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CBC Green InterTraffic – Air Quality assessment

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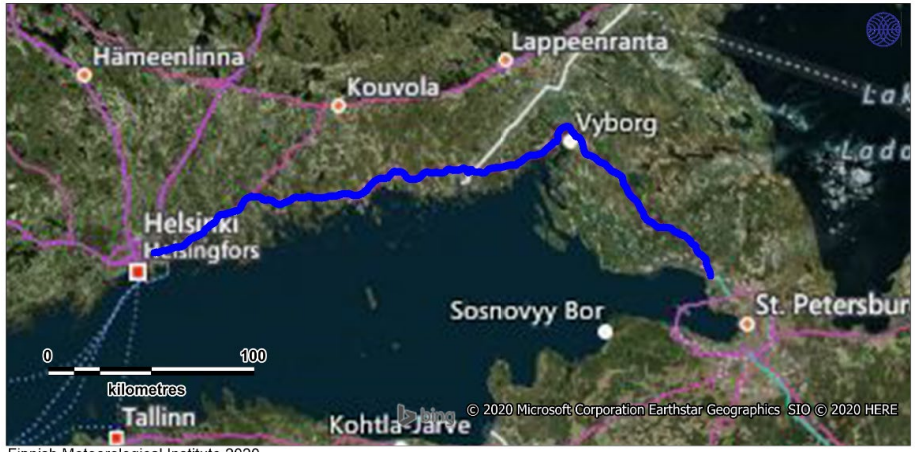
Air quality assessment



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Present situation:
- AQ monitoring
- Traffic data from year 2018

Future scenario:
- Transport infrastructure development road map, target year 2035

Information on Traffic

Emission calculations

Concentrations based on Air Quality Dispersion modelling

Air quality monitoring with innovative AQT-sensors

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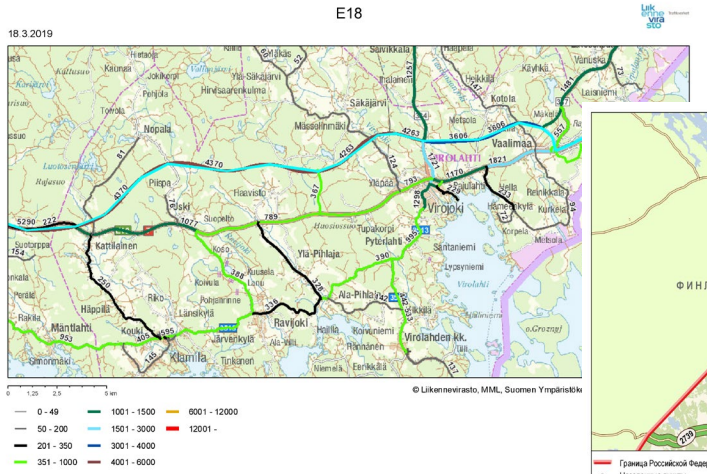
Information on traffic

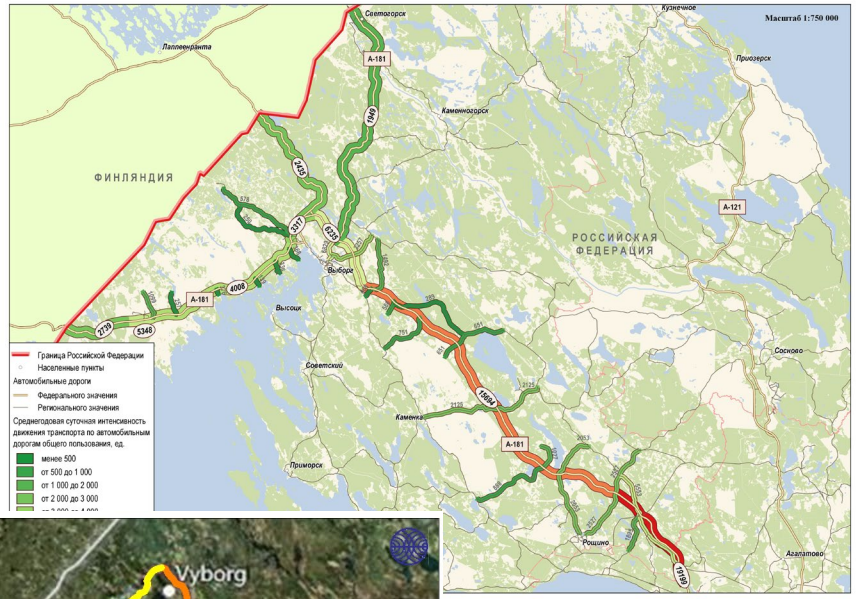
- Traffic volume
- Travel speed
- Car fleet composition
  - Percentage of busses, vans, trucks, passanger cars, etc..
  - EURO-classes of each vehicle type and how much with each EURO-class car type is driven (performance)

Open data from Finland / Data collected by Traffic Integration Ltd (TI)

http://lipasto.vtt.fi/

https://julkinen.vayla.fi/webgis-sovellukset/webgis/template.html?config=liikenne





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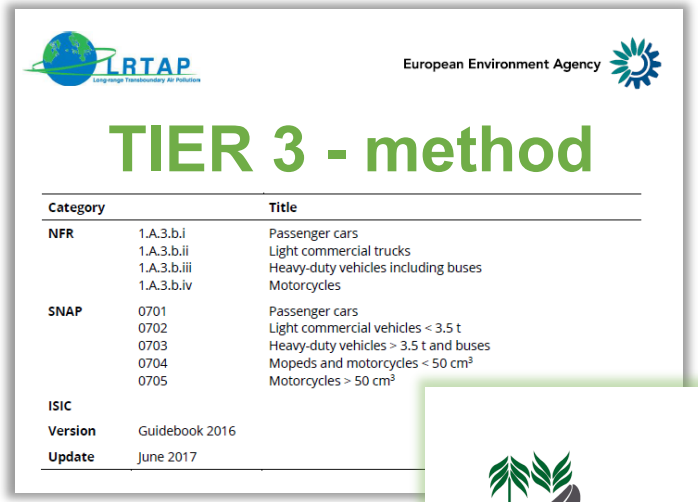
Emission calculations – a common approach based on



Emission coeffcients from EEA (2017)

- Average speed from Saint Petersburg to the border of Finland (TI): **100 km/h**
- Average type of vehicles n Russia are (TI):

1	PC	PETROL	EURO 3
2	LCV	DIESEL	EURO 3
3	BUS	DIESEL	EURO 3
4	HDV	DIESEL	EURO 2
5	HDV without trailer	DIESEL	EURO 2

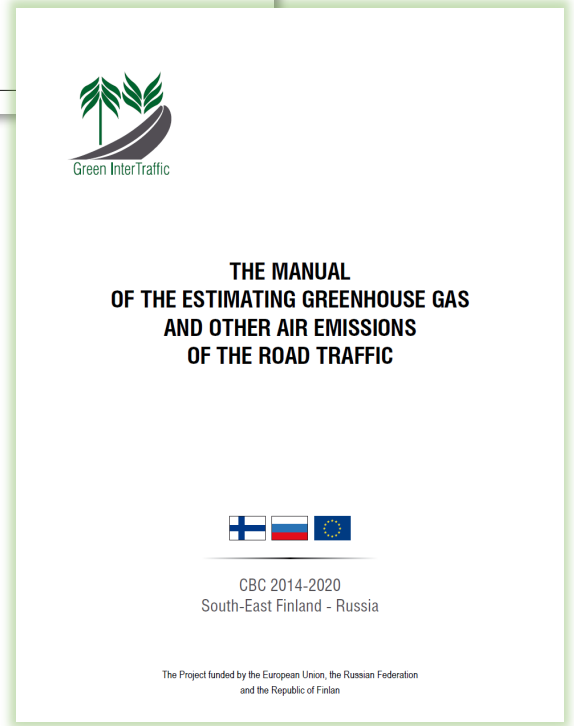
- Average speed limit for the road E18 from Russian border to Helsinki (Väylä): **100 km/h**
- Average type of vehicles in Finland are (LIPASTO) :

1	PC	PETROL	EURO 4
2	LCV	DIESEL	EURO 4
3	BUS	DIESEL	EURO 5
4	HDV wo Trailer	DIESEL	EURO 4
5	HDV w Trailer	DIESEL	EURO 4

Border area mix of traffic:

- 30 km both sides,
- 70 % of Russian vehicles
- 30 % of Finnish vehicles
- Driving velocity 90 km/h

http://en.greenintertraffic.ru/greenintertraffic/materials/documents-of-the-project.html



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– a common approach based on

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Emission calculations for nitrogen oxides (NO_x) and particulate matter (PM)

Emission dispersion modelling

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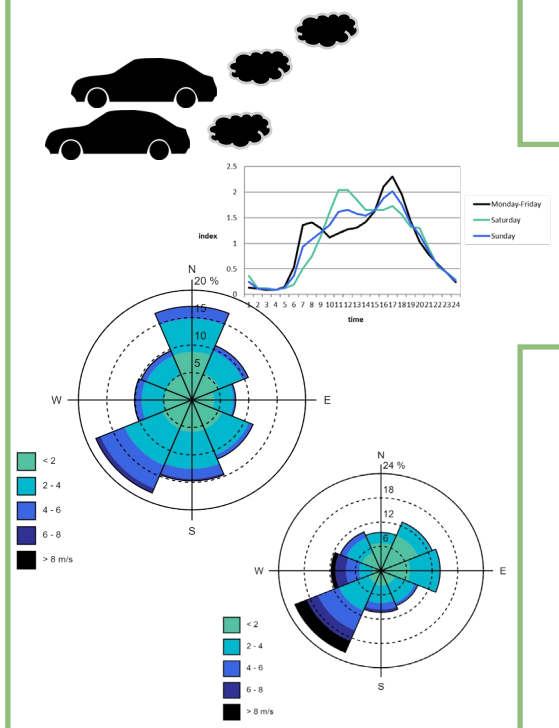
Emissions & other input data

NO_x, PM



Dispersion model CAR-FMI

The model inculudes for example the chemical transformation, deposition, effects of the terrain, …

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Concentrations in future (Road map)

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Current state

2035

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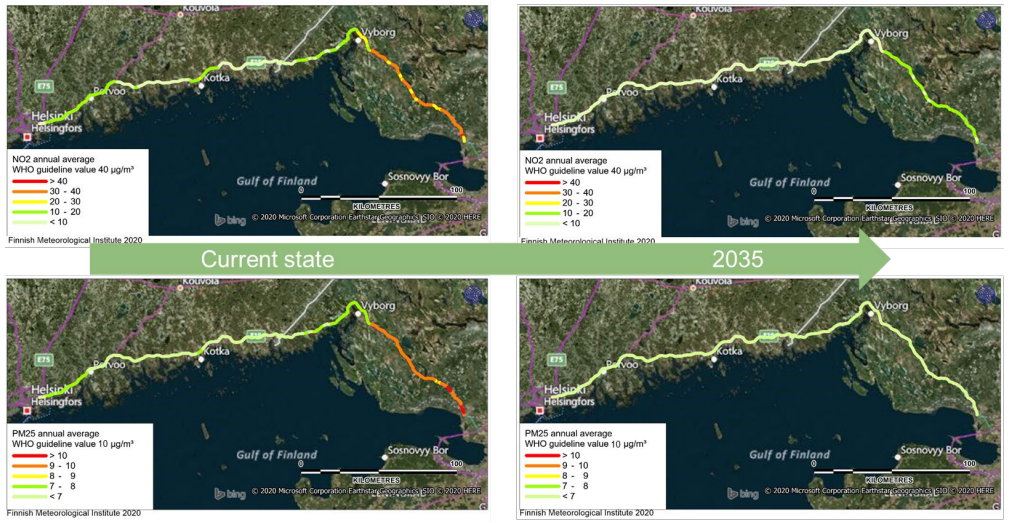
Summary of the AQ assessment

- The traffic flow intensity and the number of heavy-duty vehicles vary on the road -> Differences in Emissions and in Concentrations.
- The highest concentrations occur there where the number of heavy-duty vehicles is the highest.
- WHO (World Health Organization) has given guideline values for Air Quality.
  - The guideline values are close to be exceed between Vyborg and Saint Petersbug.
- In future scenario (Road Map), the concentrations should decrease.
  - The WHO guideline values should not exceed in the future (2035), if the traffic developement follows the roadmap.

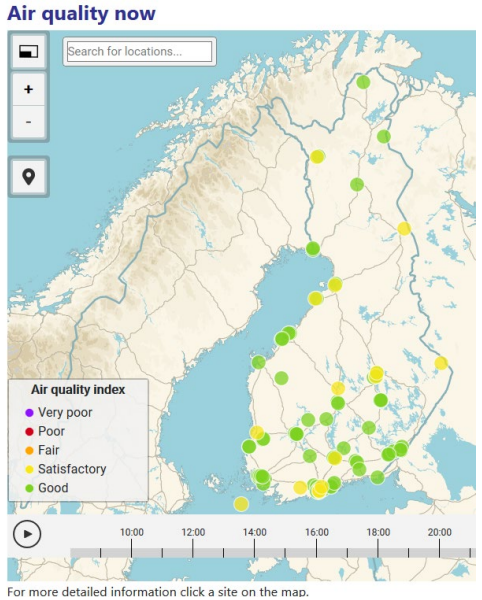


Air quality monitoring

Data Quality

Reference methods
Equivalent method

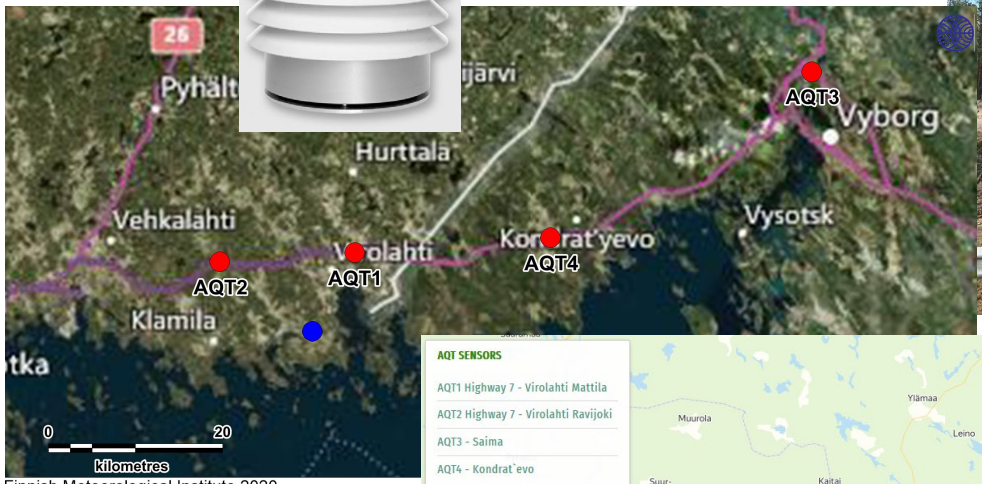
Indicative, sensor methods



SO_2,
NO_x,
PM_{10},
$PM_{2,5}$,
TRS and
O_3 etc…

Air quality monitoring with innovative sensors

- Vaisala AQT420 sensor
- Air Quality Transmitter for Pollutant Gases and Particulate Matter
  - **$PM_{2.5}$ & PM_{10}**
  - Gases: SO_2, **NO_2**, O_3 & CO
- Comparison with the continuous monitors in Kumpula, Helsinki during July 2019 and in the end of the campaing
- Installation to Road Weather monitoring stations
  - in Russia (10.10.2019 – 17.8.2020)
  - In Finland (13.11.2019 –)



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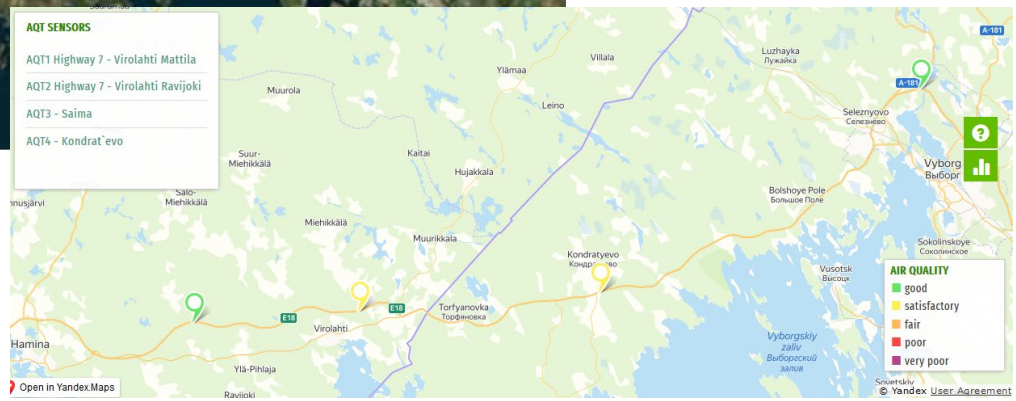

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Preliminary results from the comparison

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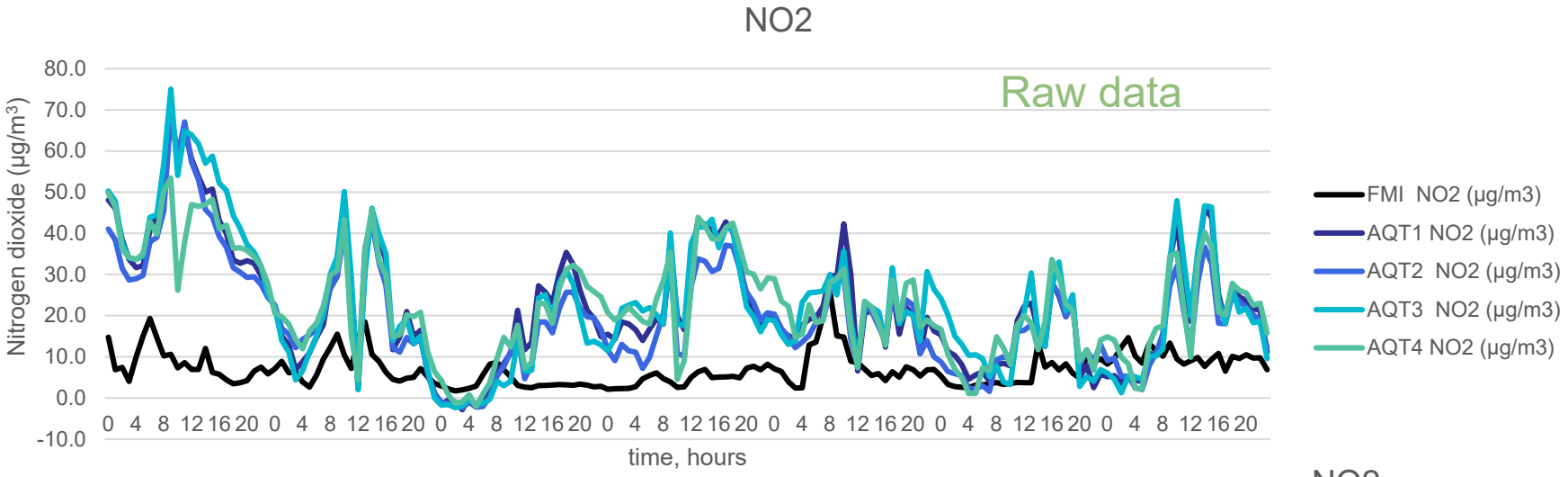
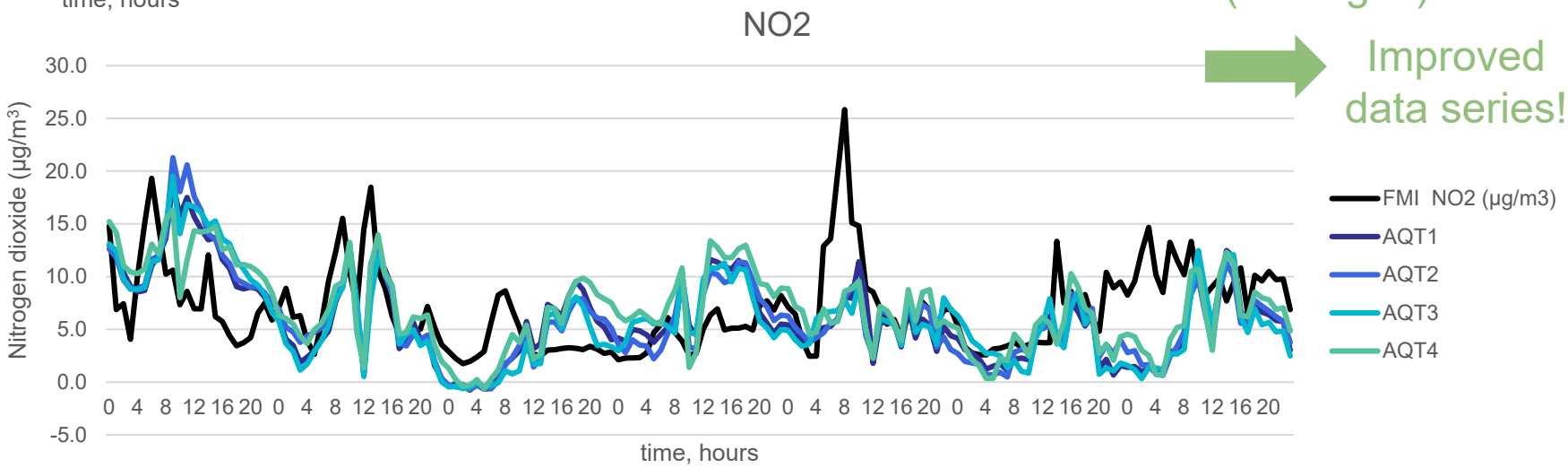
Comparison period in Kumpula



Same data with preliminary correction coefficients (averages)



Improved data series!

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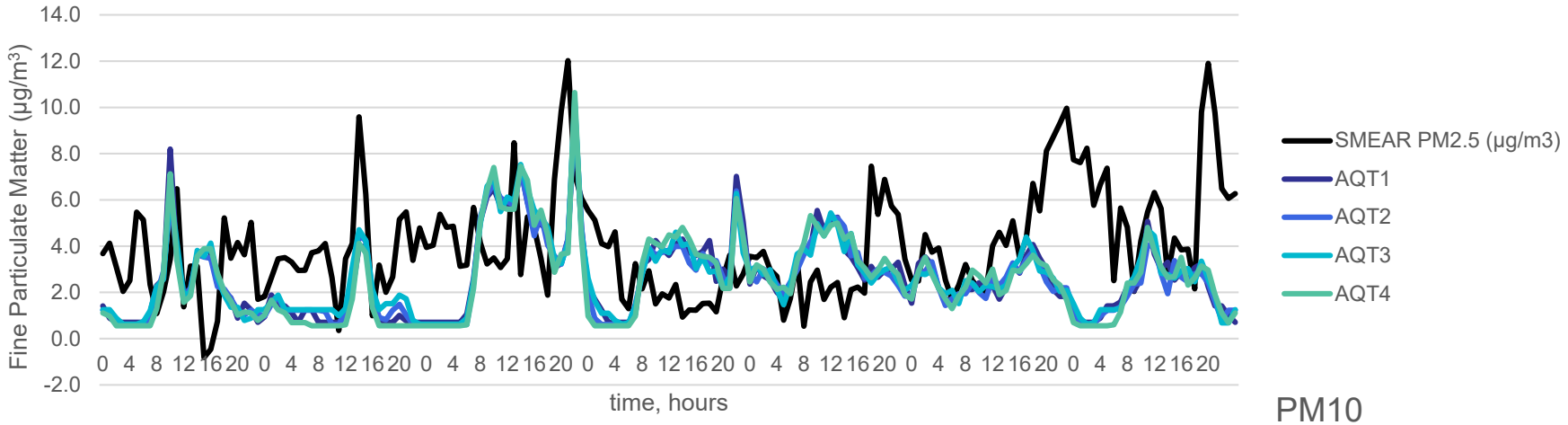
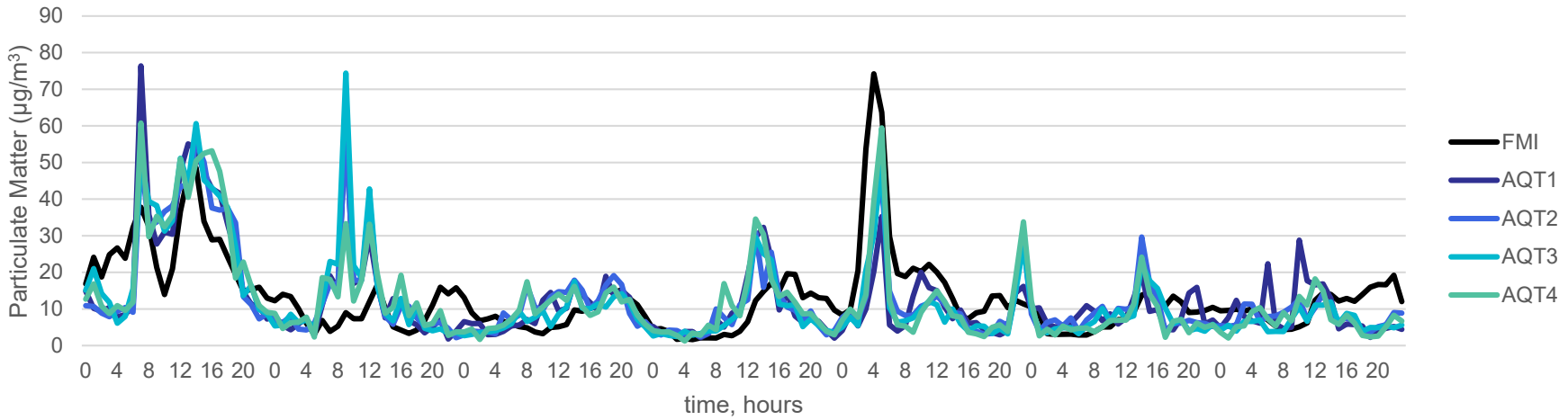
Comparison period in Kumpula

PM2.5



Improved data series, with preliminary correction coeffiecients

PM10



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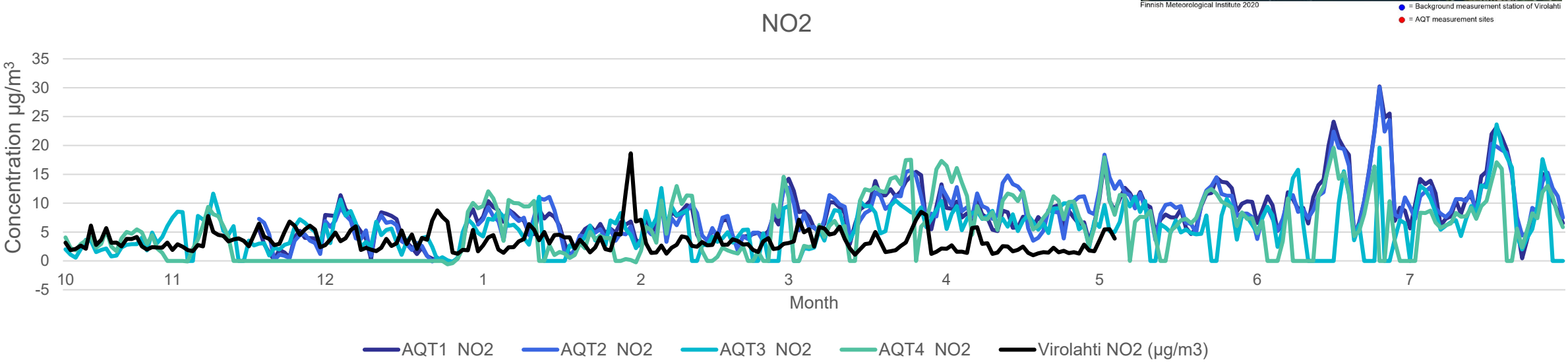
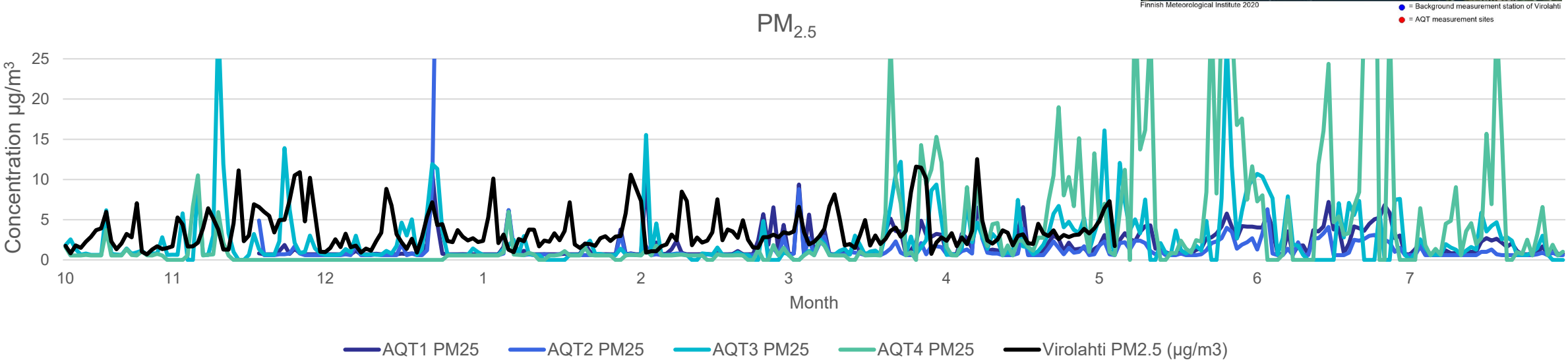
Preliminary results from the road E18



Daily mean value for nitrogen dioxide

Preliminary results from the road E18



Daily mean value for fine particulate matter

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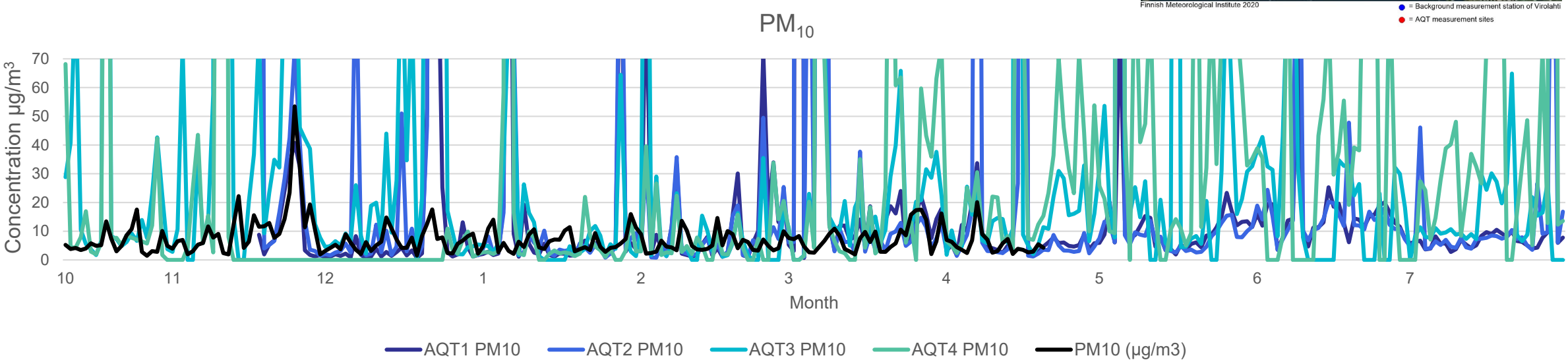
Preliminary results from the road E18



Daily mean value for PM10 = ”street dust”

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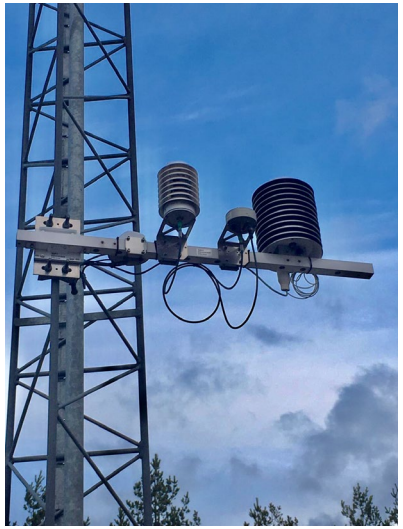
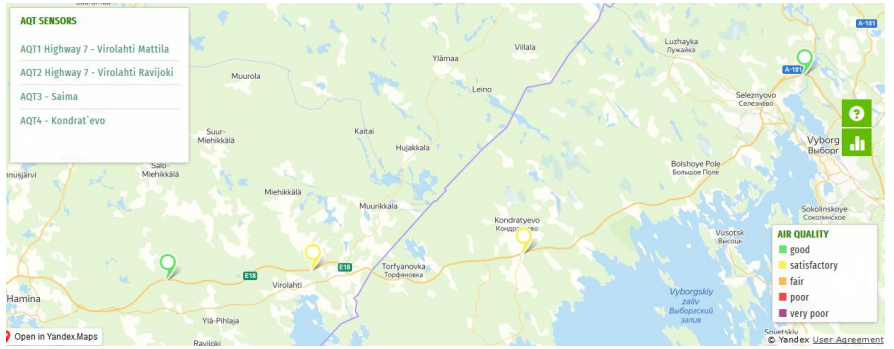
Summary of the preliminary results from the road E18

- In some cases the AQT trends follows the Virolahti measurements quite nicely.
  - The concentrations in Virolahti should be lower than along the road E18!
  - NO_2 level seems to follow the Virolahti measurements fairly good
  - Particulates seem to over-estimate the peaks quite easily -> trends are similar with Virolahti data.
- The AQT sensors seems to age after couple of months
  - However, the devices age similarly.
  - Can we interpret the differences in AQ between the locations by comparing the measurement results from different sites?
- Final analysis of the AQT sensor measurements is not done yet.
  - Comparison to equivalent methods in Kumpula again after the campaigns are not finnished.
- Measurement results were available online on project website during the whole measurement campaign. After the campaigns, a summary will be soon added on the website!





http://en.greenintertraffic.ru/

Thank you!

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