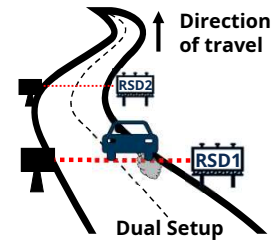


# Do two Remote Sensing instruments measure the same? Or, how varied are car emissions?

Likhitha Potturu & Jens Borken-Kleefeld

## One vehicle passing two Remote Sensing devices in a row

- Remote Sensing devices measure pollutant concentrations in the exhaust plume of passing vehicles
- Two devices measure consecutive emissions from the same vehicle
- How varied are vehicle emissions within a short distance?**

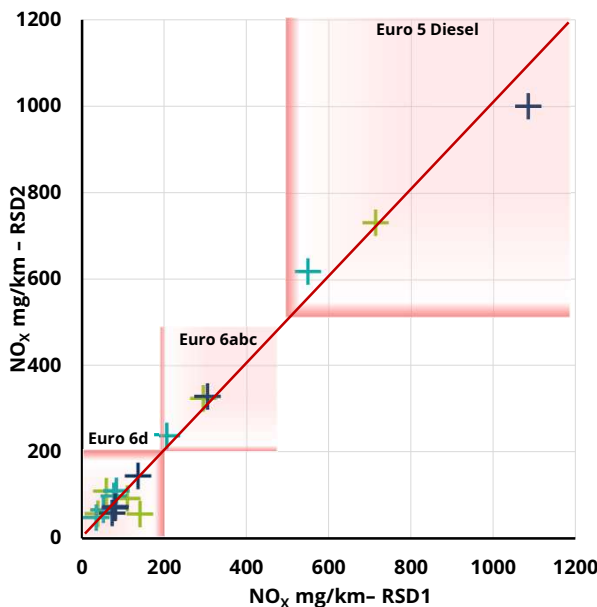


## Data sources & Preparation

- Focus on gasoline and diesel cars with emission standards Euro 5, Euro 6abc and Euro 6d
- For each car, two emission measurements from consecutive setups in Berlin, Frankfurt (D), Prague (CZ)
- $\text{NO}_x$  emission value pairs only correlated when engine load within 2 kW/ton, and both below 23 kW/ton  
⇒ Reduce influence of vehicle dynamics for each car analyzed

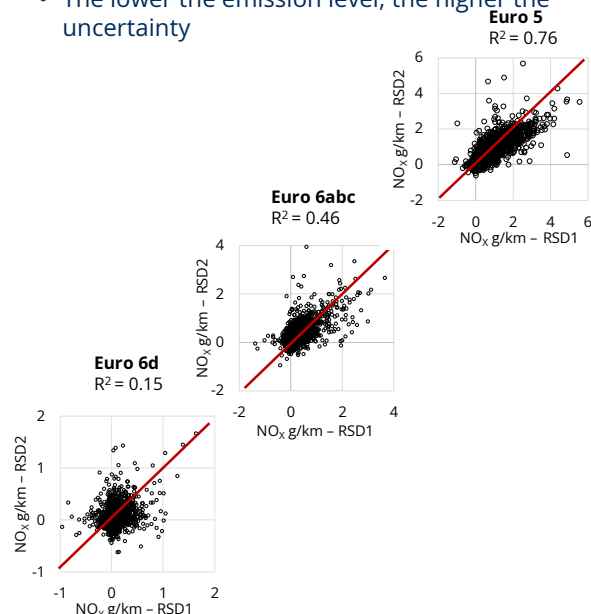
## Correlation on average

- Same emission level per Euro class**  
⇒ **averaged over thousands of vehicles** ( $R^2 = 0.99$ )



## Correlation for individual vehicles

- Instantaneous emissions variable over short driving distance
- The lower the emission level, the higher the uncertainty



## Conclusions

- Emissions per class (=averaged over hundreds of records) are consistent across devices and campaigns
- Emissions for individual cars are highly variable. A vehicle emission factor needs many single records



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