

# Investigation of personal air pollutant exposure by a mobile measurement system - AIRQUIX

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## • Instruction

The Air Quality Inspection Box (AIRQUIX), a light-weight low-cost portable smart air quality monitoring device, developed for mobile measurement.

It is equipped with a sensors package which can measure NO<sub>2</sub>, NO, O<sub>3</sub>, CO<sub>2</sub>, PM1, PM2.5, PM10, GPS, T, RH, P, etc. Several mobile measurement campaigns were performed with this technique including a personal air pollutant exposure study.

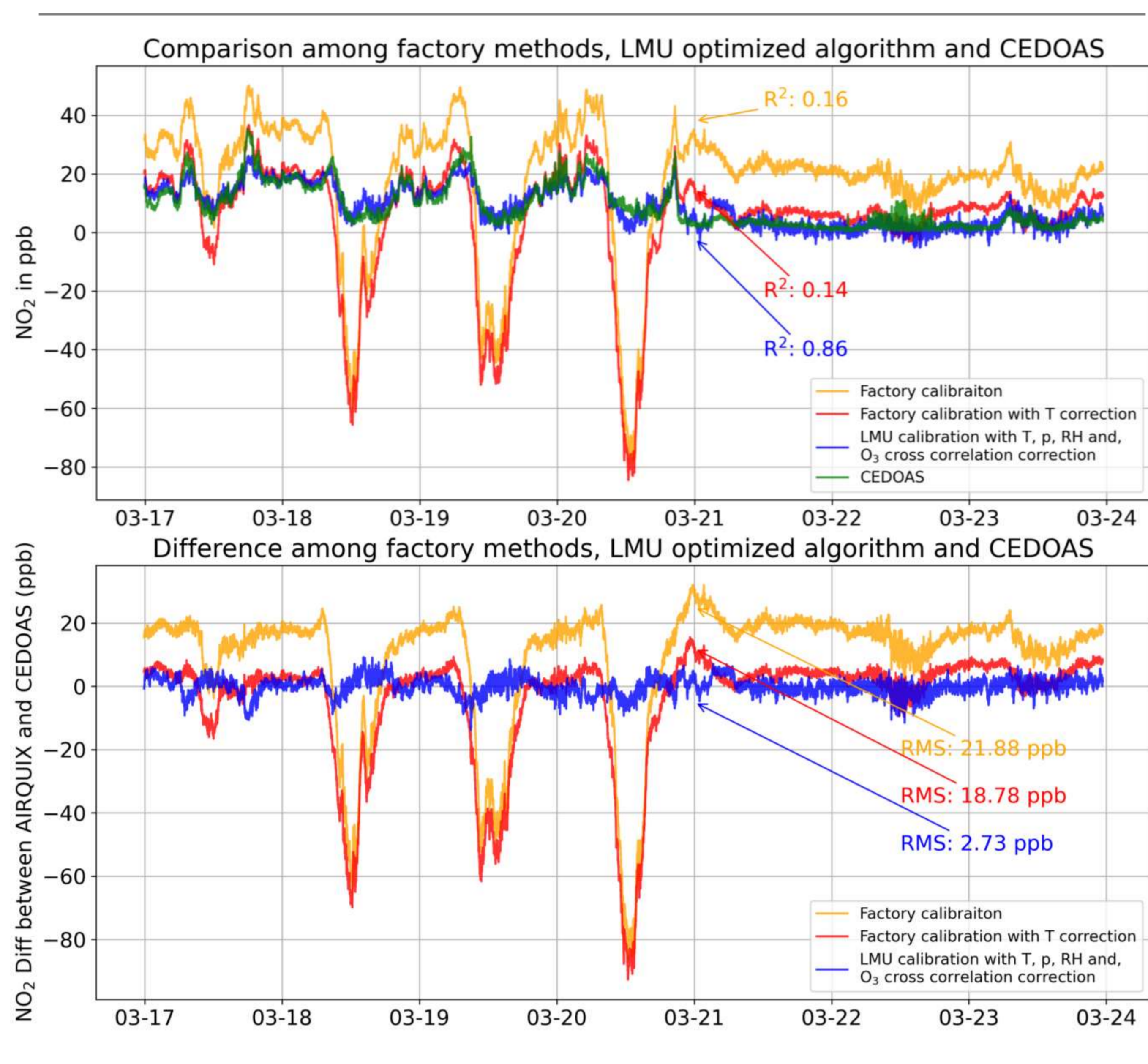
## • AIRQUIX instrument specification



- Weight: ~1.5kg (Include battery)
- Power: <10W (5V, 2.1A, while recharging)
- Battery life: 7.5h
- GPS: Internal and external connector
- Knob: 10-positions mode selector
- Display: 2.4inch display
- Wi-Fi: WLAN access point

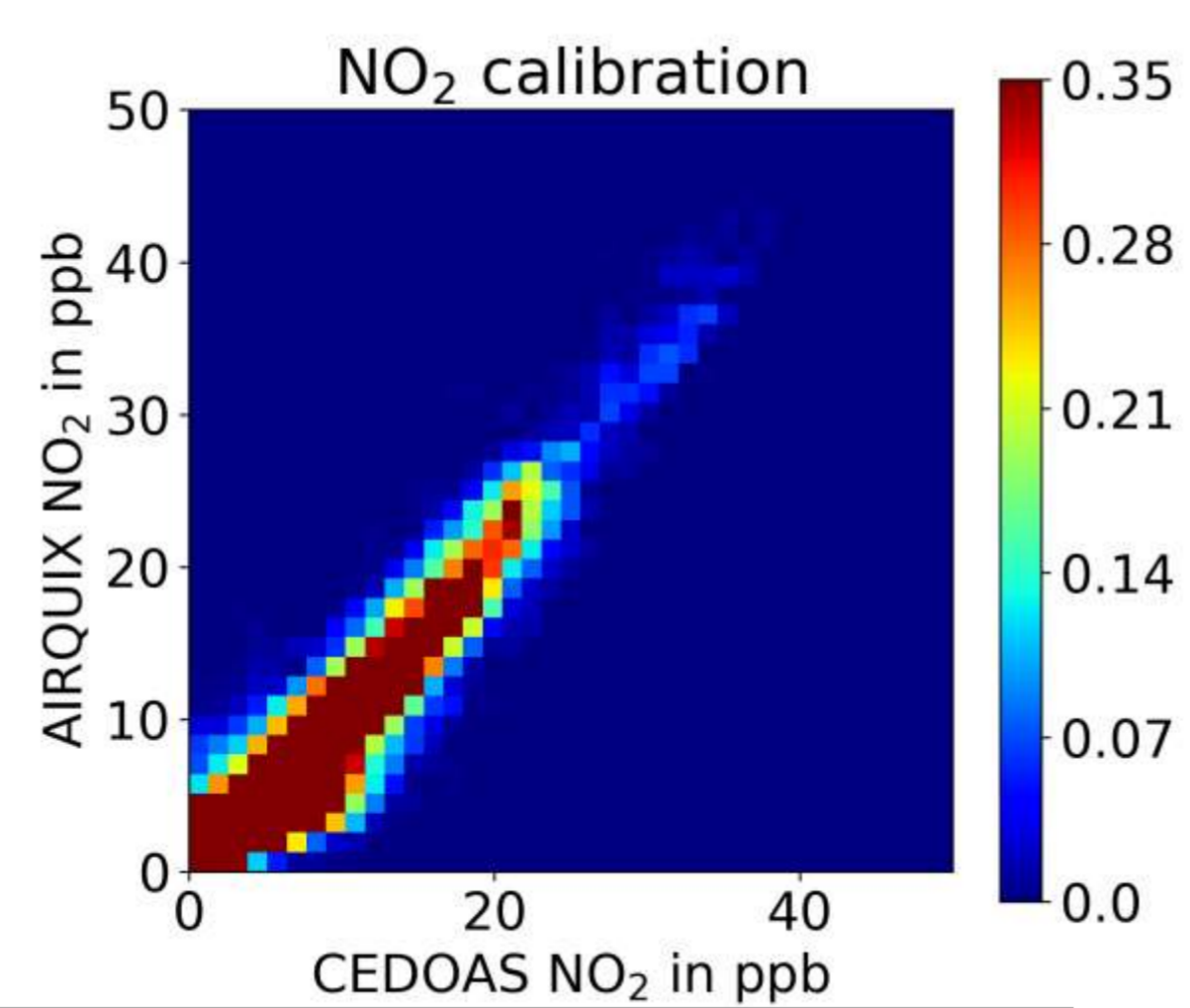
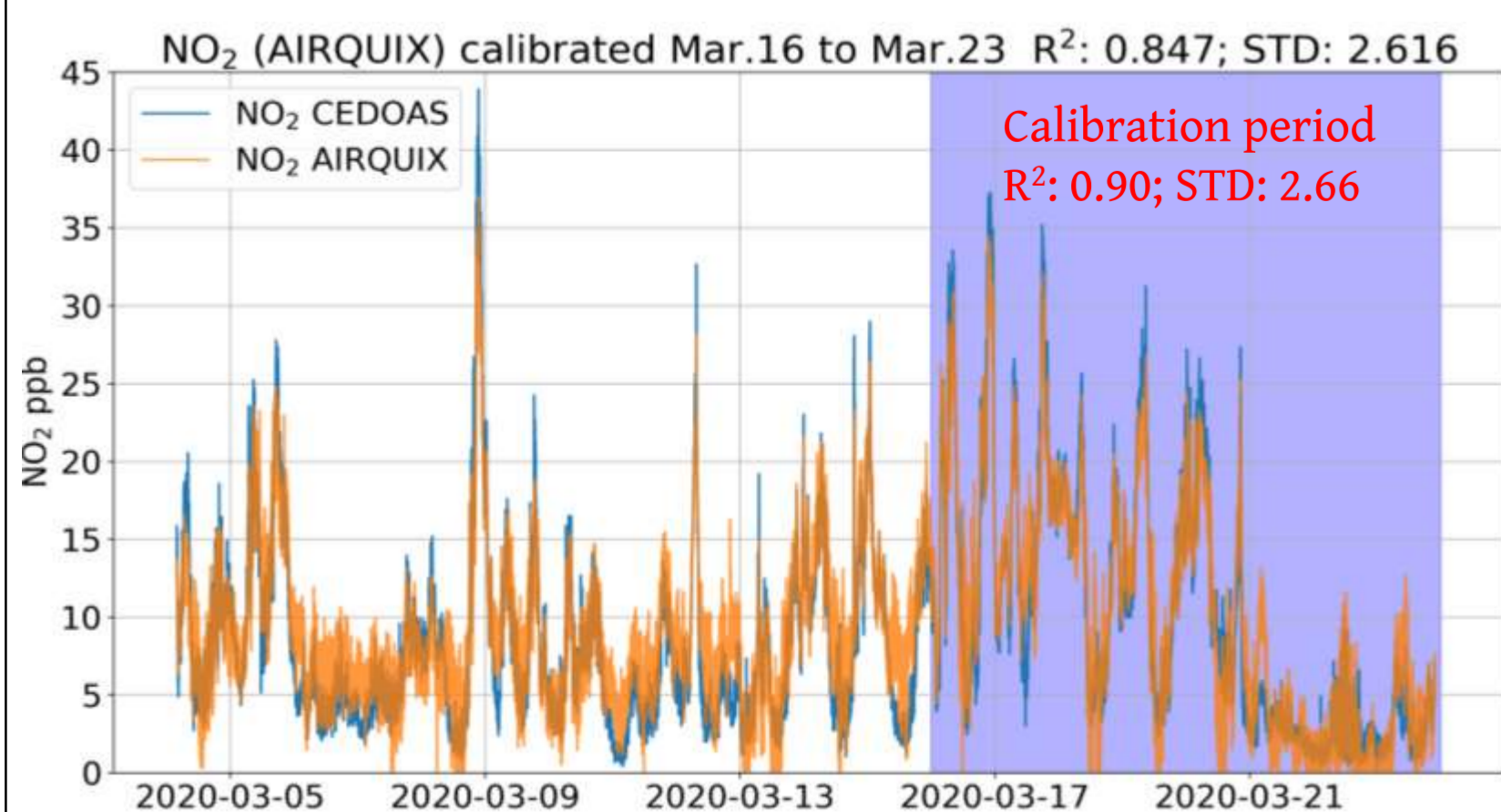
## • AIRQUIX evaluated and calibrated by high-end instruments

The performance of AIRQUIX with different retrieval algorithm was evaluated. The factory recommended methods (orange and red curves) show a partially correlation (0.16, 0.14 respectively) which is not acceptable for our application.

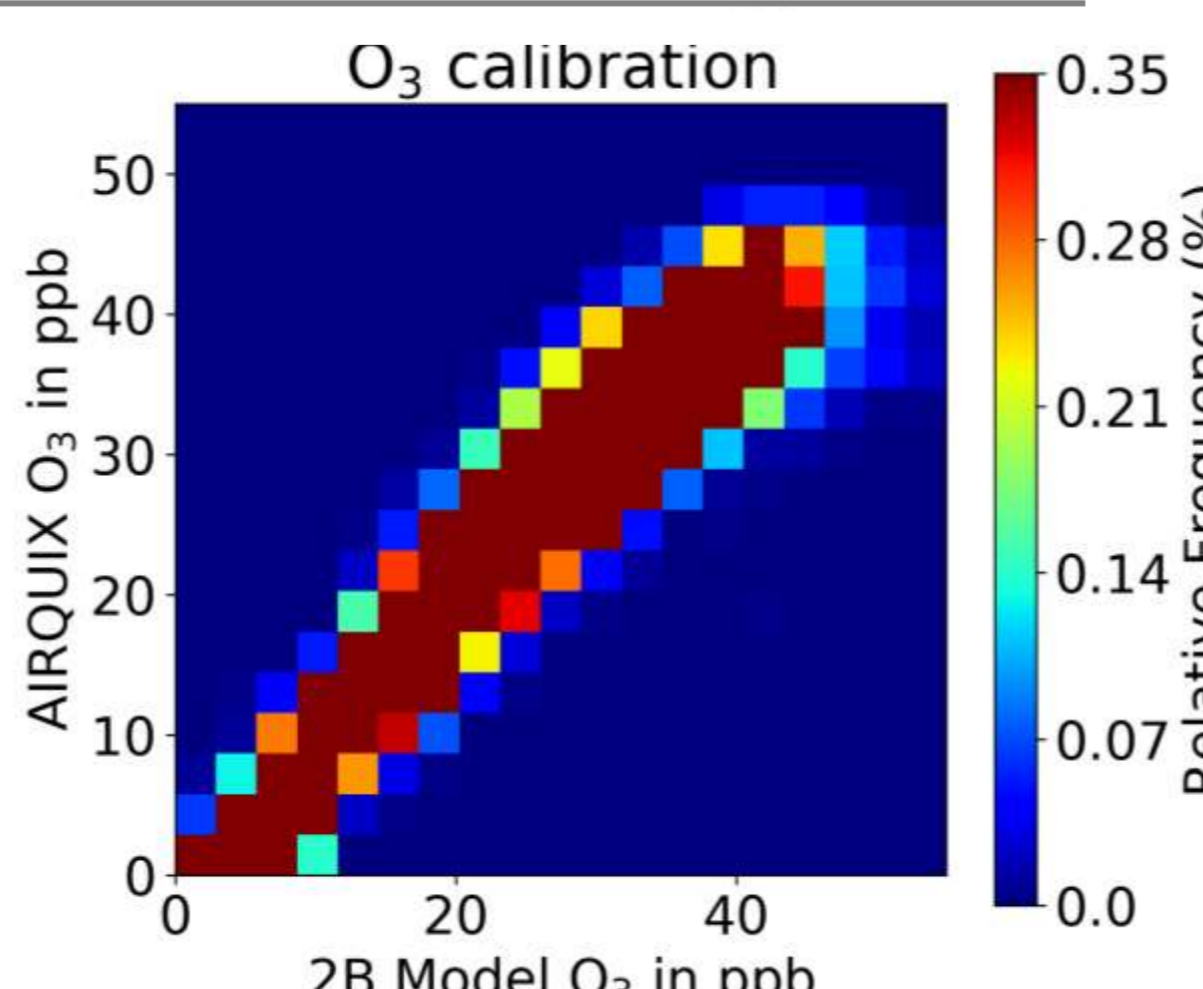
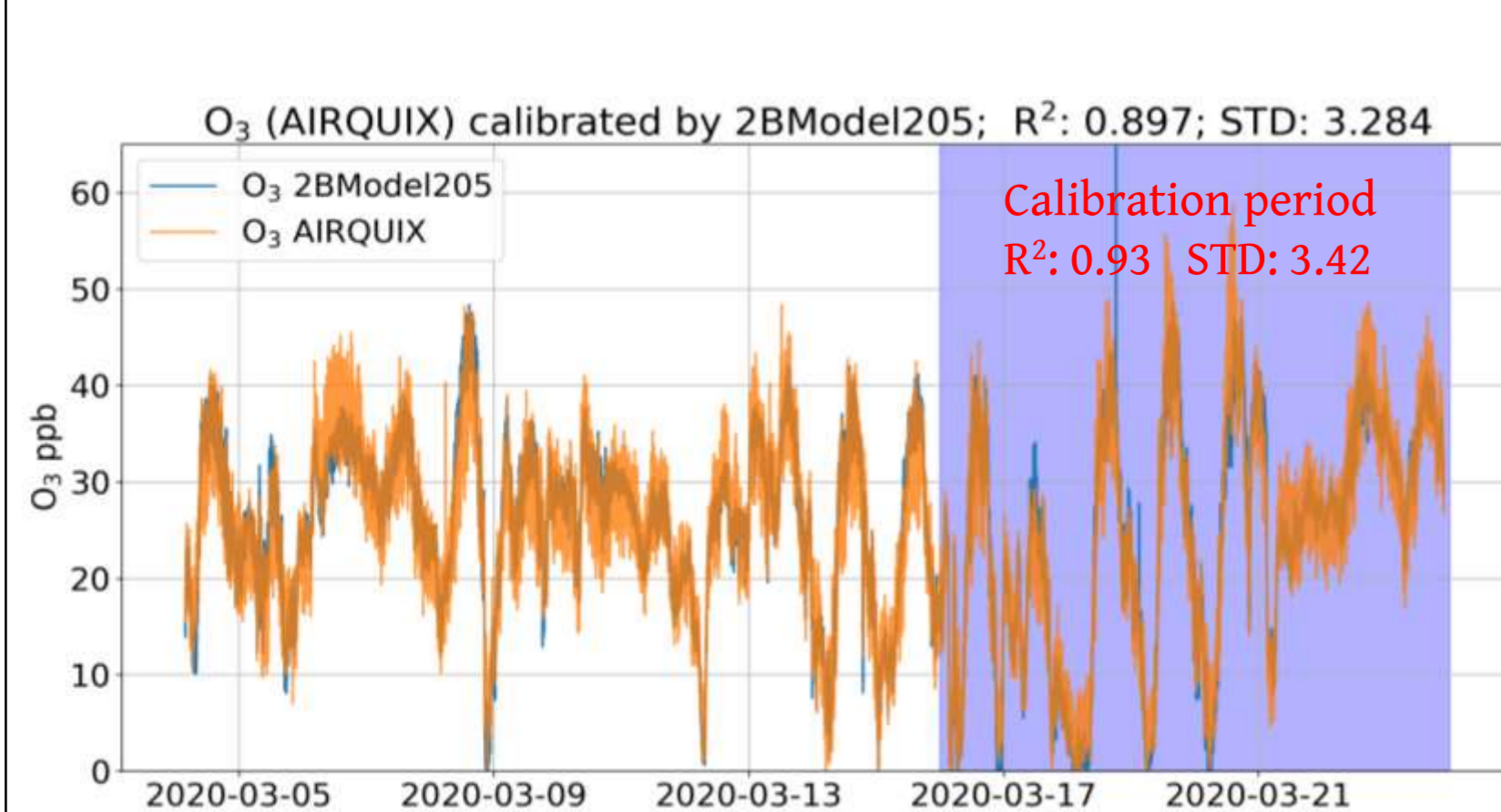


- A optimized retrieval algorithm using extra environmental parameters as well as a correction of cross correlation with other species has been developed.
- Pre-/Post calibrations using high-end instruments based on our algorithm were always performed for AIRQUIX, which guaranteed sensors can perform with a high accuracy under robust environments.

## • NO2 calibration with CEDOAS

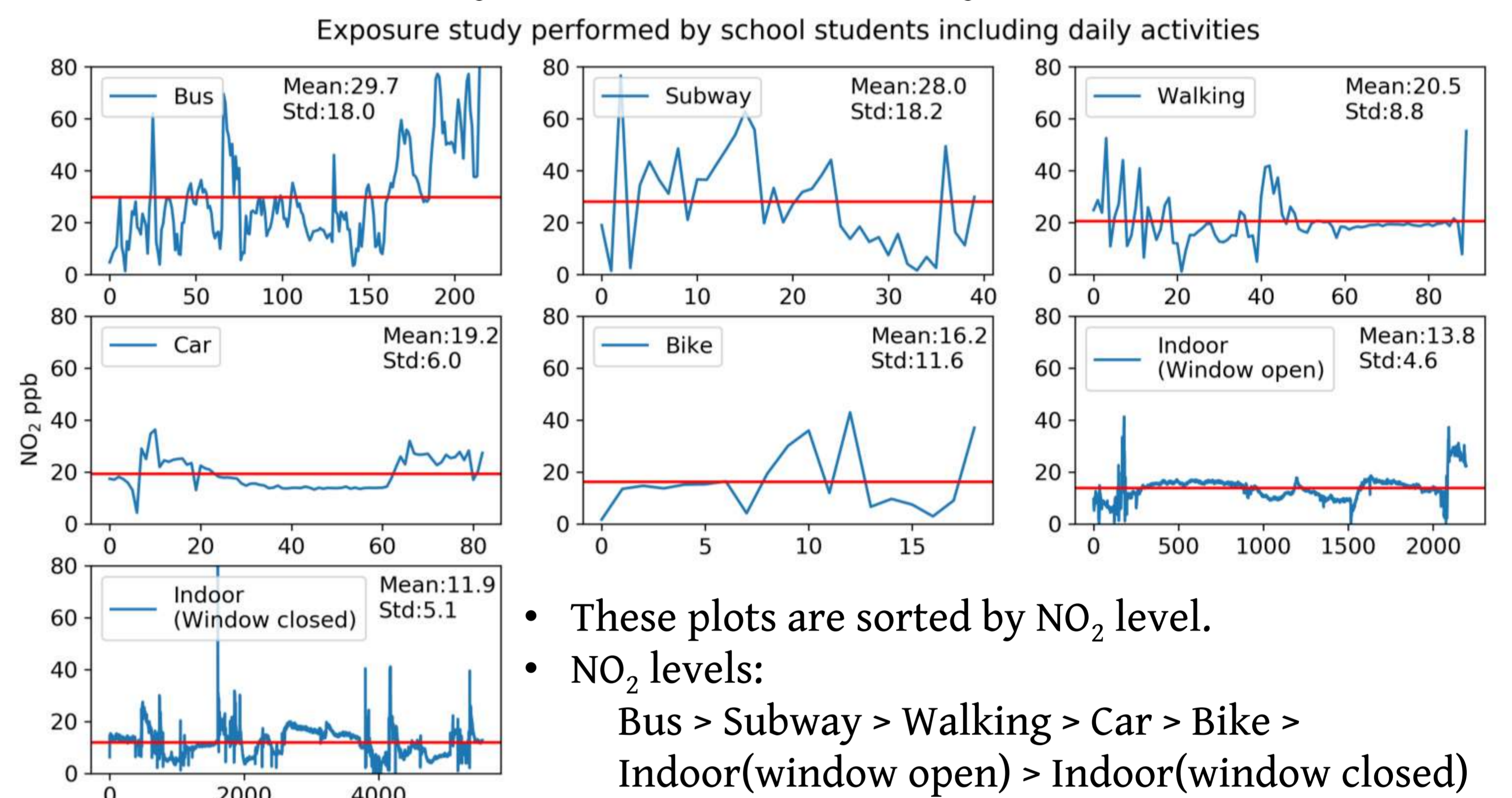


## • O3 calibration with 2BModel205

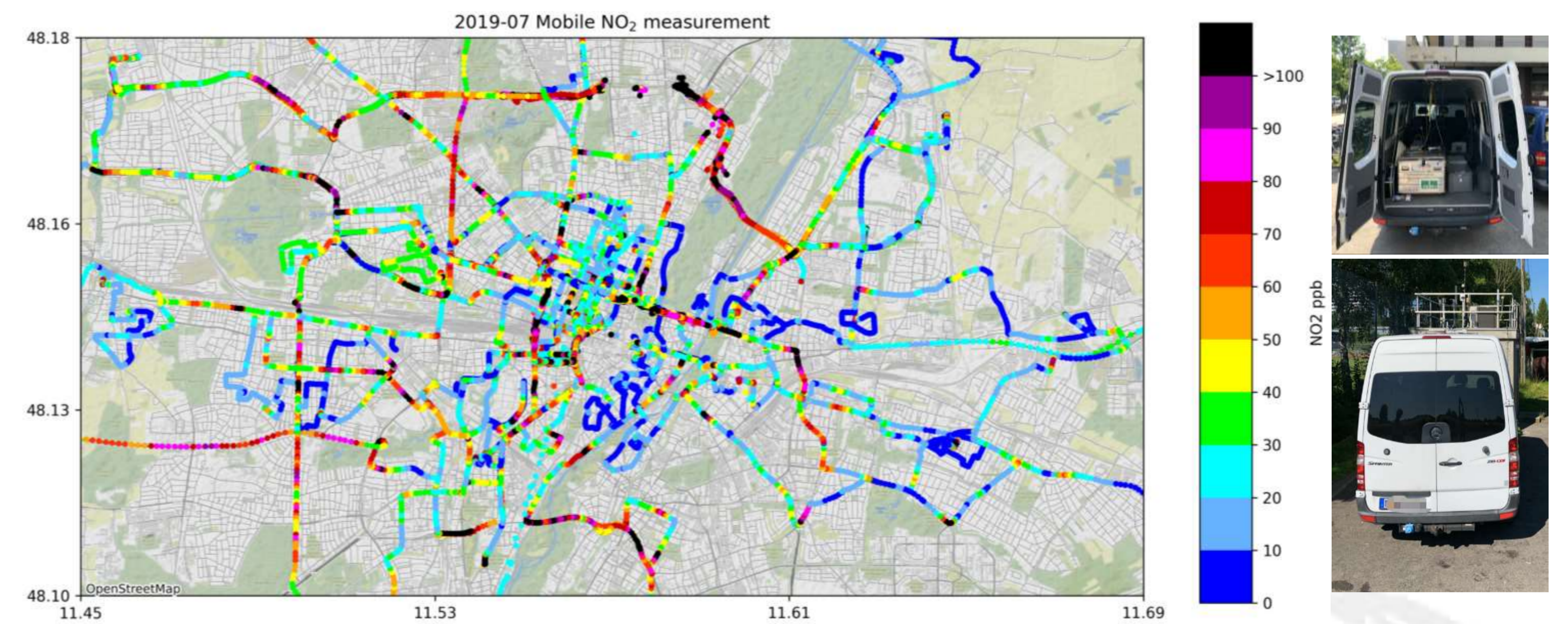


## • Personal exposure applications performed by AIRQUIX

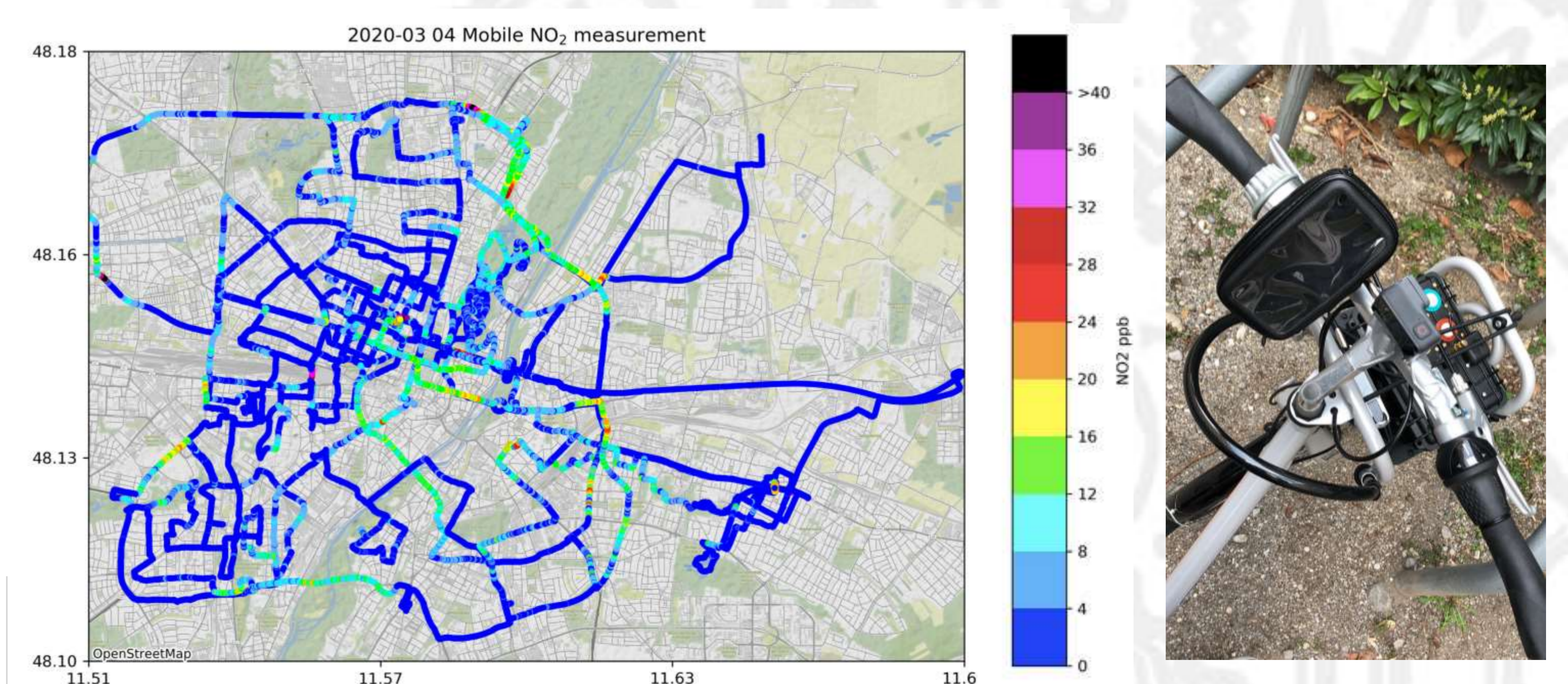
AIRQUIX were carried by several students for 5 days. Different daily activities are sorted by events, which defined by knob mode selector.



## Mobile measurement of NO<sub>2</sub> using CEDOAS on 2019.07



## COVID-19 related mobile measurement of NO<sub>2</sub> using AIRQUIX on 2020.03-04



## Reference:

Erik Hofmann; Dora Thallinger; Jonathan Garben; Marcus Bürger; Tom Kosik; Ferdinand Hilgenberg; Betreuer: Florian Linder; 2020, Forschungsprojekt AIRQUIX-Luftqualitätsmessungen auf unseren Schulwegen  
Horbanski M, Pöhler D, Lampel J, Platt U. The ICAD (iterative cavity-enhanced DOAS) method. Atmospheric Measurement Techniques. 2019 Jun 1;12(6).  
Ye, S. and Wenig, M., 2020, May. Human exposure assessment to air pollutants: application of a new portable air monitoring instrument. In EGU General Assembly Conference Abstracts (p. 9075).