2009 HDDVs show elevated PM indicating potential DPF malfunctions
- $NO_x$ emissions continue to decrease though reductions are more limited at the Port due to low catalyst temperatures
- OHMS provides a means for rapid measurements of a large number of HDDVs
  - Ports
  - Weigh Stations
  - Border Crossing