

26th CRC On-Road Vehicle Emissions Workshop
Newport Beach, California
March 13 – 16, 2016

WHY SHOULD WE STILL CARE ABOUT LIGHT-DUTY HIGH EMITTING VEHICLES?

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Donald H. Stedman
has been selected to receive one of the
California Air Resources Board's 2015
Haagen-Smit Clean Air Awards!

Acknowledgments

California Air Resources Board
Contract 12-303

Coordinating Research Council
E-106

University of Denver



Measurements and Equipment

Site and

Measurement Dates

www.feat.biochem.du.edu

West Los Angeles

Southbound La Brea Blvd.
to Eastbound I-10

March 28 – April 3 2015
(22,125 records)

DU FEAT

Single Measurement Stdev

NDIR – CO₂

CO ± 4 g/kg

HC ± 4 g/kg

% Opacity ± 0.8%

UV – NO ± 0.4 g/kg

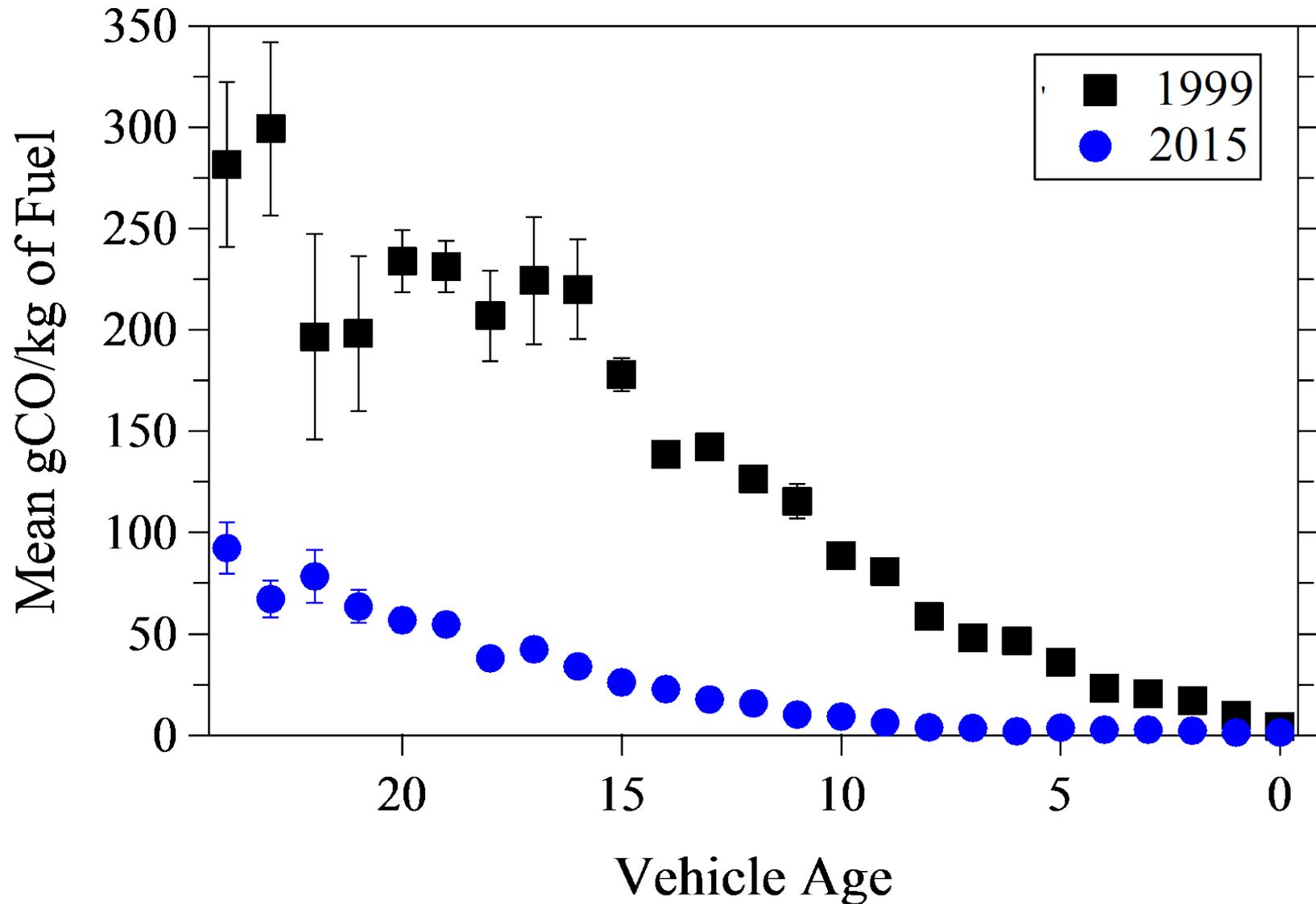
NO₂ ± 0.3 g/kg

NH₃ ± 0.02 g/kg

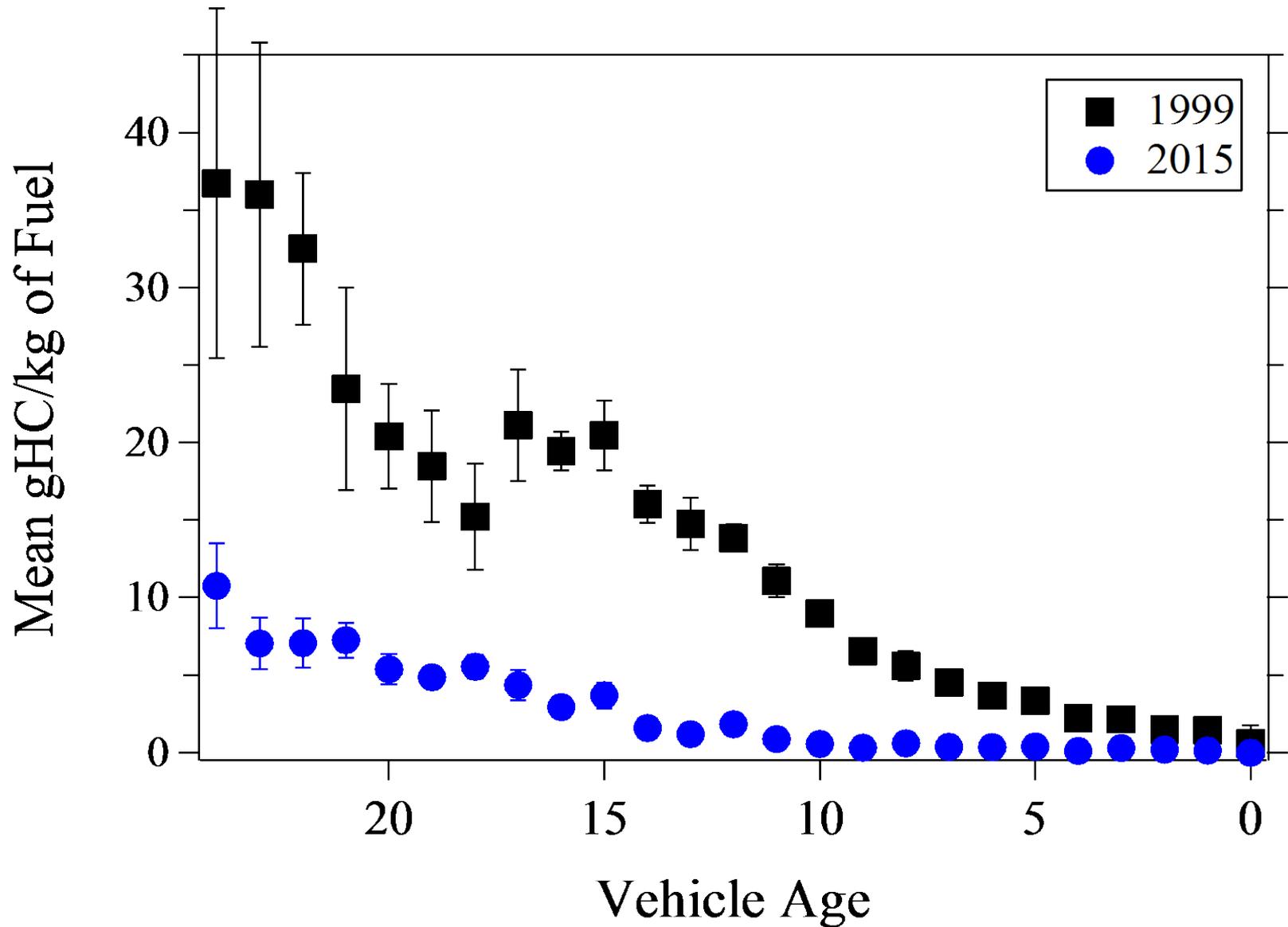
Speed and Acceleration

License Plate Photo

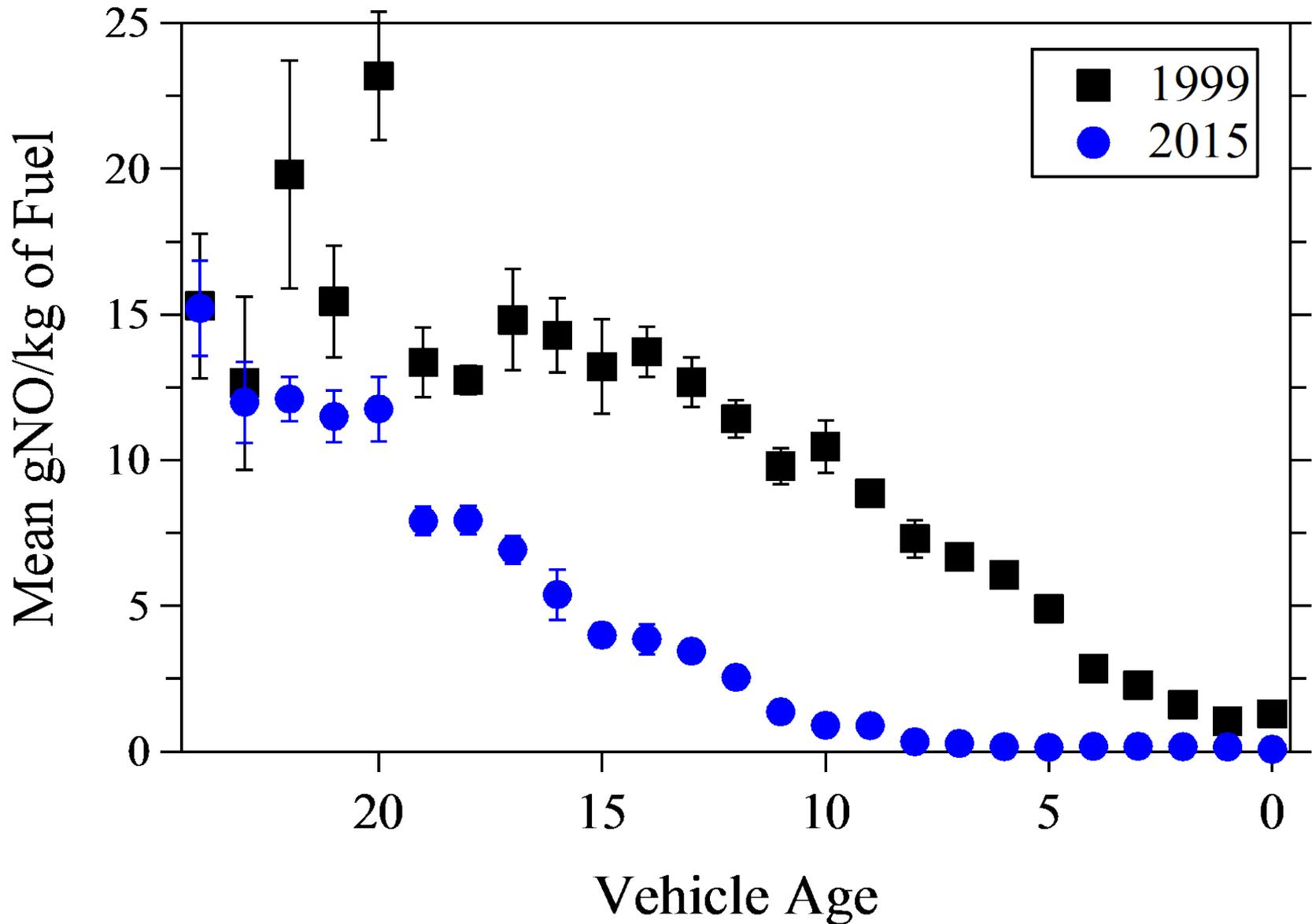
West Los Angeles CO Emission Comparison



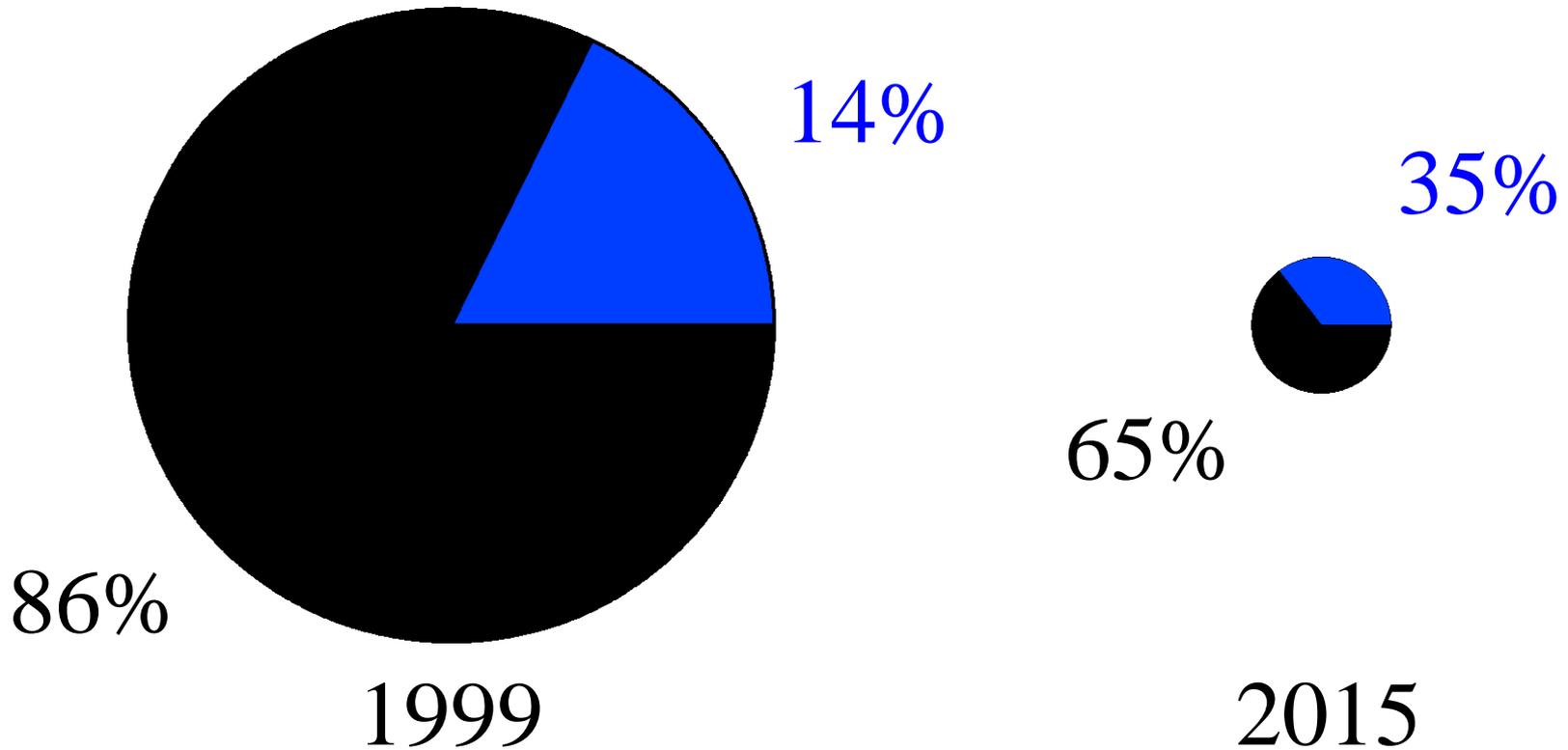
West Los Angeles HC Emission Comparison



West Los Angeles NO Emission Comparison

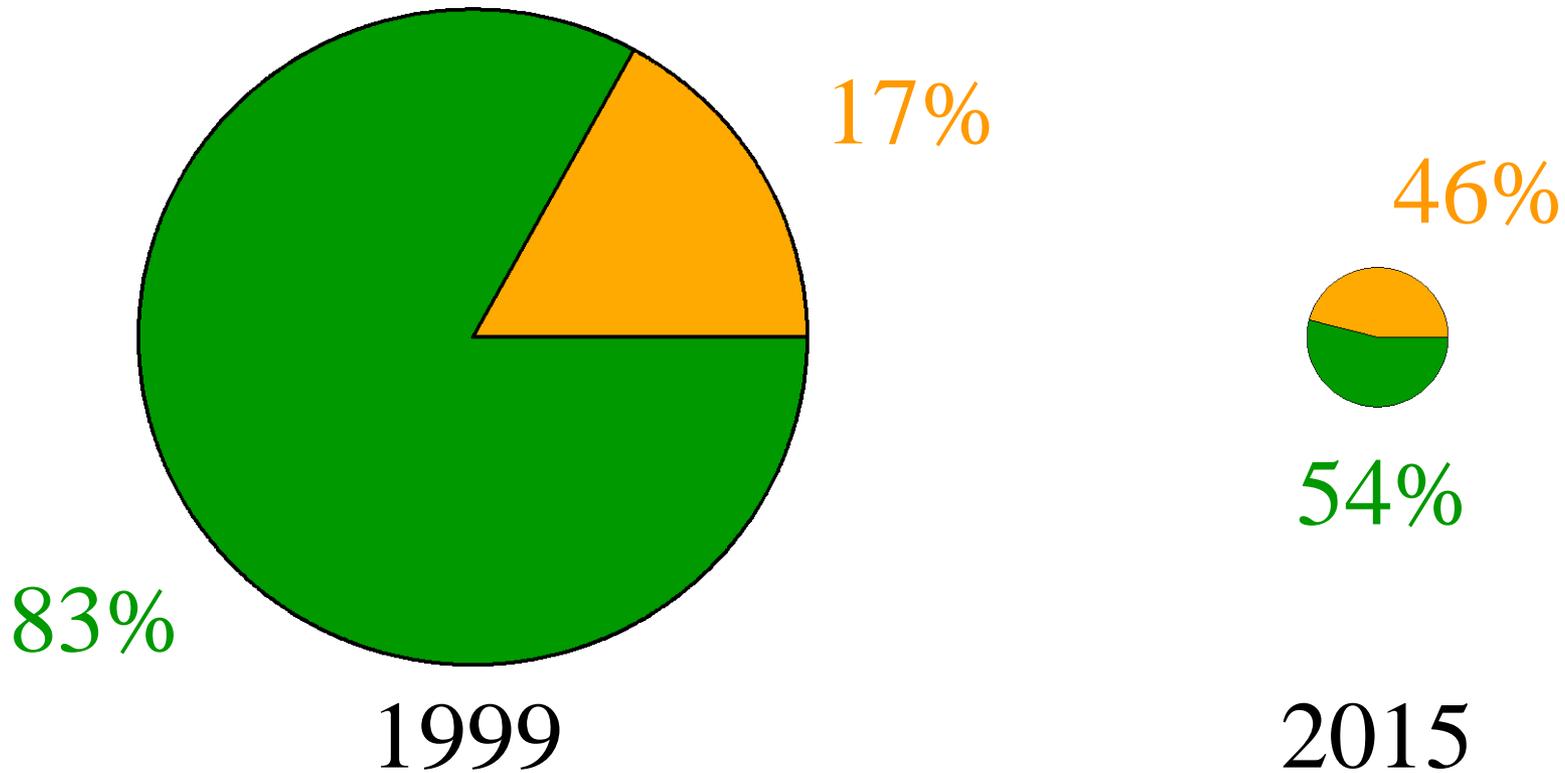


West Los Angeles Percentage of CO Contributed by the 99th Percentile



2015 99th Percentile Averaged
463 gCO/kg of fuel (3.9 %CO)

West Los Angeles Percentage of HC Contributed by the 99th Percentile



2015 99th Percentile Averaged
58 gHC/kg of fuel (1600ppm HC)

Does One Car Matter?



349 gHC/kg of fuel (~80 grams/mile)

CARB Almanac Emissions Projection For South Coast Air Basin

- 2015 Inventory Year
- On-road Mobile Sources
- South Coast Air Basin
- TOG – 116.7 tons/day / ROG – 106.7 tons/day

I'm going to call it 120 tons/day

www.arb.ca.gov/app/emsinv/2013/emssumcat.php

One Car

Measured Twice, Avg. 330 gHC/kg of Fuel

- 30 miles per day @ 10mpg = 3 gallons / day
- 3 gal/day x 0.75 kg / liter = 8.5 kg fuel / day
- 8.5 kg x 330 gHC/kg = 2800 grams HC / day
- 120 short tons = 108,960,000 grams HC /day
- One car accounts for 0.003% of SCAB HC
- This one car is only 0.00001% of SCAB fleet assuming 10,000,000 vehicles.

2015 West Los Angeles Fleet as Surrogate for the Basin Fleet

- 5 vehicles (7 readings) all above 300 gHC/kg
- 5/17,360 unique vehicles = 0.03% WLA Fleet
- 10,000,000 vehicles in the SCAB
- 0.03% = 3000 vehicles in the SCAB
- 120 short tons TOG / day
- 3000 vehicles contribute ~ 8 tons / day
- Or ~ 6.5% of the SCAB 2015 TOG / day

Recent Research

Atmospheric Environment 122 (2015) 686–695



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Contents lists available at ScienceDirect

Atmospheric Environment

journal homepage: www.elsevier.com/locate/atmosenv



Trends in selected ambient volatile organic compound (VOC) concentrations and a comparison to mobile source emission trends in California's South Coast Air Basin



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H I G H L I G H T S

- Annual concentrations of ambient VOCs decreased 40% from 1999 to 2009 in the SoCAB.
- LDGV tailpipe emission reductions were a major factor for VOC concentration decreases.
- Benzene concentration normalized ratios of ambient VOCs remained stable 1999–2009.
- Isooctane increases prove that LDGV emissions were main contributor to ambient VOCs.
- LDGV tailpipe emissions remained the dominant contributor to ambient VOCs in 2009.

- Tailpipe emissions dominant contributor to 2009 ambient VOC's
- EMFAC predicts evaporative emissions dominant contributor

Conclusions

- Yes we still believe High Emitters matter, especially for HC, and they matter more and more with each passing day!
- There is disagreement over the source (tailpipe or evaporative) and amount of HC emissions in the South Coast Air Basin
- The impact of increasingly skewed emission distributions may be one reconciling factor
- HC reductions will always reduce ozone