INTRODUCTION TO SEMS

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9th UCR PEMS Conference and Workshop

March, 2019

HORIBA

Introduction to SEMS

Agenda

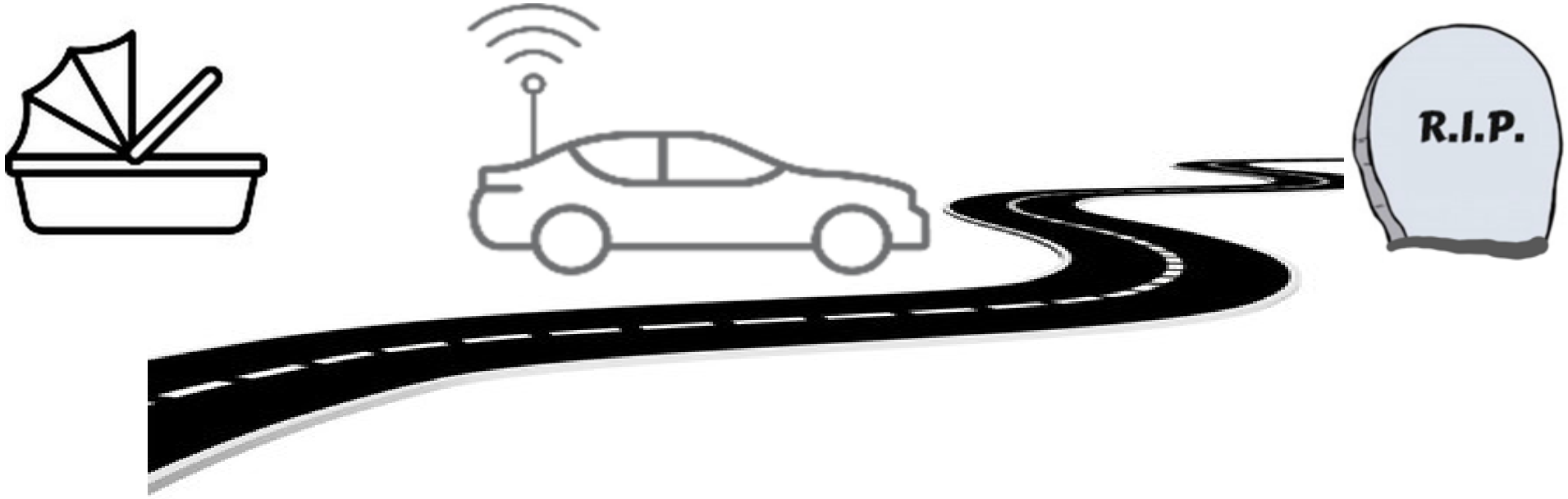
- Purpose
- History & Cooperation
- Hardware
- Services
- Comparisons
- Summary

PURPOSE

SEMS: Purpose

Realize of Craddle to Grave Capability

From the first trip…	over the entire life…	until the last trip



SEMS: Purpose

Additional Real World Emission Data

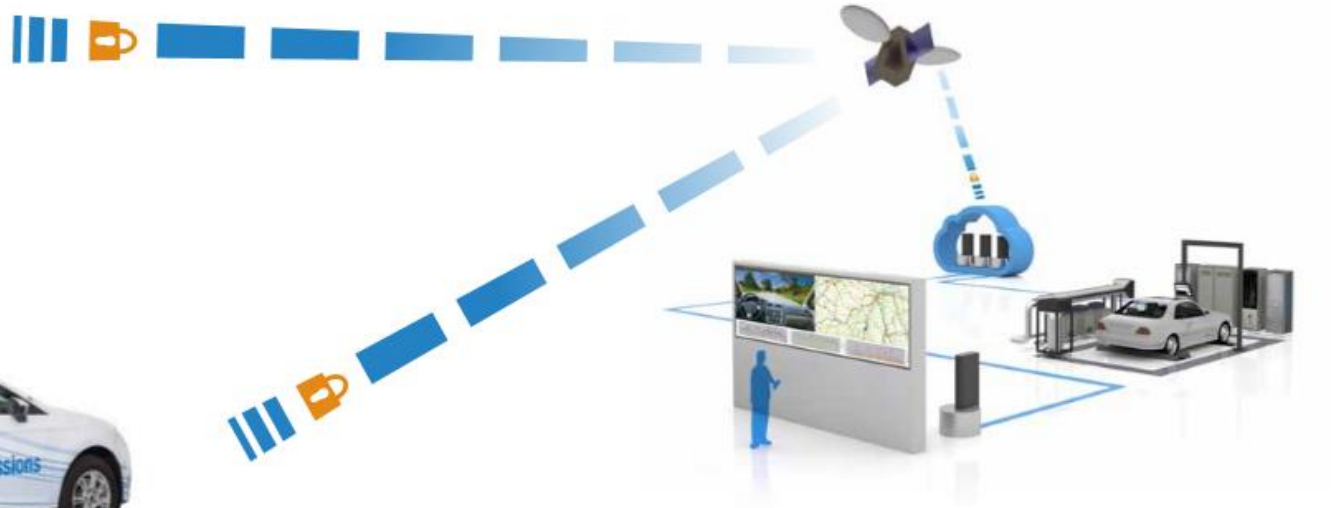
Real World Measurement

SEMS
Smart Emissions Measurement System

OBS-ONE
On-Board Emissions Measurement System

Lab Management

STARS ENTERPRISE
The Next Generation Enterprise Lab Management

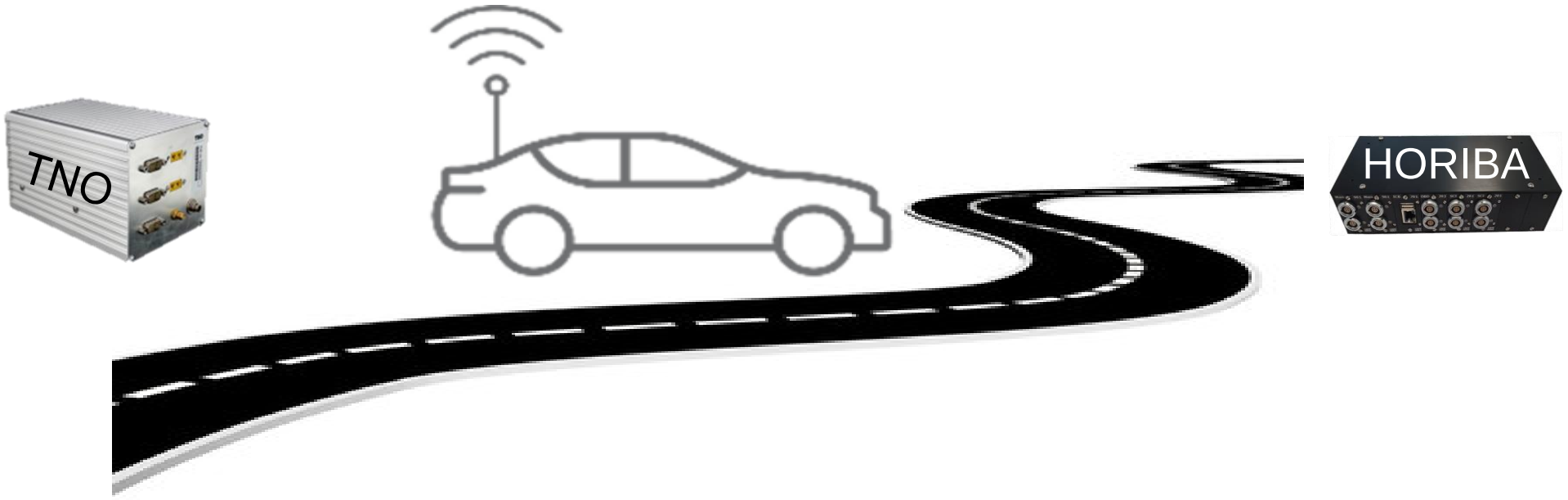


HISTORY AND COOPERATION

HORIBA

SEMS: History and Cooperation

2012	2018 cooperation	Future

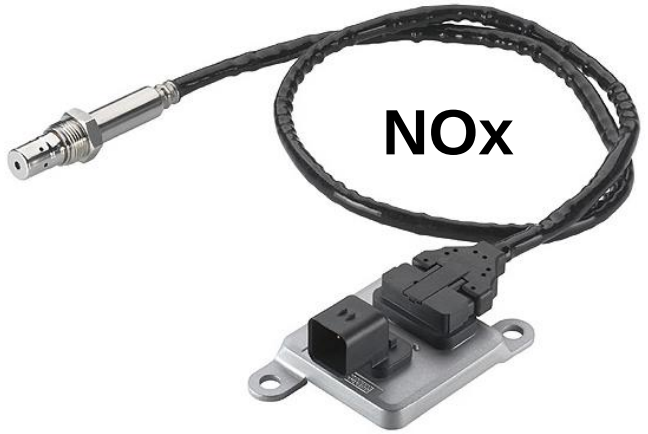


HARDWARE

HORIBA

SEMS: Hardware Integration

Commercially Available Industrial and Automotive Hardware Components



Thermocouple

SEMS: Hardware Integration

Sensors

Tailpipe Extention

PEMS Method

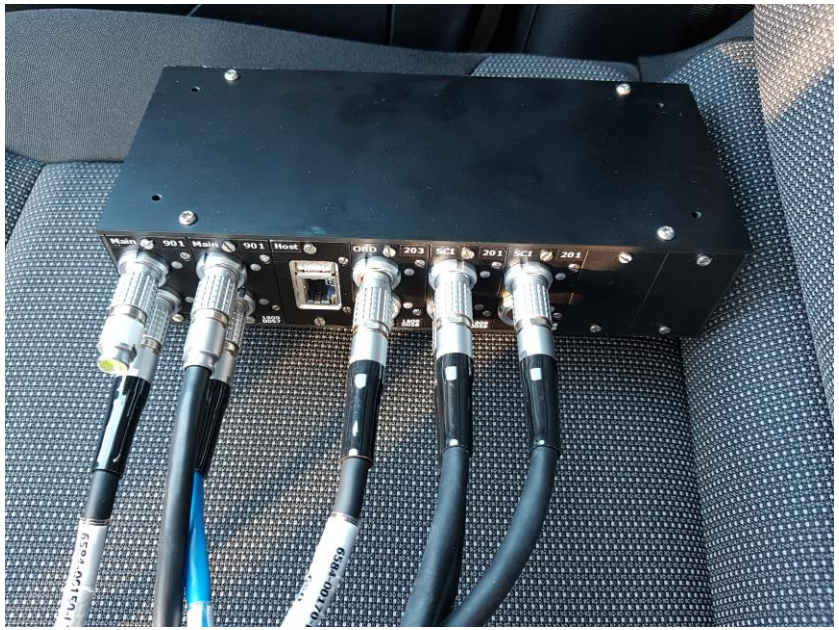
Integrated on Vehicle

Preferred Solution

SEMS: Hardware Integration

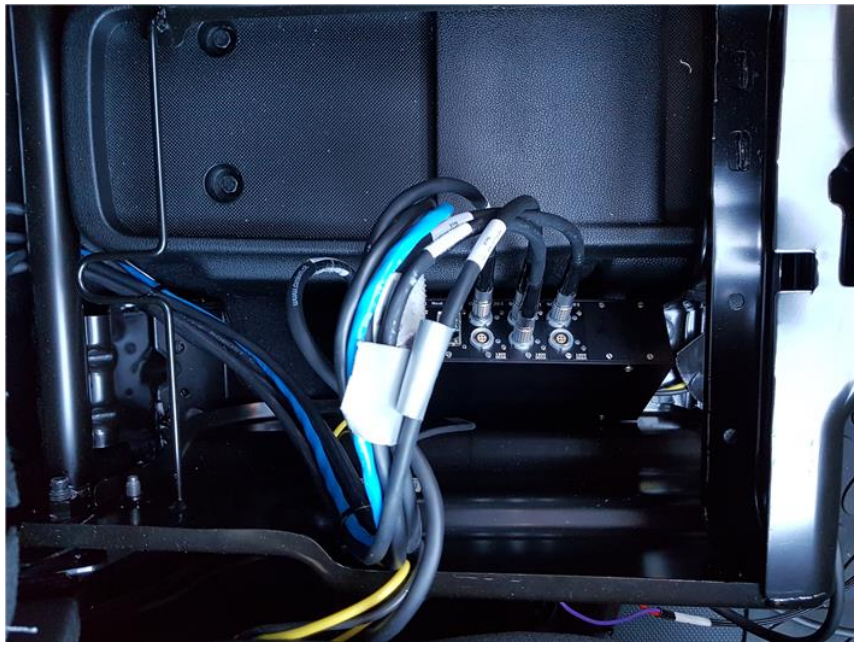
Datalogger and Mobile Device

Quick Installation



Short Test Durations

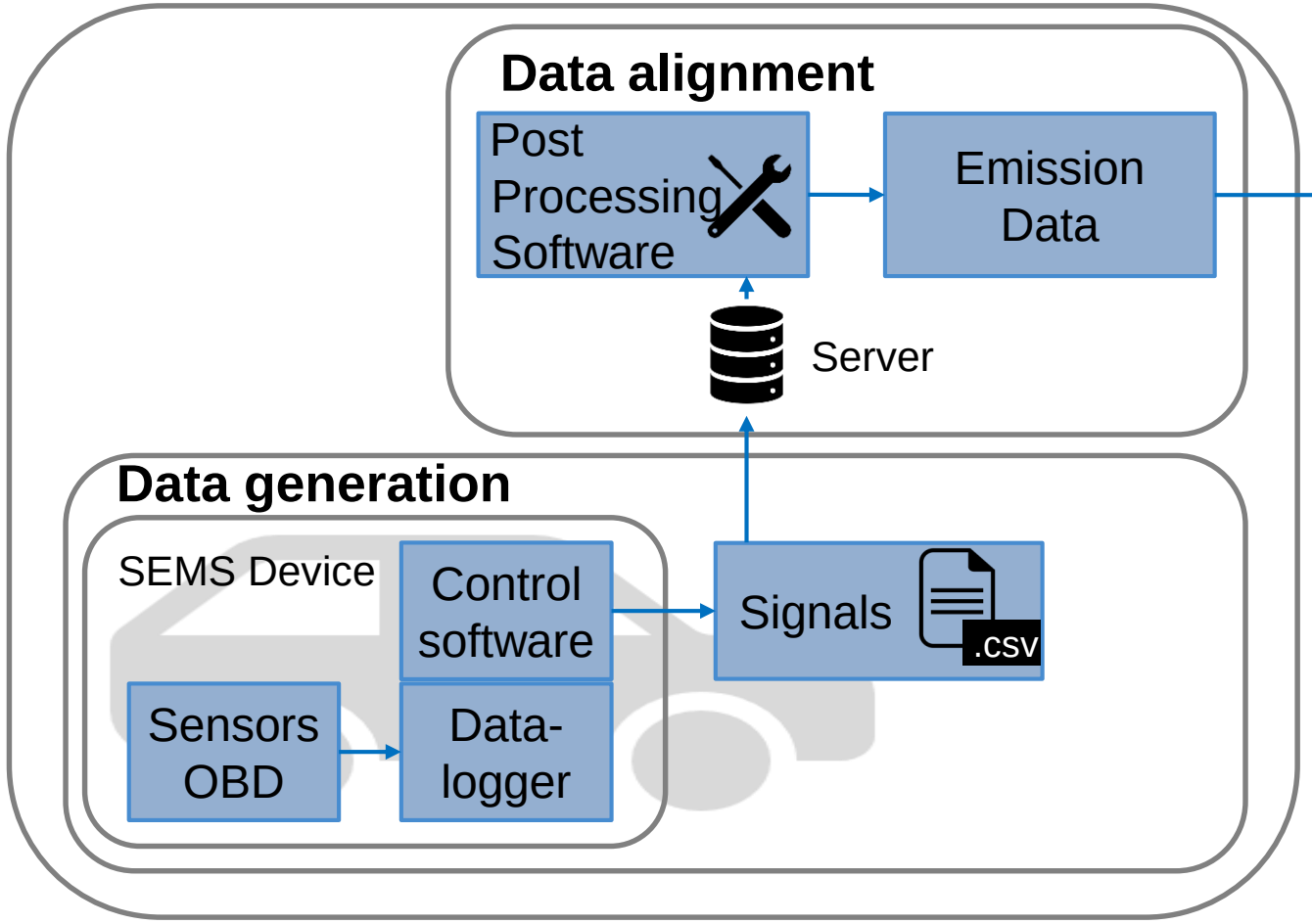
Integrated Installation



Long Test Durations

SEMS: Structure

Basic Assemblies



SEMS Services – **„The product“**

Emission data

- Emission

.CSV

Data analysis

- Graphical representation
- Database generation
- Analysis

Data related consulting

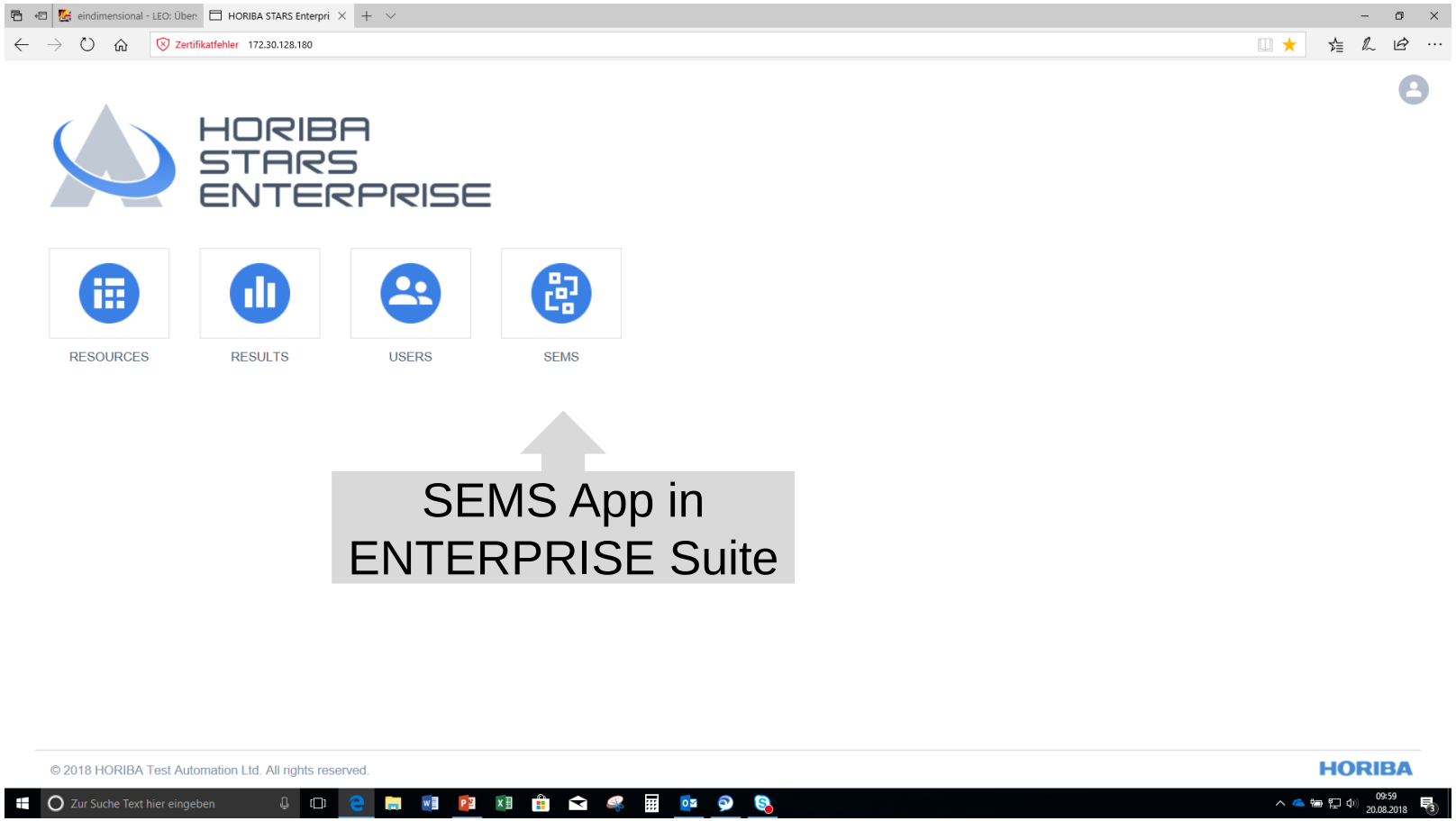
- Strategic
- Technical
- Business

APPLICATION AND SERVICES

HORIBA

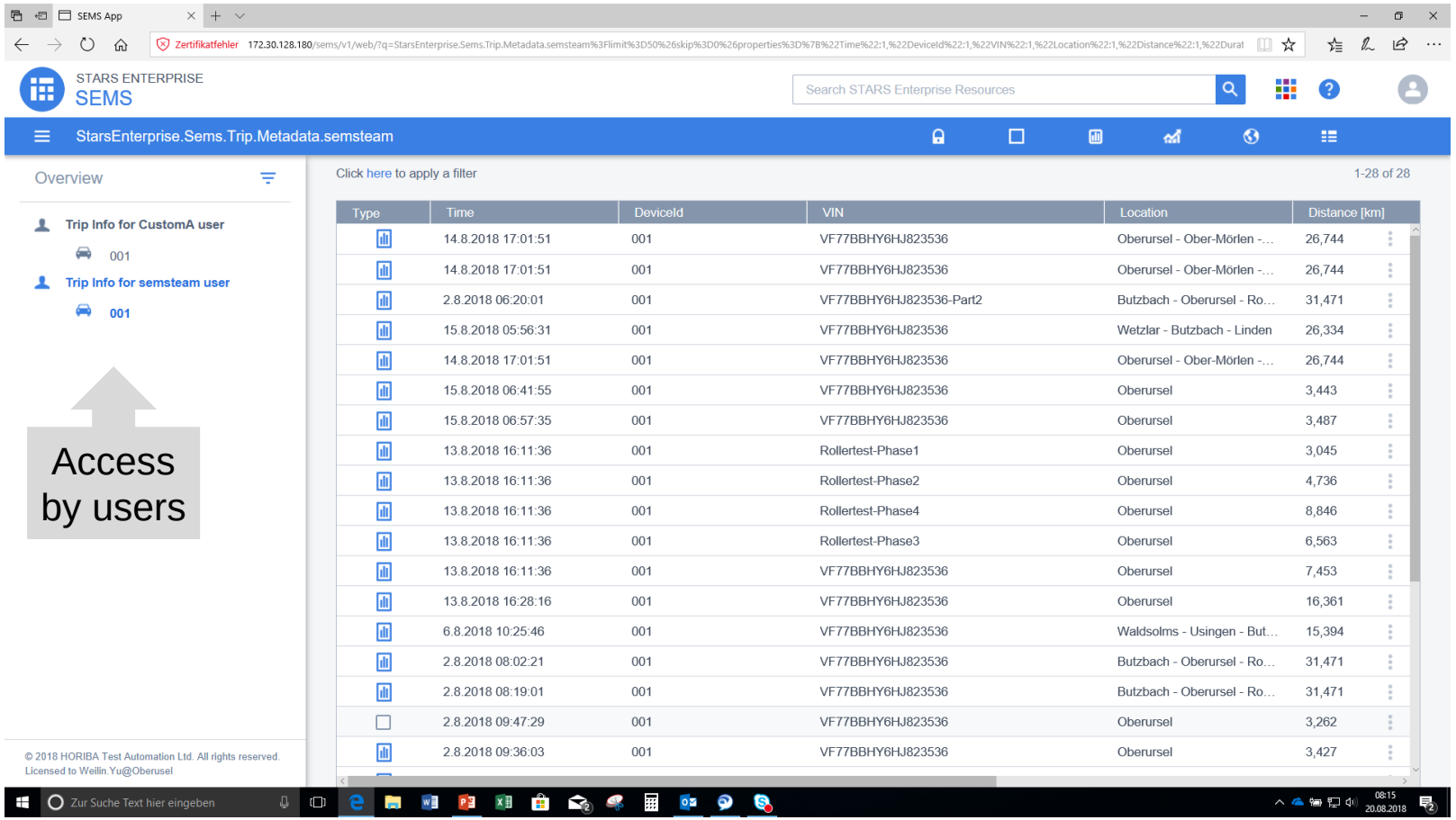
SEMS: Application and Services

SEMS Application Available on the STARS ENTERPRISE Platform



SEMS: Application and Services

Test Data Files in a Global Database

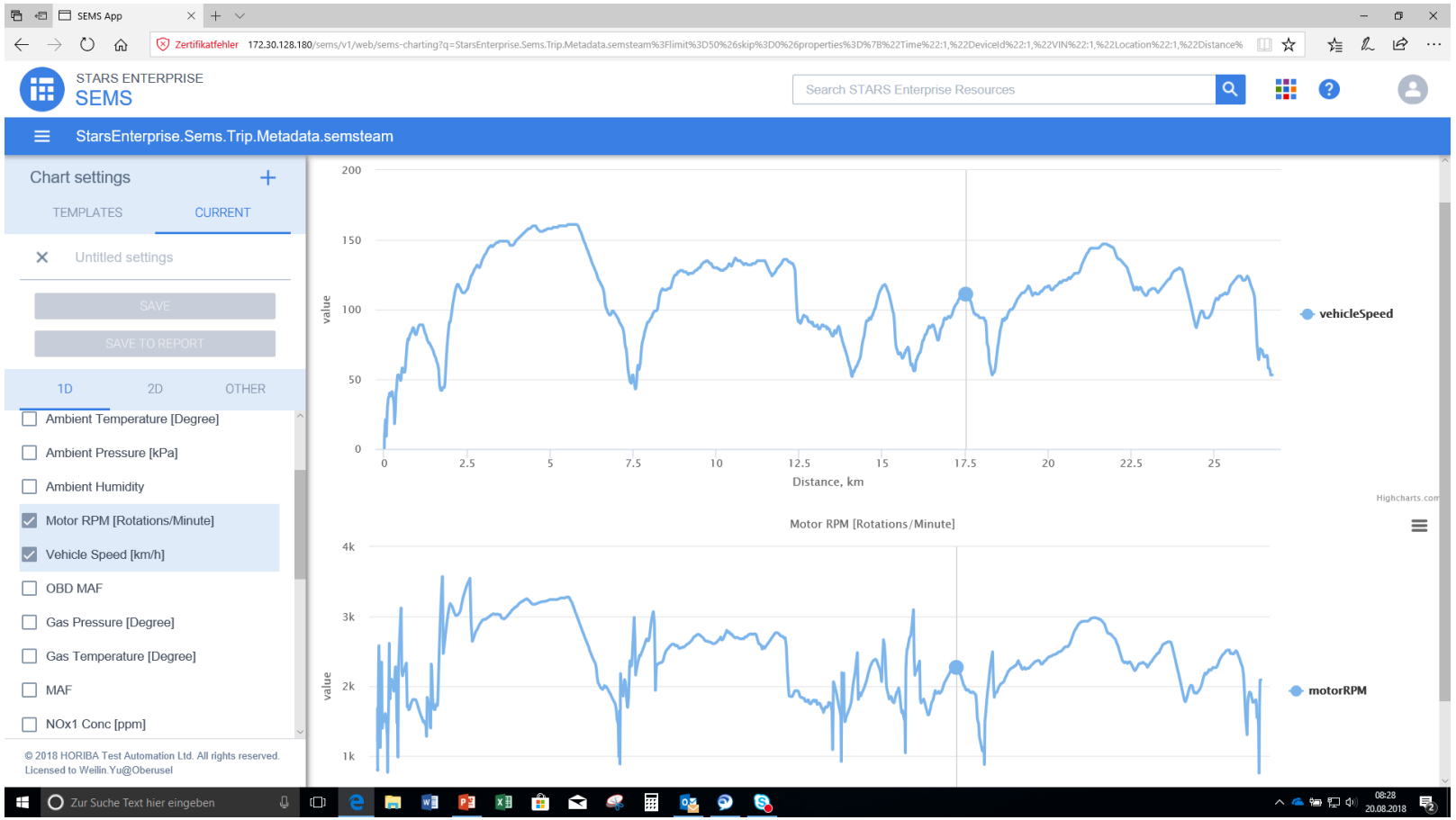


Access by users

All data files collected globally

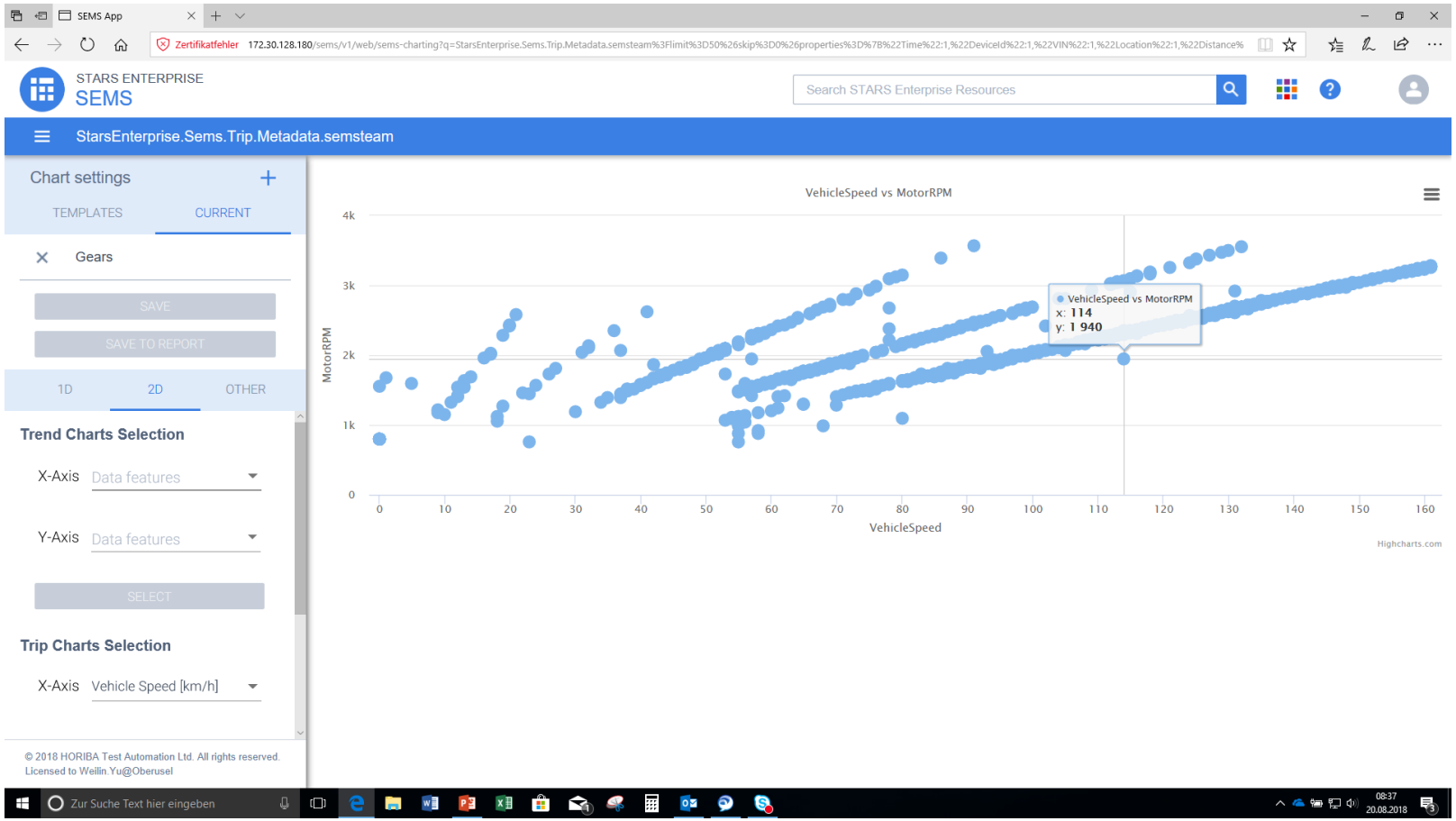
SEMS: Application and Services

One Dimensional Charts



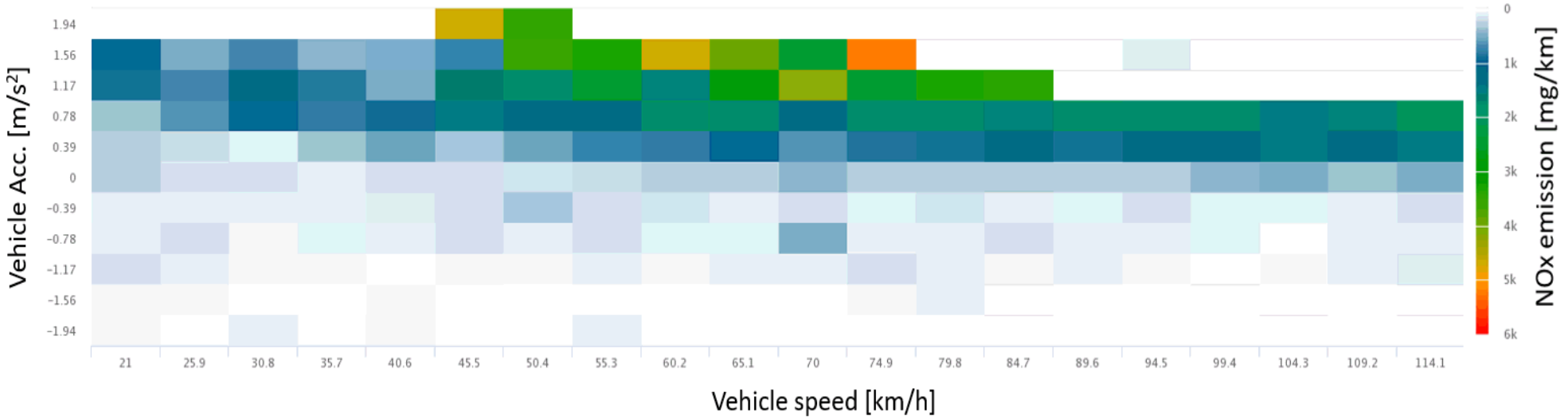
SEMS: Application and Services

Two Dimensional Charts



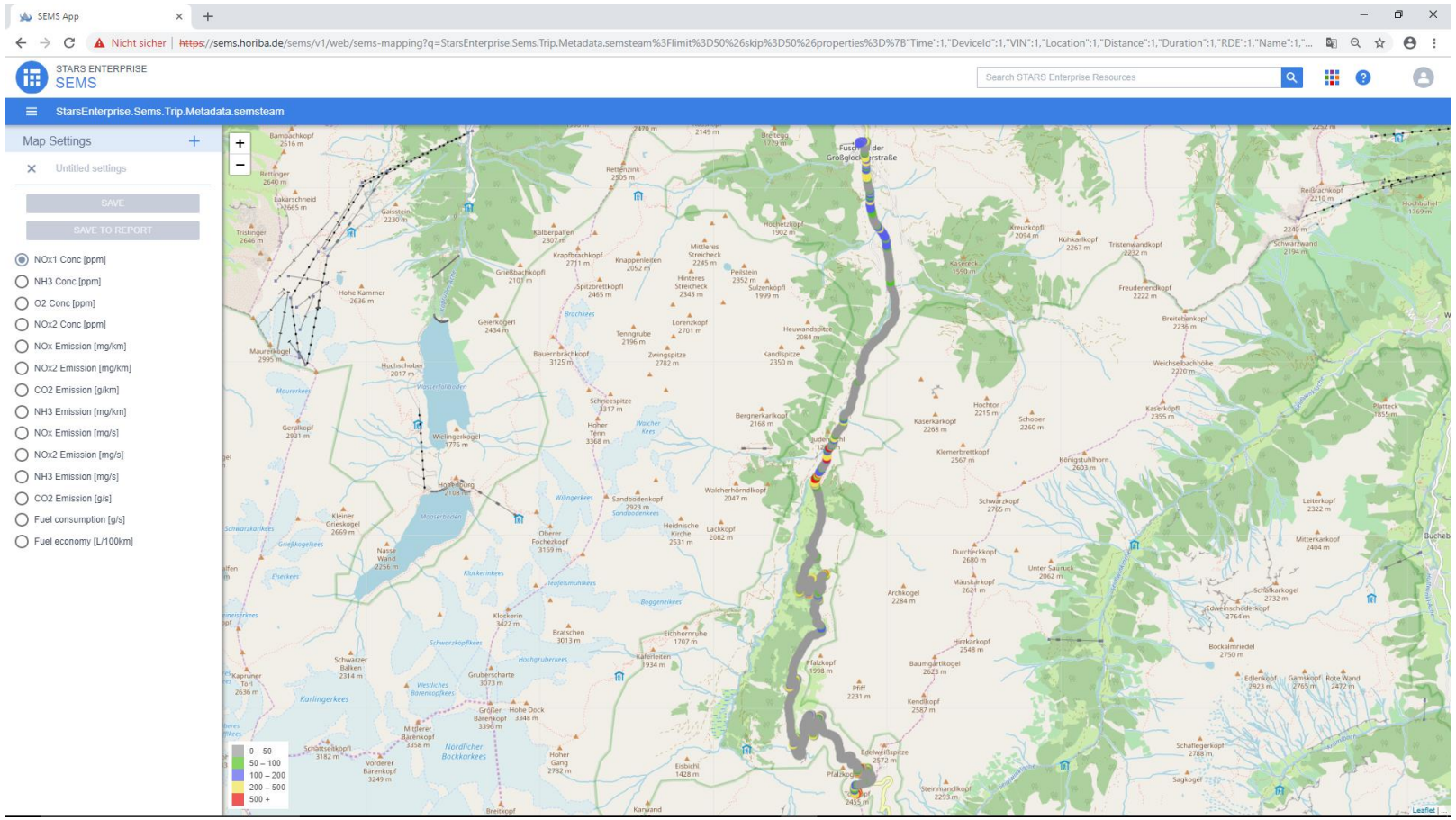
SEMS: Application and Services

Three Dimensional Chart



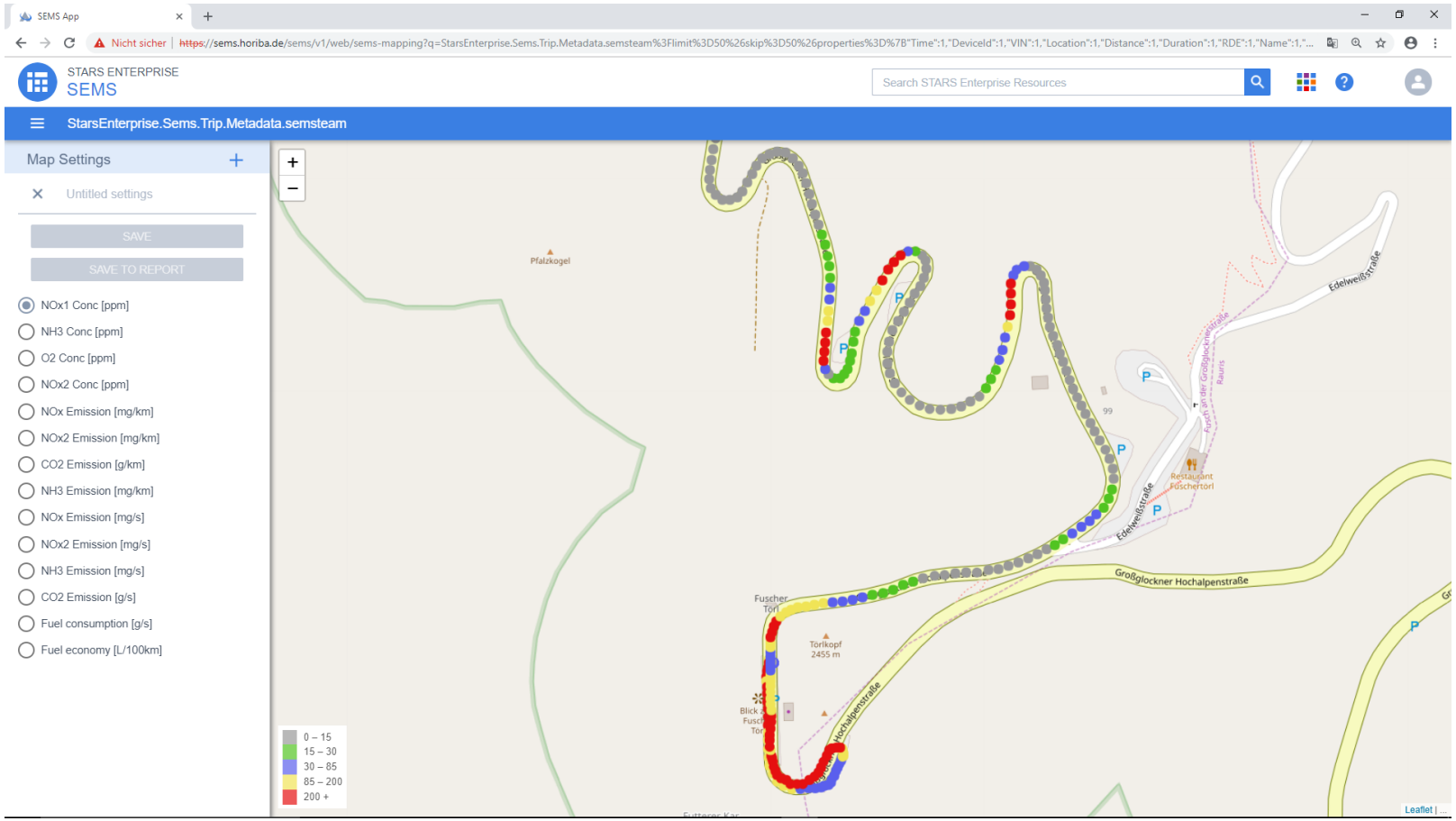
SEMS: Application and Services

Individual Trip Maps



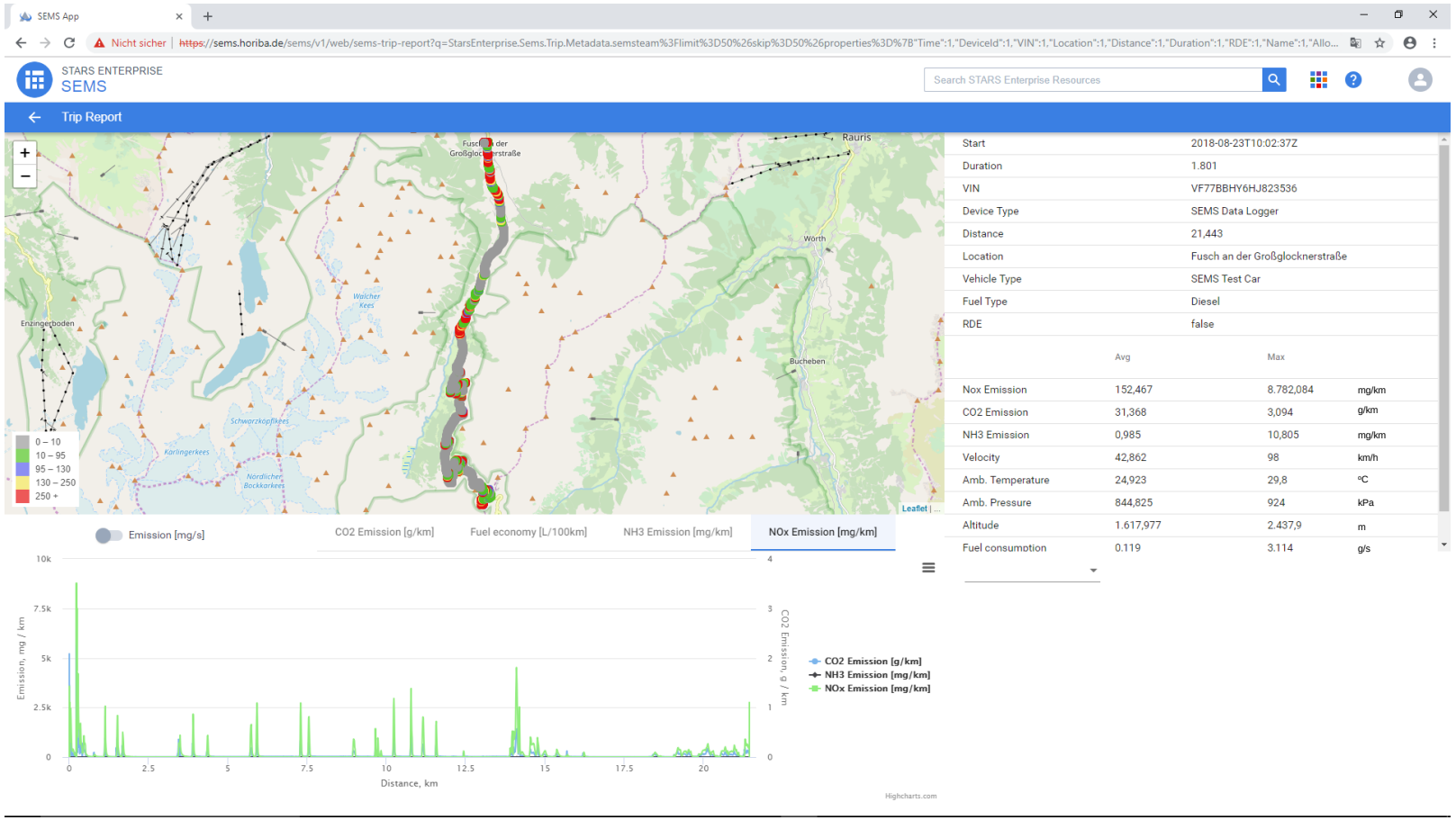
SEMS: Application and Services

Zoom and Resolution Feature on Trip Maps



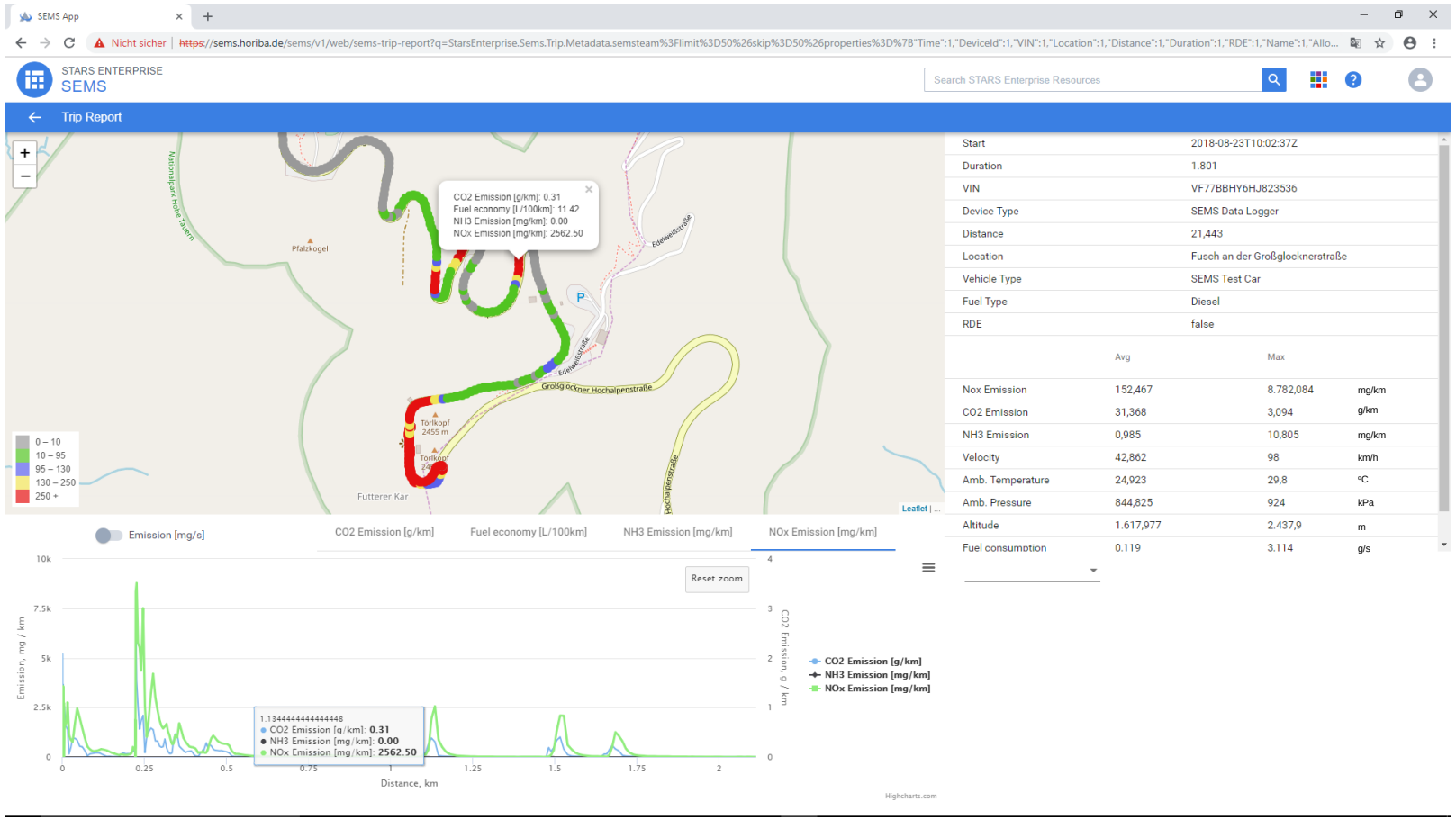
SEMS: Application and Services

Trip Report



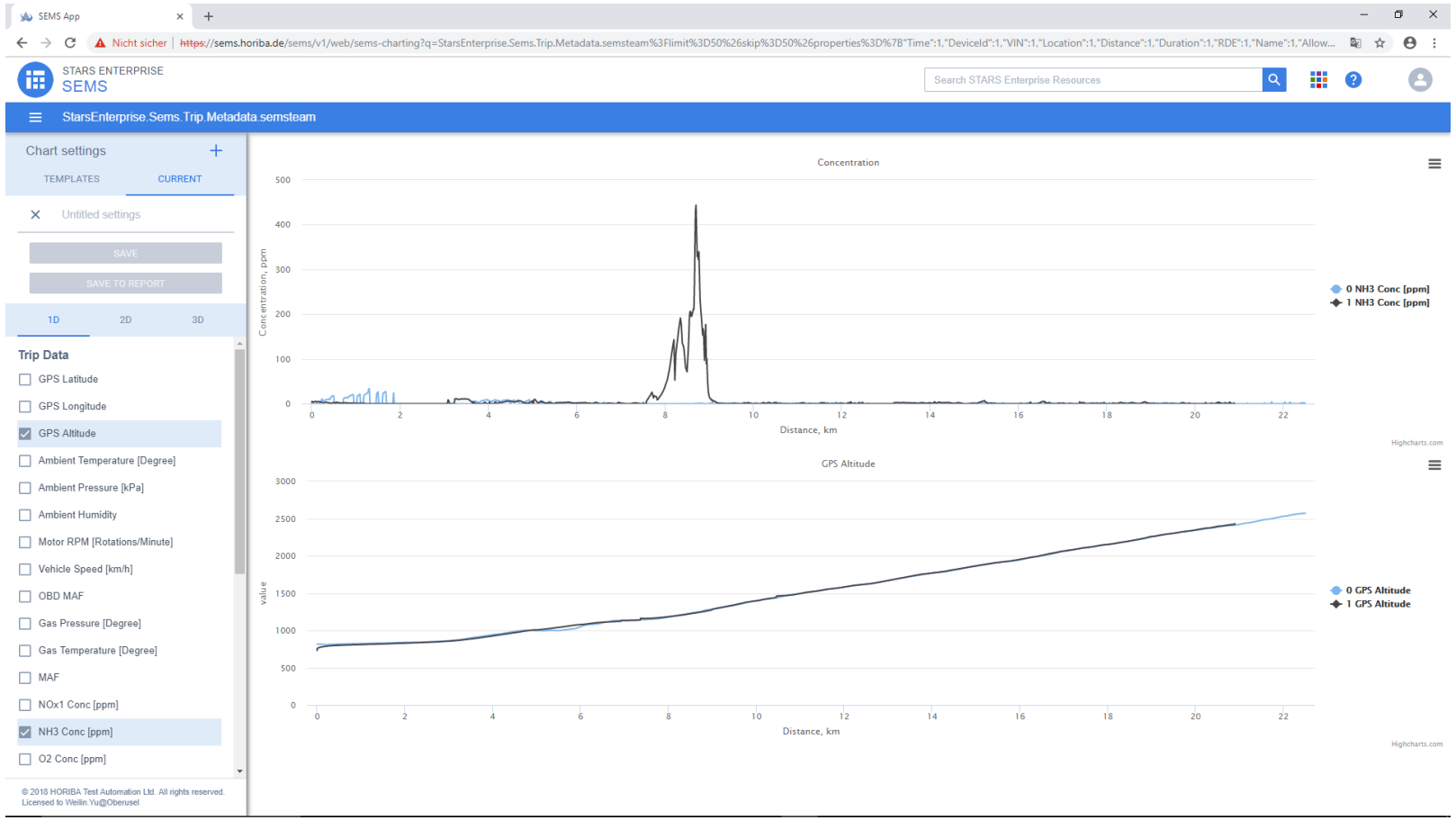
SEMS: Application and Services

Trip Report Zoom and Synchronization



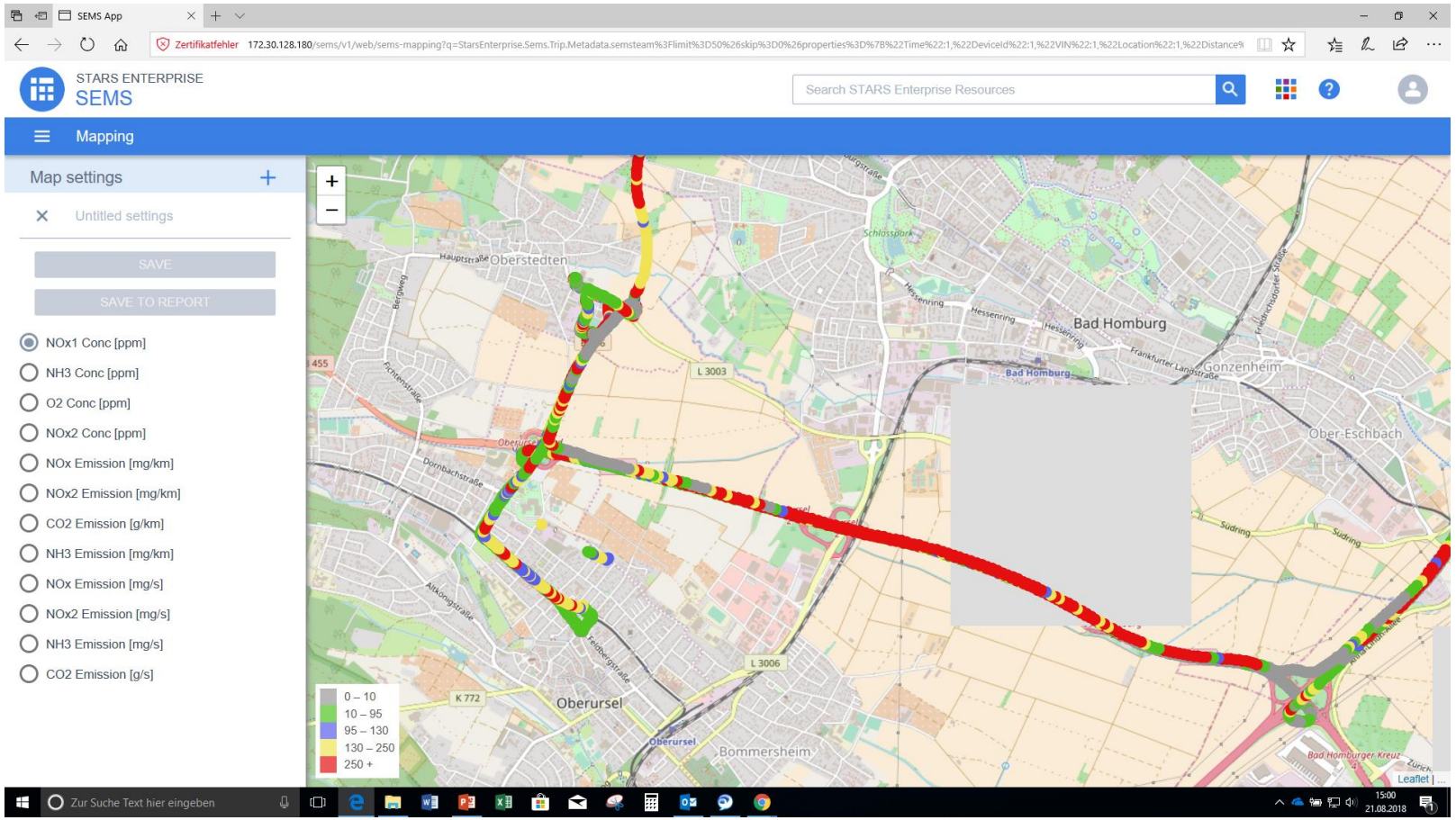
SEMS: Application and Services

Multiple Trip Summary



SEMS: Application and Services

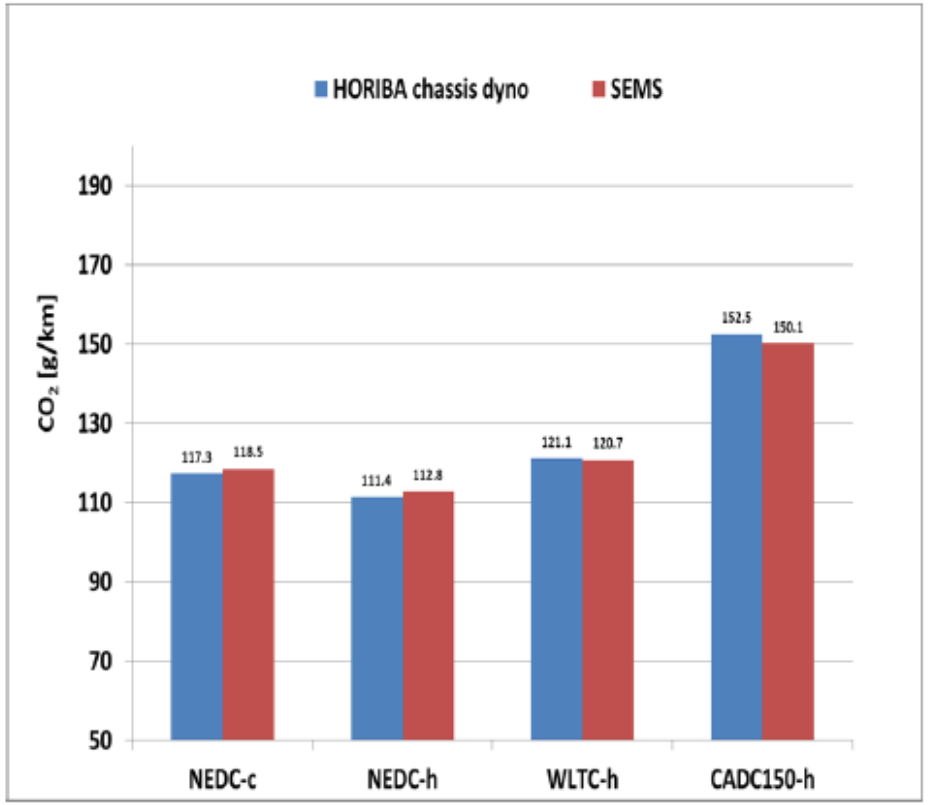
Multiple Trip Mapping



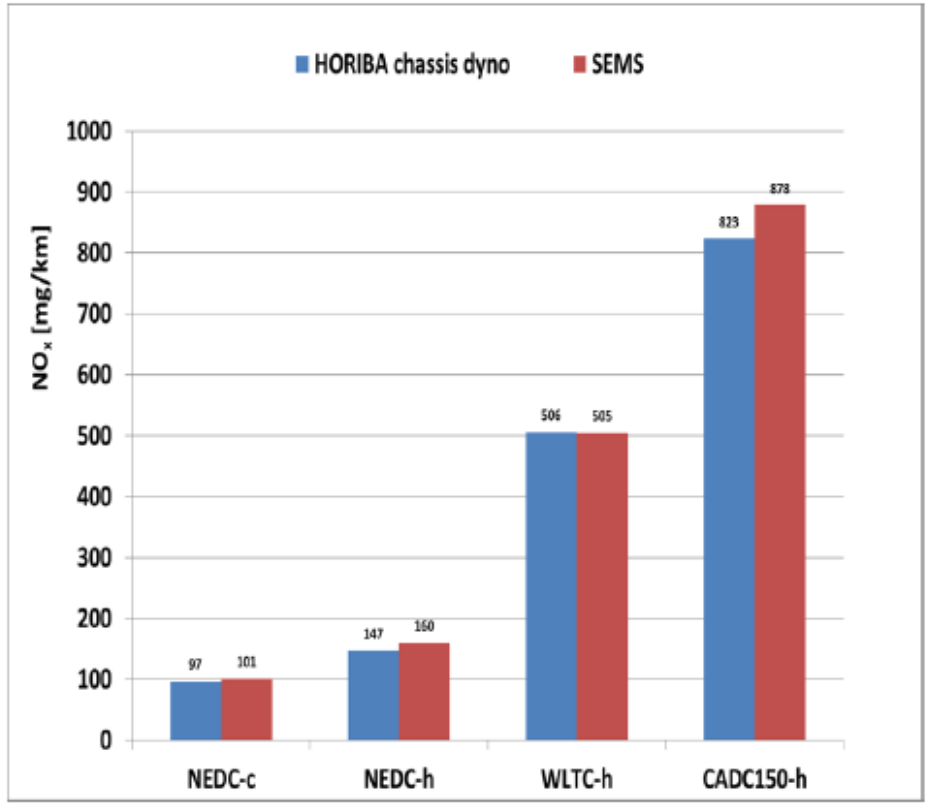
COMPARISONS

SEMS: Comparison

Measurement Accuracy



CO_2 Deviation: – 1.6 to 1.3%



No_x Deviation: – 0.1 to 8.8%

SEMS: Comparison

WLTC 3 - Separated into 4 speed cycles

	NOx [mg/km]	CO2 [g/km]	Fuel Economy [l/100km]
WLTC Low-Speed	387.1	181.8	6.9
SEMS Low-Speed	370.5	188.3	6.8
WLTC Medium-Speed	149.9	138.6	5.2
SEMS Medium-Speed	137.6	142.8	5.2
WLTC High-Speed	188.0	134.8	5.1
SEMS High-Speed	176.6	134.3	4.9
WLTC Extra-High-Speed	539.4	182	6.9
SEMS Extra-High-Speed	533.0	182.2	6.6

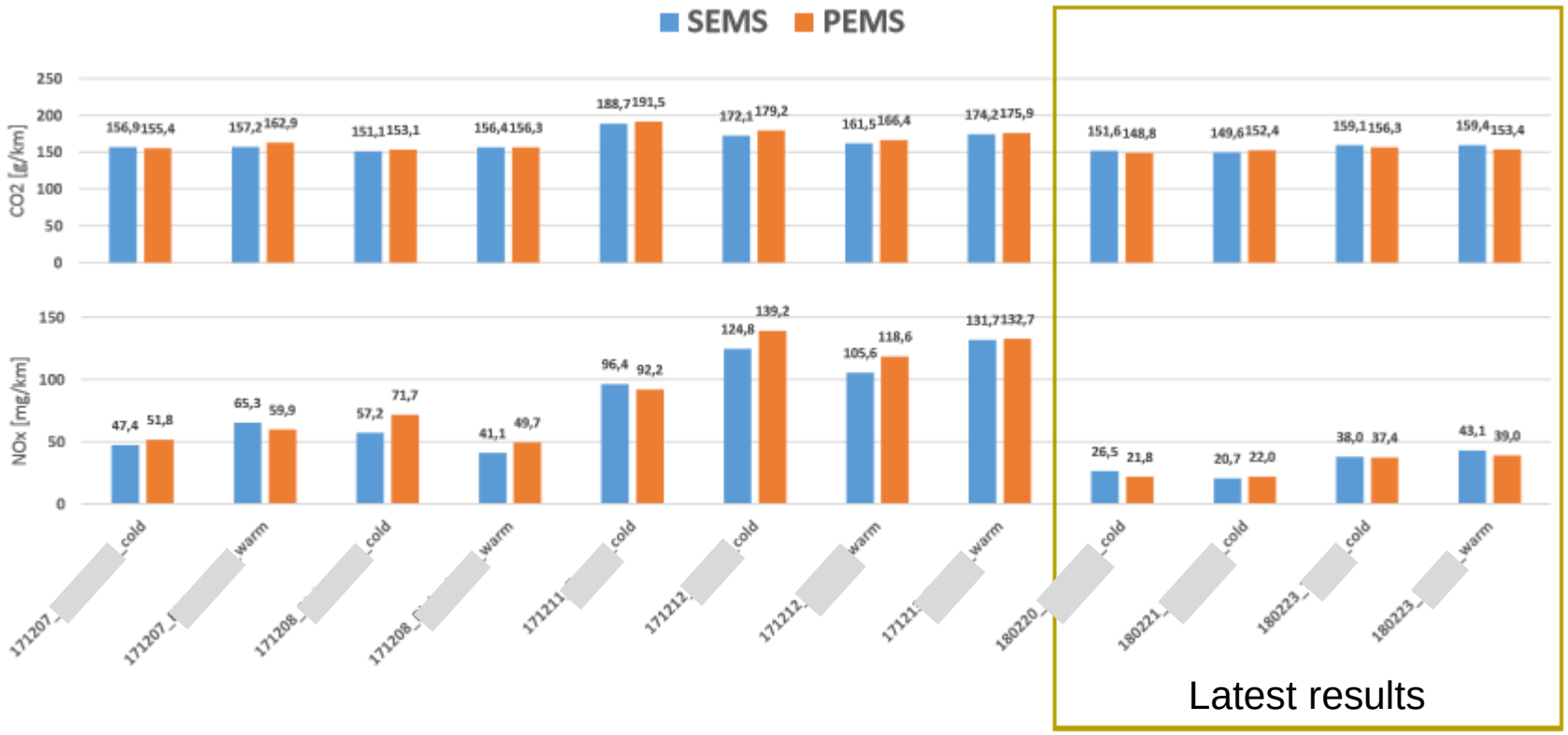
WLTC-SEMS Deviation **Feb, 20th 2019**	Nox - mg/km [%]	CO2 - g/km [%]	Fuel Economy - l/100km [%]
Low-Speed	-4.3	3.6	-1.4
Medium-Speed	-8.3	3.1	0.0
High-Speed	-6.1	-0.4	-3.9
Extra-High-Speed	-1.2	0.1	-4.3
Average	-5.0	1.6	-2.4

WLTC-SEMS Deviation **Feb. 21st 2019**	Nox - mg/km [%]	CO2 - g/km [%]	Fuel Economy - l/100km [%]
Low-Speed	-4.5	1.1	-3.0
Medium-Speed	-10.8	-0.3	-3.8
High-Speed	-5.5	-0.5	-5.9
Extra-High-Speed	-2.2	0.0	-2.9
Average	-5.7	0.1	-3.9

HORIBA

SEMS: Comparison

Comparison to PEMS



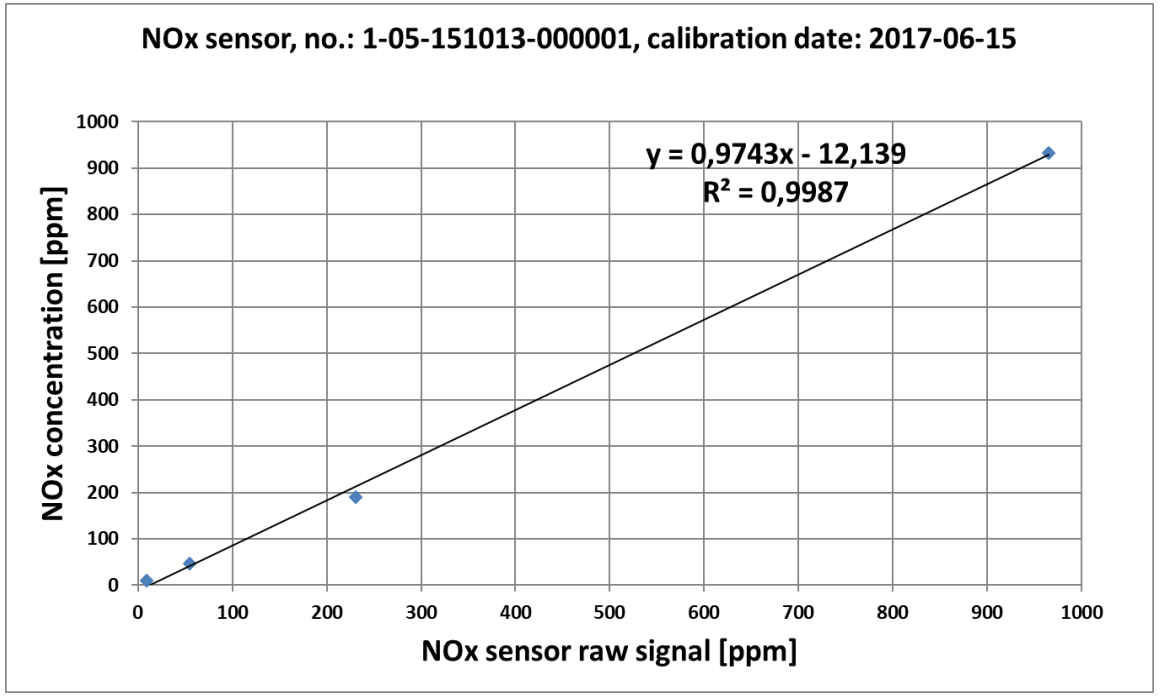
-1.9 to 3.7%

1.6 to 10.5%

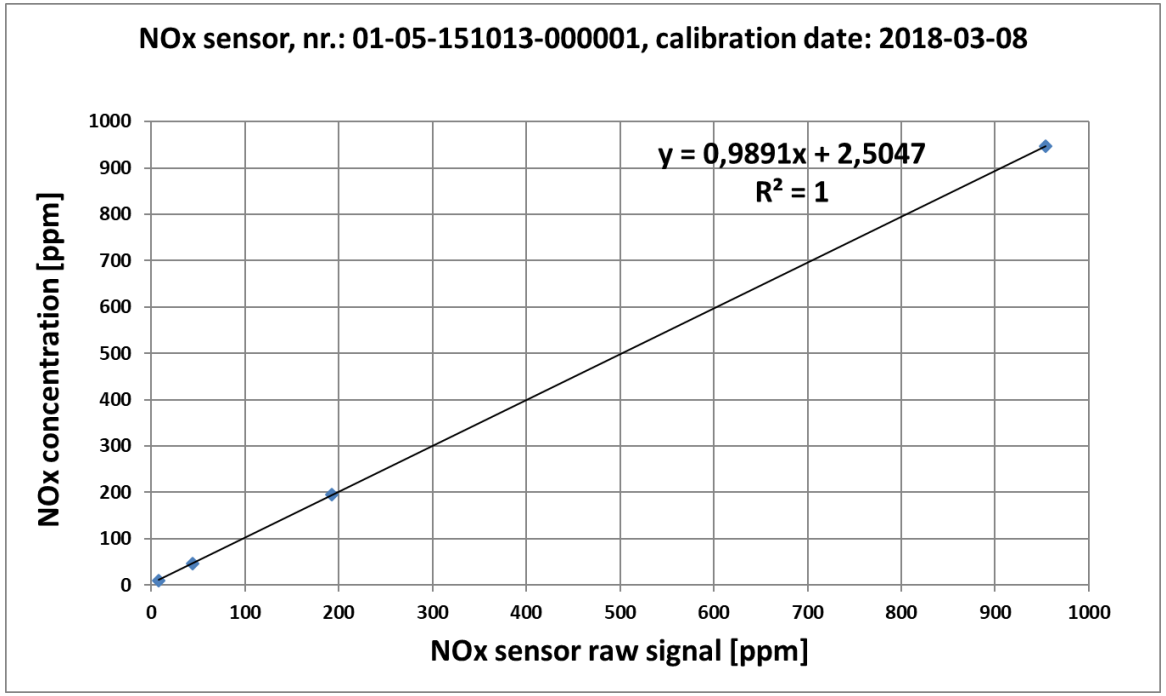
SEMS: Comparison

Nox sensor calibration

NOx calibration June 2017

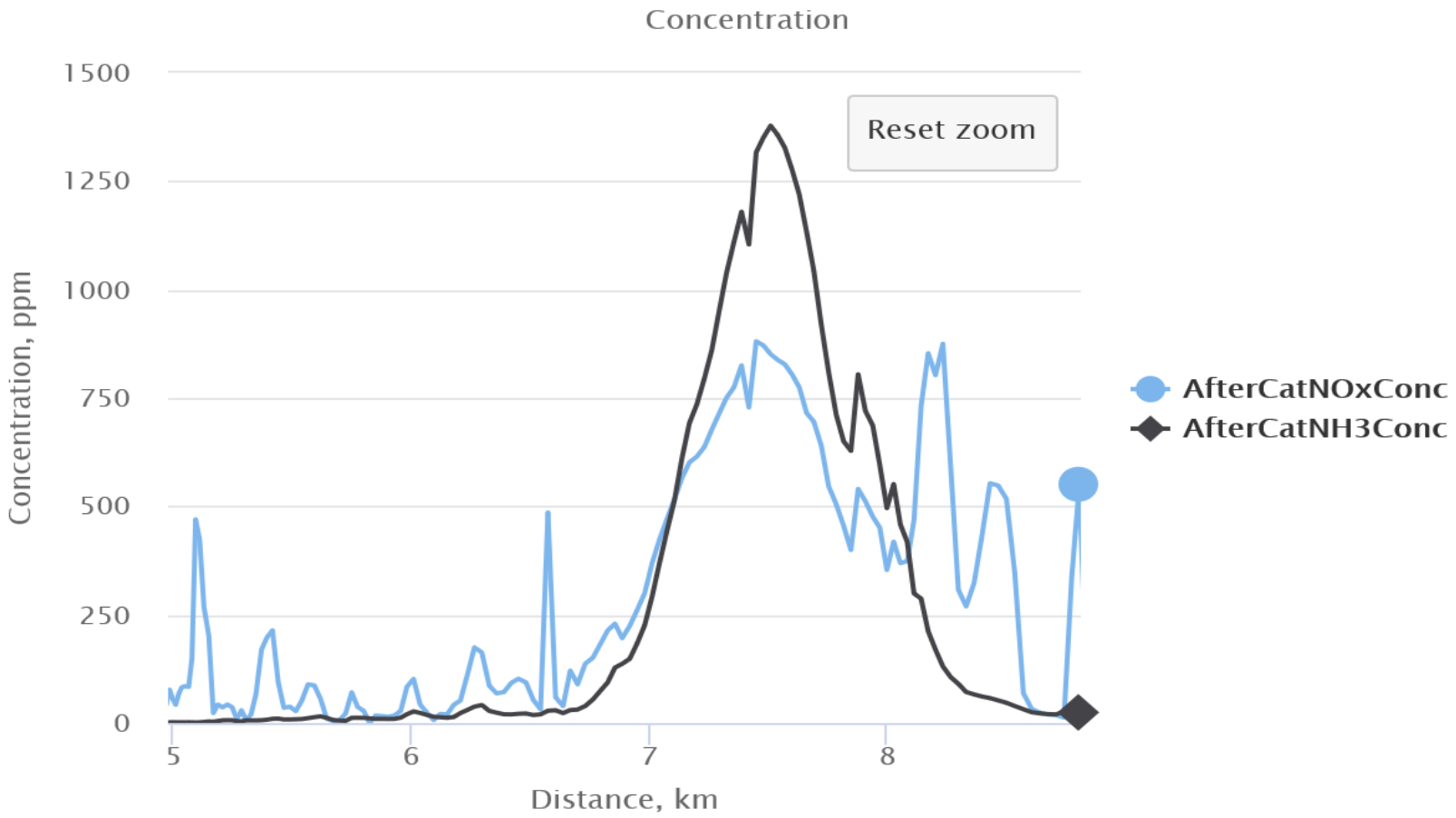


NOx calibration March 2018



SEMS: Comparison

Cross-sensitivity of NH3 to NOx



SUMMARY

SEMS: Summary

- HORIBA and TNO have developed a more flexible device to meet the increasing demand for RDE and other on-road or on-vehicle testing
- SEMS can be utilized as a screening tool for real driving emissions and is able to accommodate larger vehicle populations than PEMS
  - larger populations increase utility of statistical analysis and assist with identifying anomalies and outliers

SEMS Features:

- Small and lightweight
- Easier and faster installation than PEMS
- Sufficient accuracy for non-compliance applications
- **An independent database and dataprocessing offer**

HORIBA

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Omoshiro-okashiku

Joy and Fun

Thank you

Cảm ơn

감사합니다

ありがとうございました

Dziękuję

धन्यवाद

Grazie

Merci

谢谢

நன்ற

ขอบคุณครับ

Obrigado

Σας ευχαριστούμε

Děkuji

شُكْرًا

Tack ska ni ha

Danke

Большое спасибо

HORIBA