FAIRMODE WG2 MQI Mapping Exercise
Contribution from Poland

Second webinar - 3rd September 2024

Q1 + Q2+ Q3 evaluation of on-the-fly MQI

Questions / tests to be addressed

- **Q1 – Is the MQI robust?**

1. Choose and document the data and stations you want to use for the MQI analysis
2. Compare FAIRMODEs on-the-fly MQI with own home calculation
3. Carry out ONE analysis of your choice

   - Check robustness of your MQI with respect to the number of stations
   - Check robustness of your MQI with respect to aggregation area (polygons vs. country)
   - Check robustness of your MQI across pollutants
   - Compare your MQI with others MQI – if beaten by CAMS – analyse the emission data
   - Check MQI ability to assess specific modelling purpose

- **Q2 - Are the MQI stringent enough and consistent among pollutants?**
- **Q3 – Does the fail/pass MQO test ensure a valid distinction between Fit/non-Fit-for-purpose modelling applications ?**

WG2 Data Used in the exercise

Model used: ***GEM-AQ (one of the models from CAMS ENSEMBLE)***

Main uses of the modelling system under the AAQD: ***all known – assessment, forecast, source apportionment, station representativness***

Monitoring Stations data used: ***all from Poland***

Emissions: ***Central Emission Database for Poland (500 m grid), EMEP outside PL (10 km grid)***

Pollutant: ***PM10, PM25, NO2, O3***

Area used for the MQI evaluation: ***Poland***

Meteorological year used: ***2019***

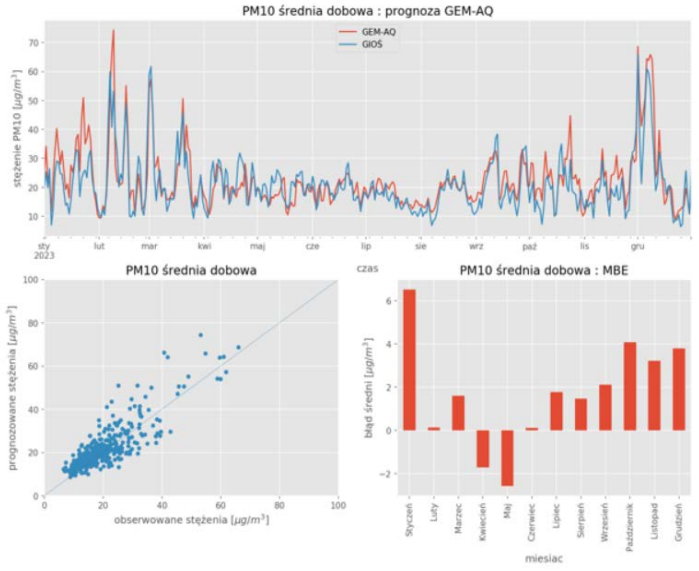
Selected MQI/Stringency level: ALL

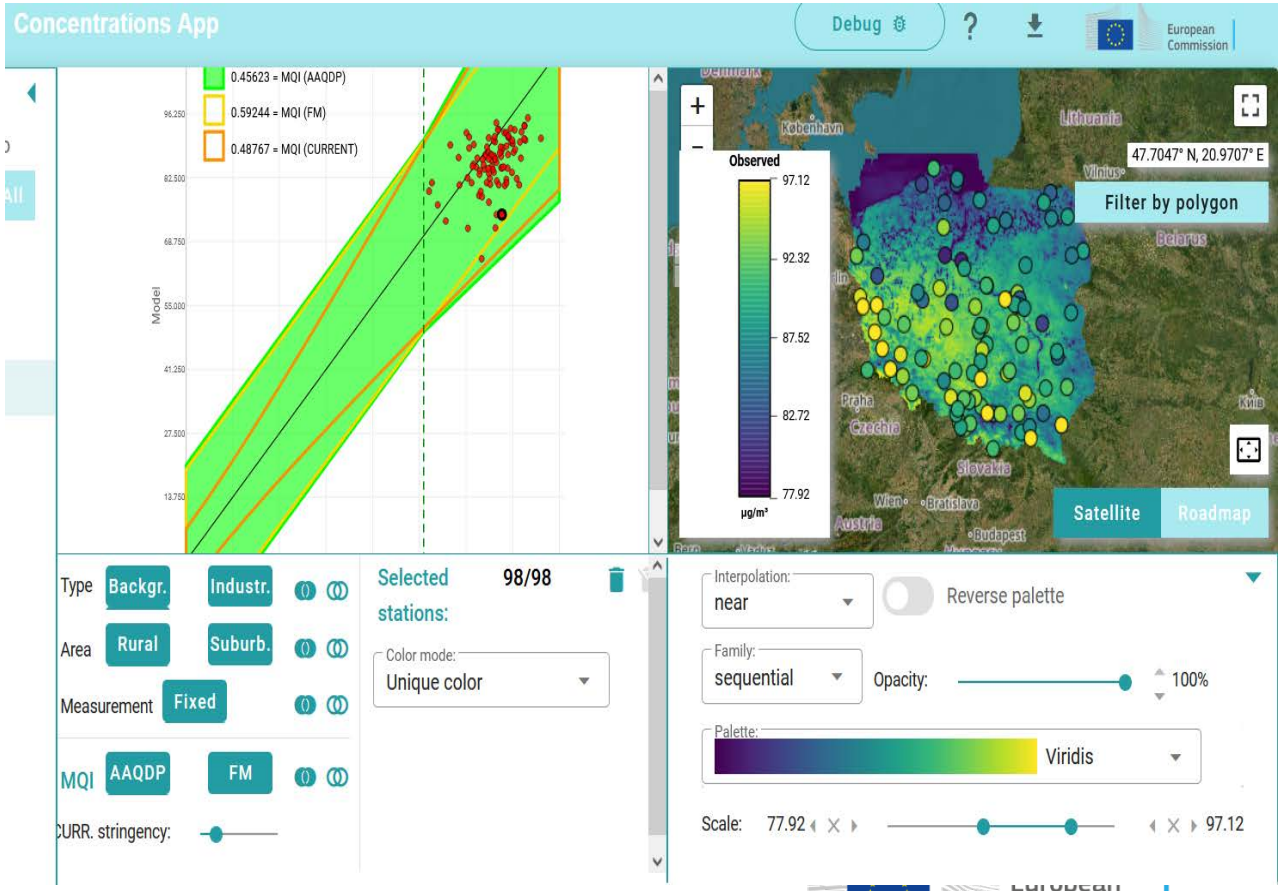
WG2 Evaluation of the FAIRMODE MQI

Comparison of the MQO from FAIRMODE and at home evaluation

Base:

	anl_conf	anl_conf_perc
bap	95	55.2%
no2	85	72.0%
nox	73	62.9%
o3	101	100.0%
px10	249	98.8%
px25	133	96.4%
so2	40	45.5%

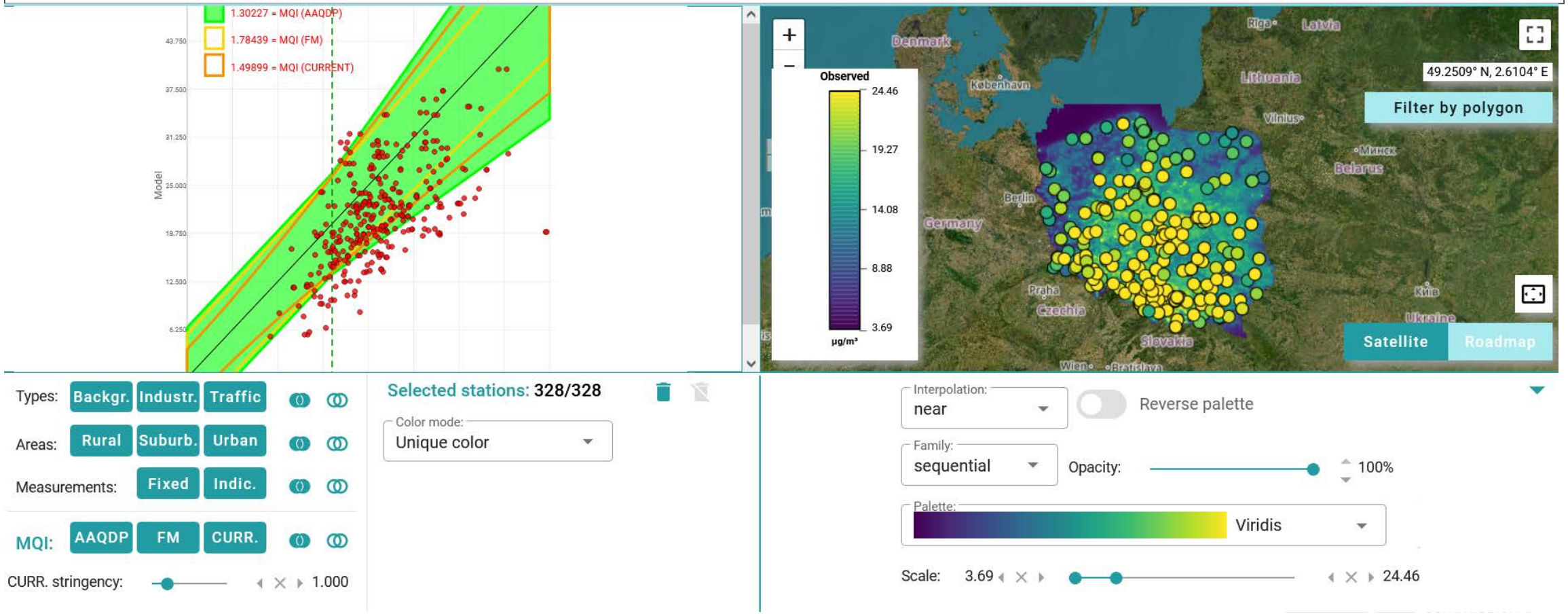




Lp	Kod stacji	Ocena błędu prognozy						Długość serii pomiarowej
		MBE µg/m³		RMSE µg/m³		Korelacja		
		max	avg	max	avg	max	avg	
1	DsDziePilsud	6.16	8.84	34.15	14.16	0.51	0.74	361
2	DsJelGorOgin	14.82	9.80	33.65	17.20	0.64	0.73	360
3	DsKlodzSzkol	0.21	4.94	31.51	12.21	0.60	0.76	362
4	DsLegAlRzecz	-19.28	-4.01	32.86	11.35	0.55	0.69	361

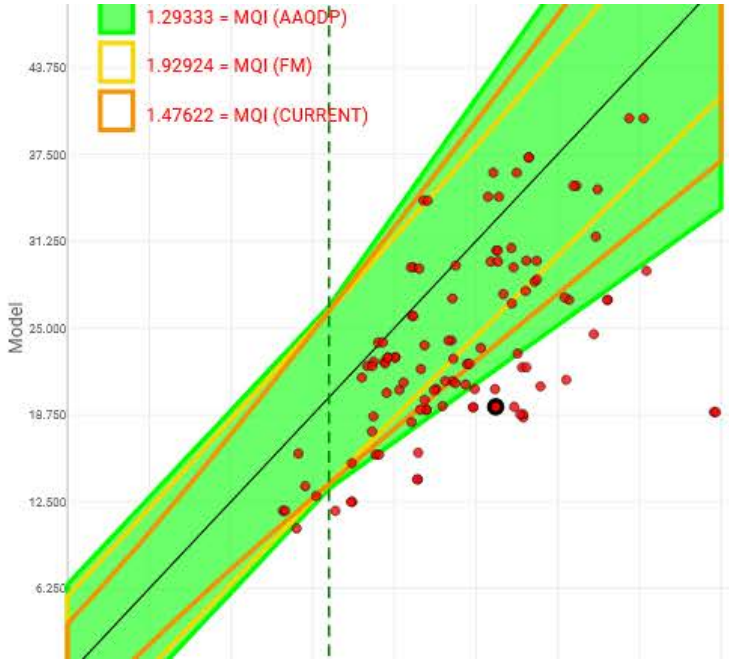
WG2 Evaluation of the MQI robustness - Results

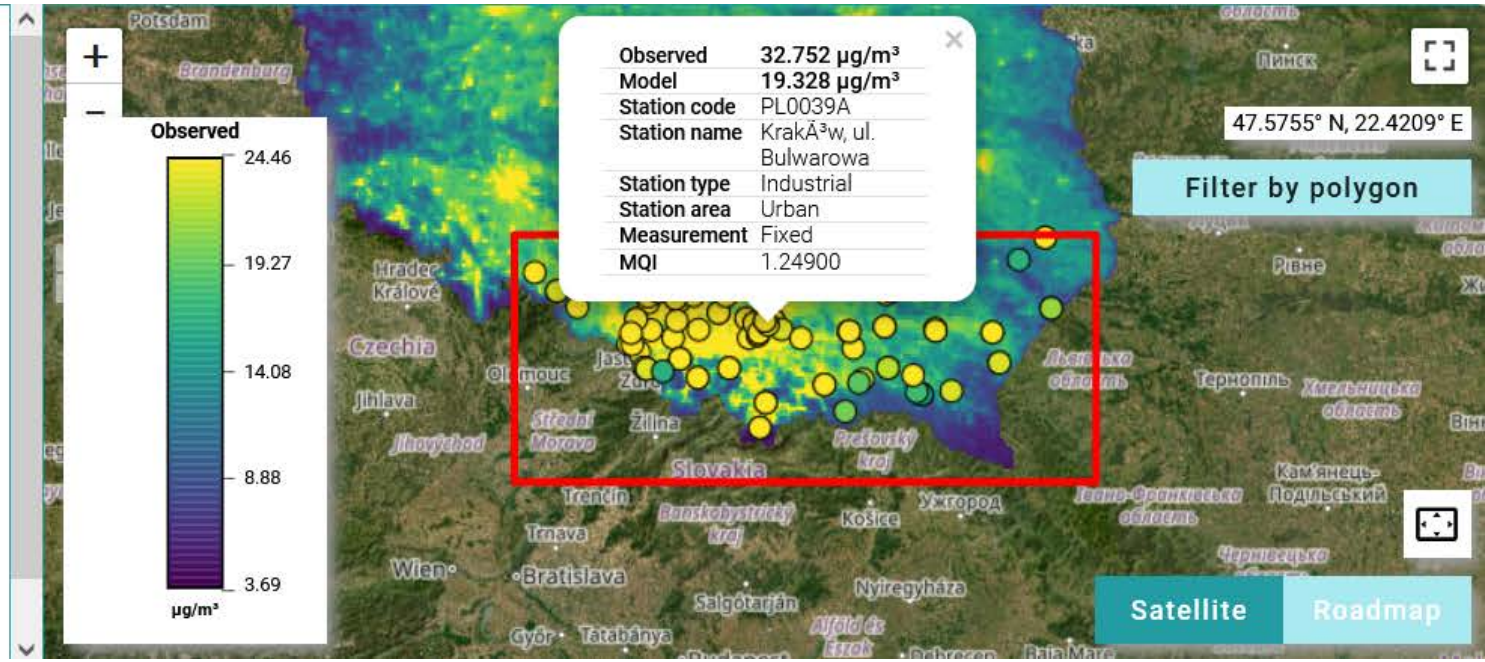
Robustness test I – aggregation area– PM10 – country – no assimilation



WG2 Evaluation of the MQI robustness - Results

Robustness test I – aggregation area – PM10 – polygon (southern Poland) – no assimilation

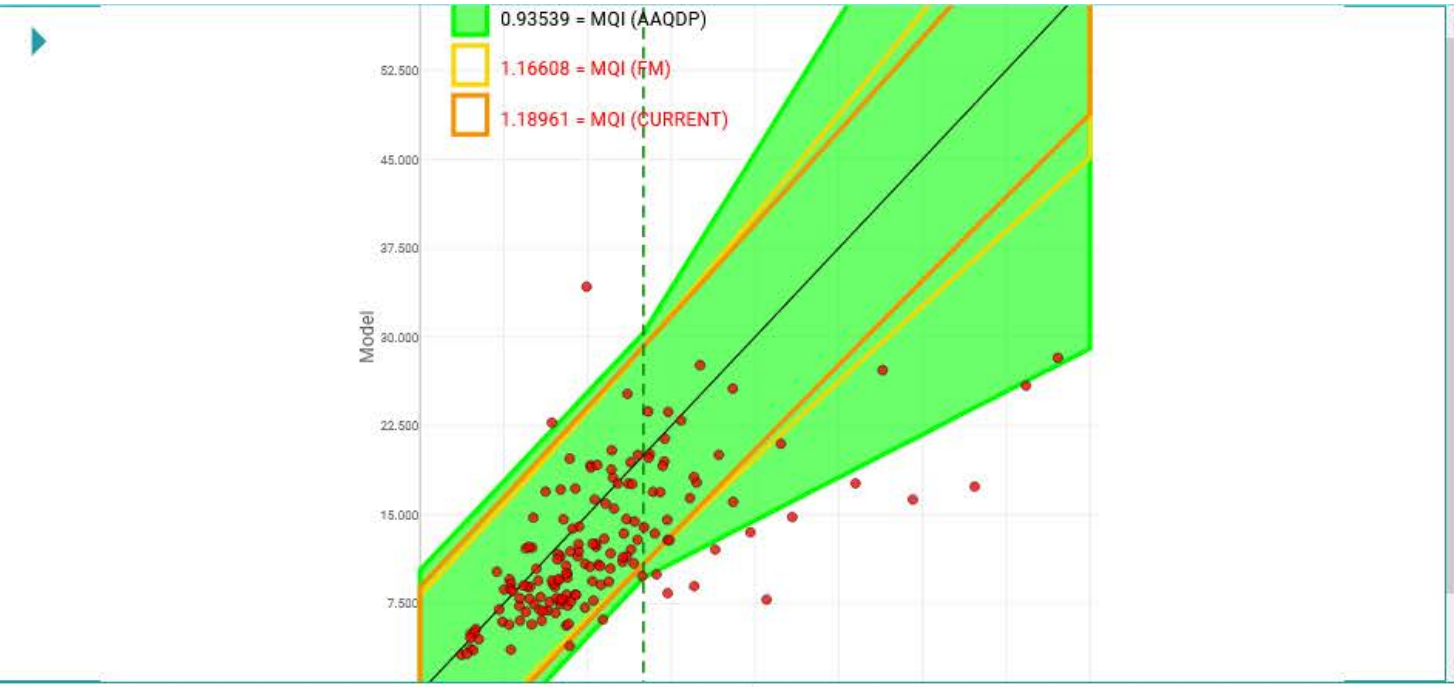


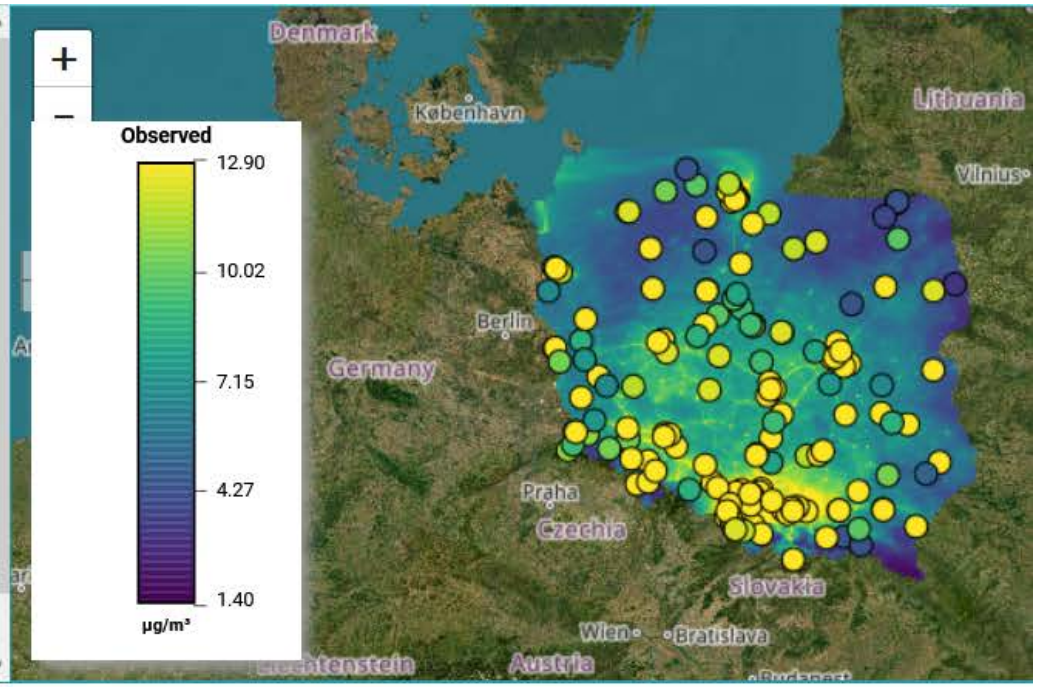


European Commission

WG2 Evaluation of the MQI robustness - Results

Robustness test II – type of station – NO2 – all stations – no assimilation





Types: Backgr. Industr. Traffic

Areas: Rural Suburb. Urban

Selected stations: 157/157

Color mode: Unique color

Interpolation: near

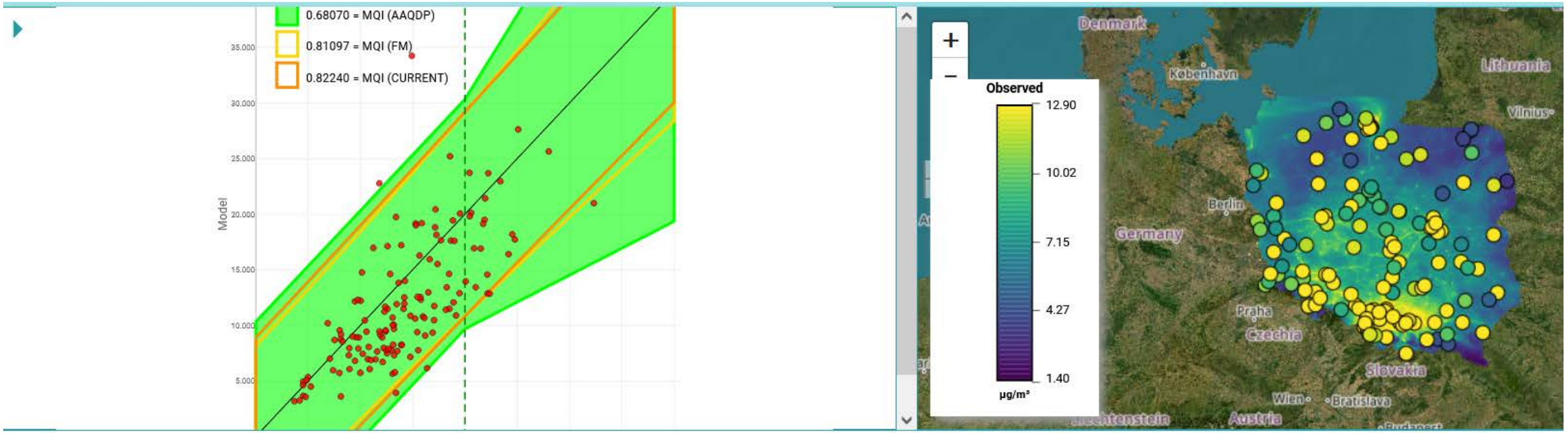
Reverse palette

Family:

European Commission

WG2 Evaluation of the MQI robustness - Results

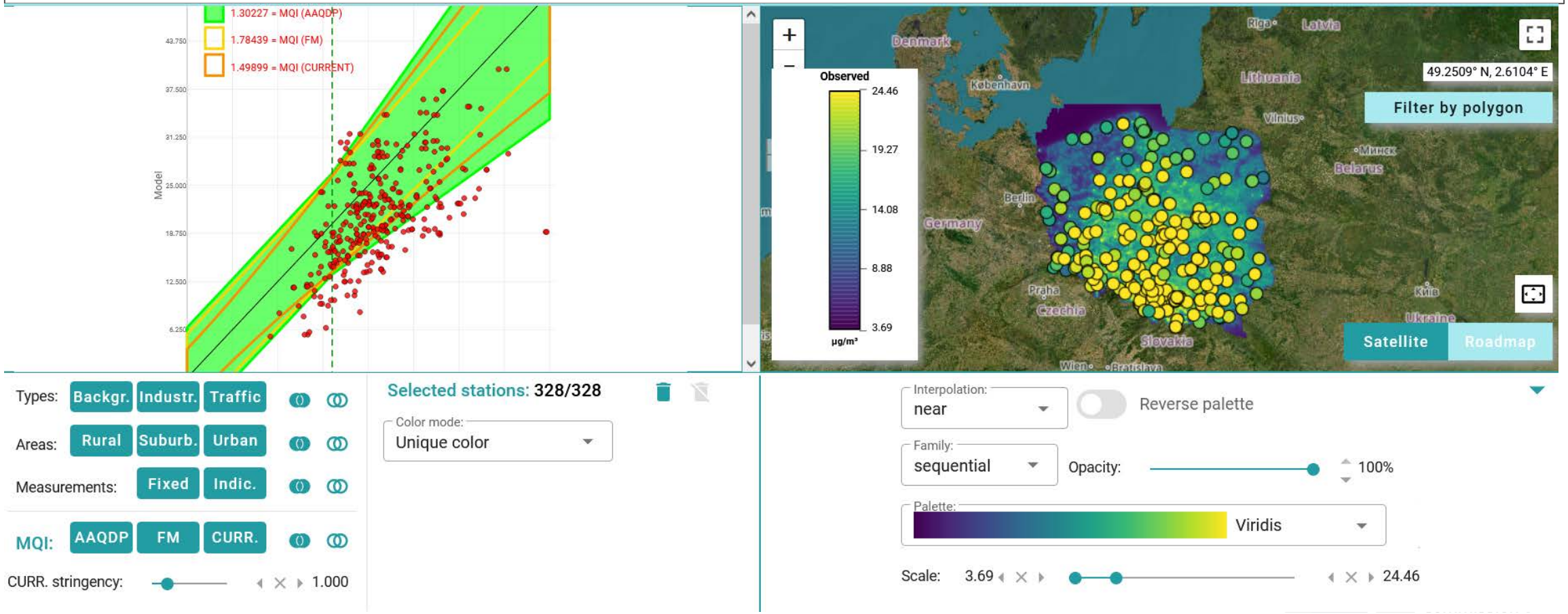
Robustness test II– type of station– NO2 – no traffic stations– no assimilation



European Commission

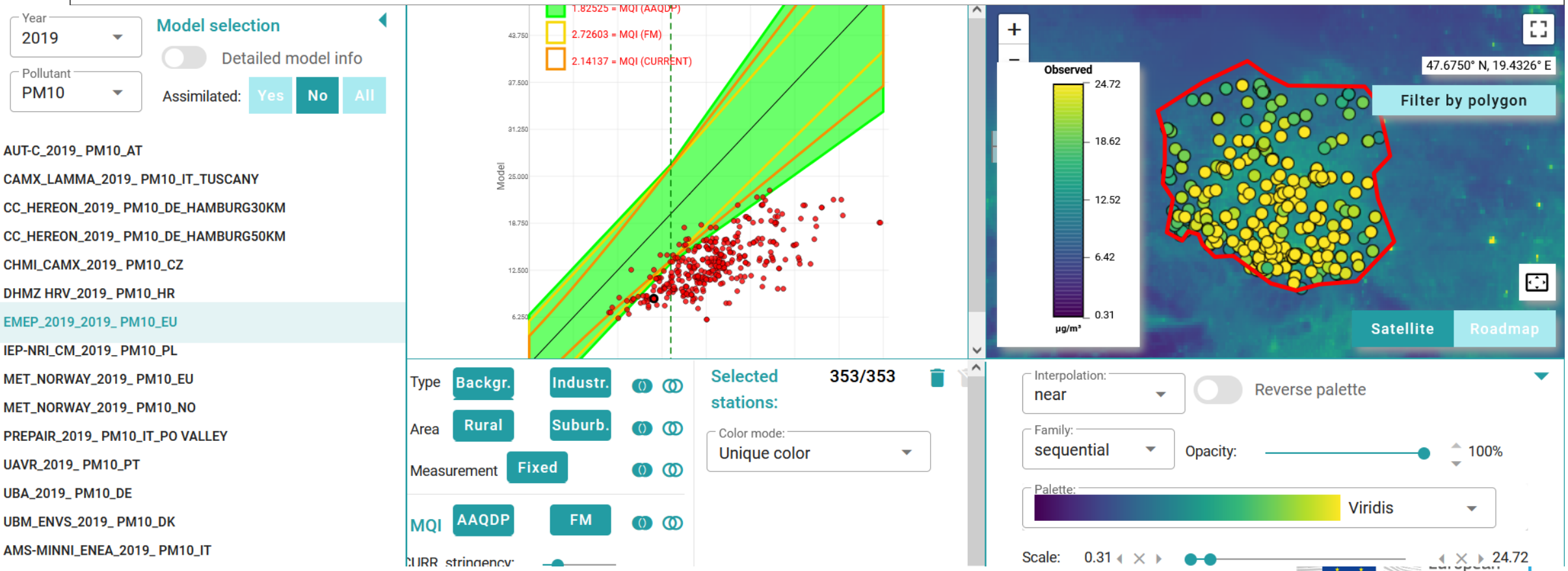
WG2 Evaluation of the MQI robustness - Results

Robustness test III – MQI comparison– PM10 – no assimilation – IEP - NRI



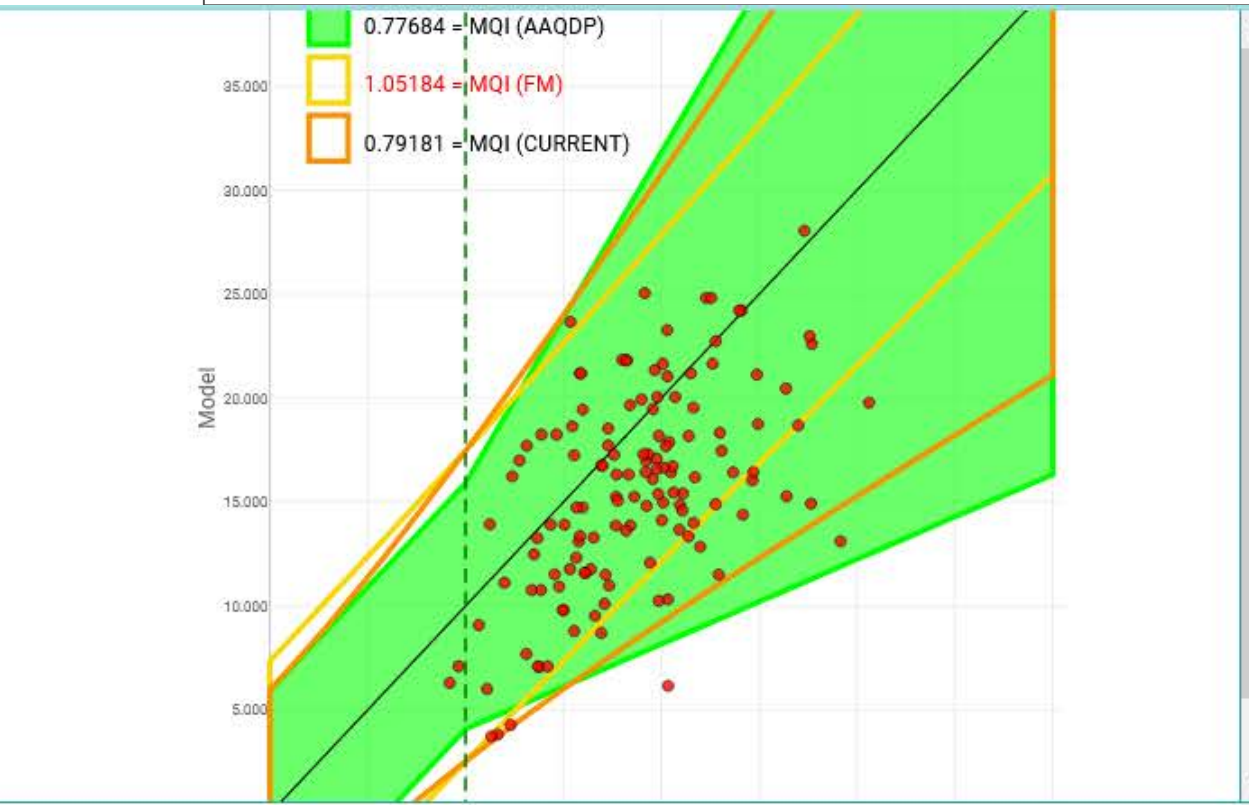
WG2 Evaluation of the MQI robustness - Results

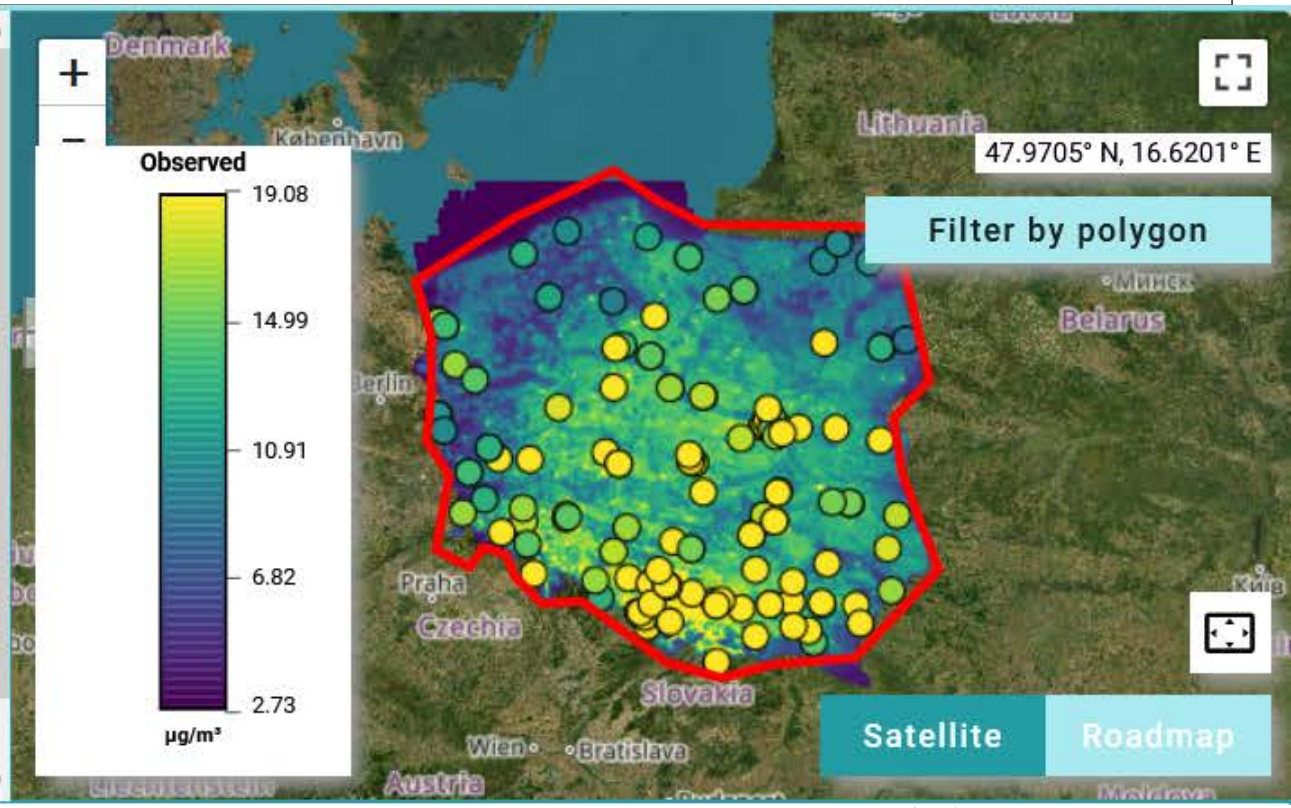
Robustness test III – MQI comparison– PM10 – no assimilation - EMEP



WG2 Evaluation of the MQI robustness - Results

Robustness test III – MQI comparison– PM25 – no assimilation – IEP-NRI

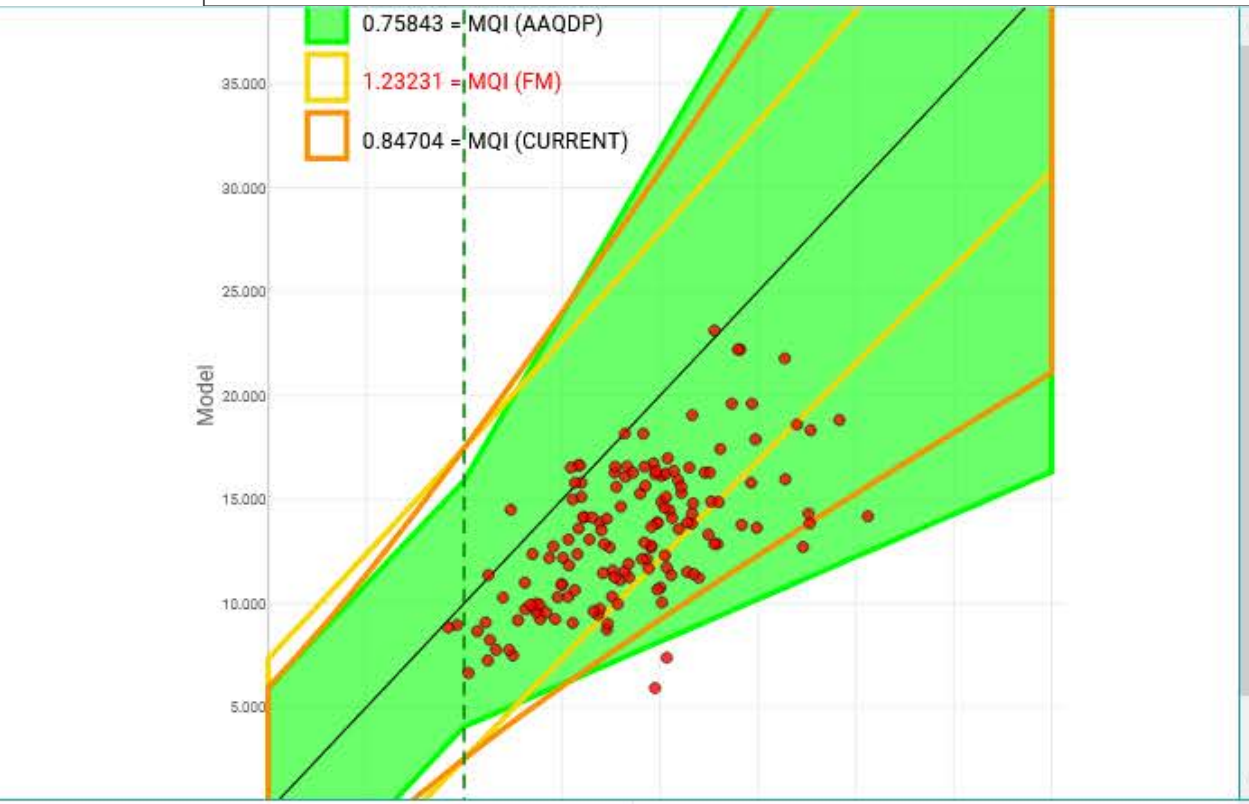


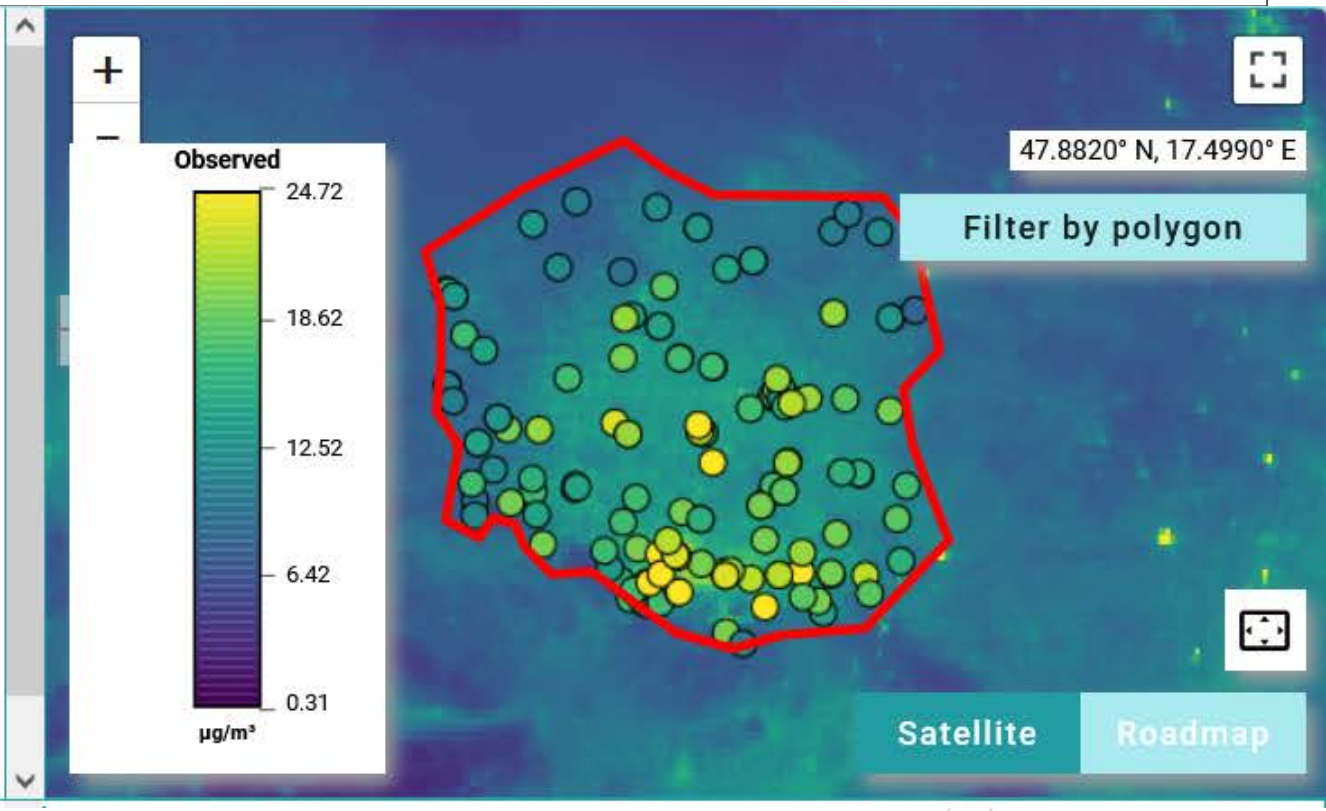


European Commission

WG2 Evaluation of the MQI robustness - Results

Robustness test III – MQI comparison– PM25 – no assimilation - EMEP

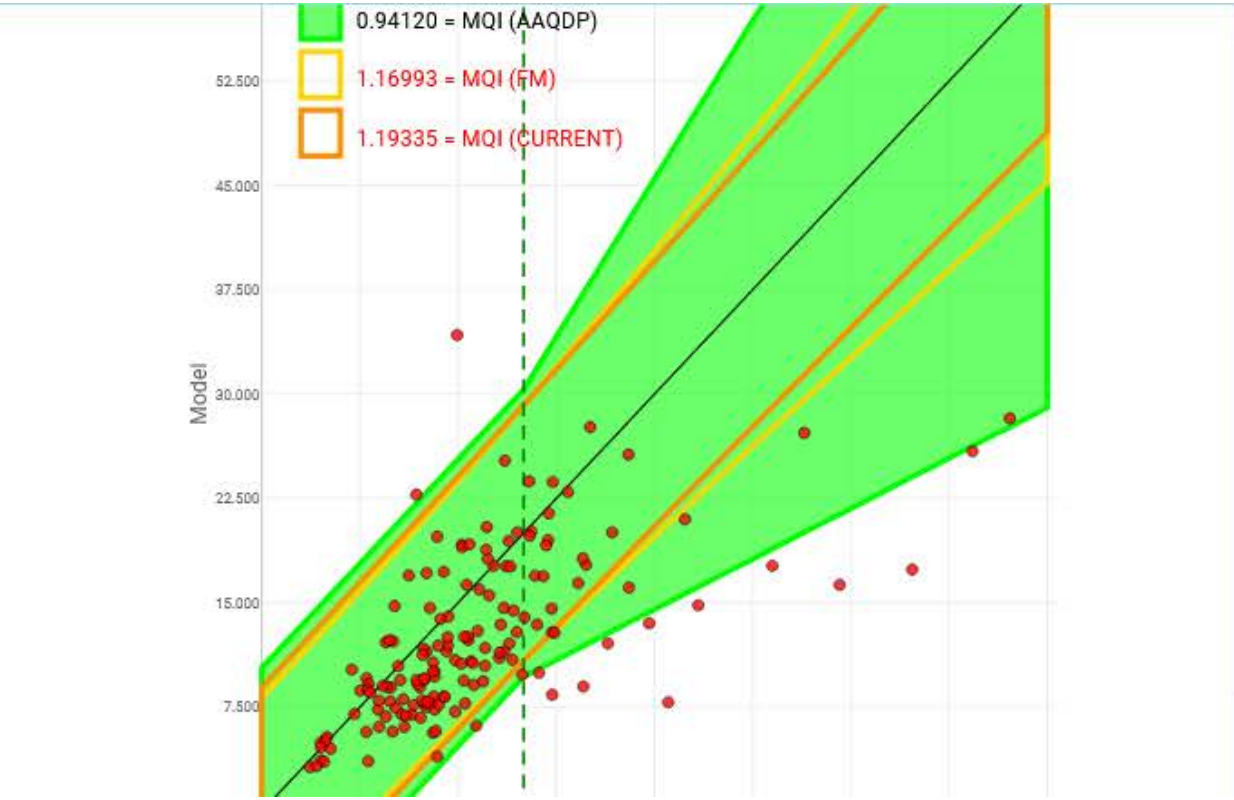


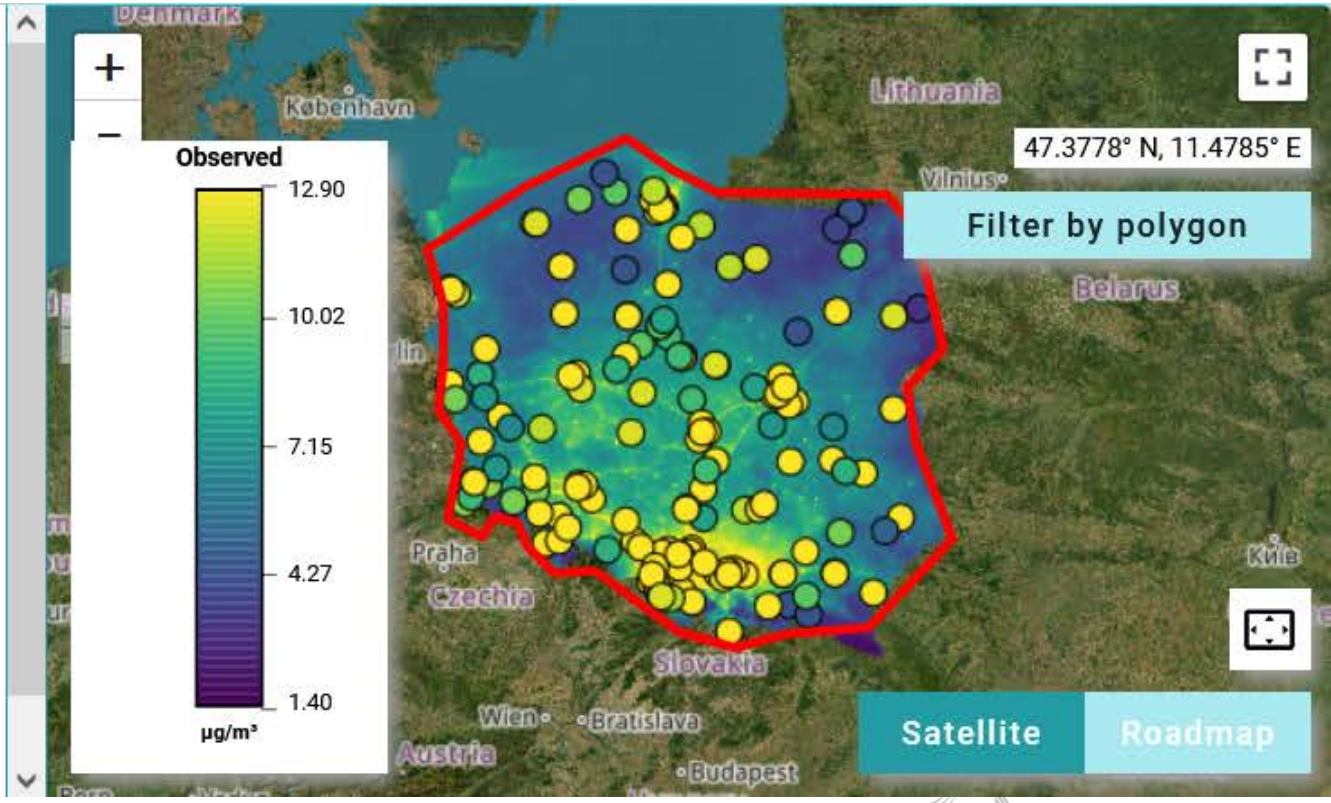


European Commission

WG2 Evaluation of the MQI robustness - Results

Robustness test III – MQI comparison– NO2 – no assimilation – IEP-NRI

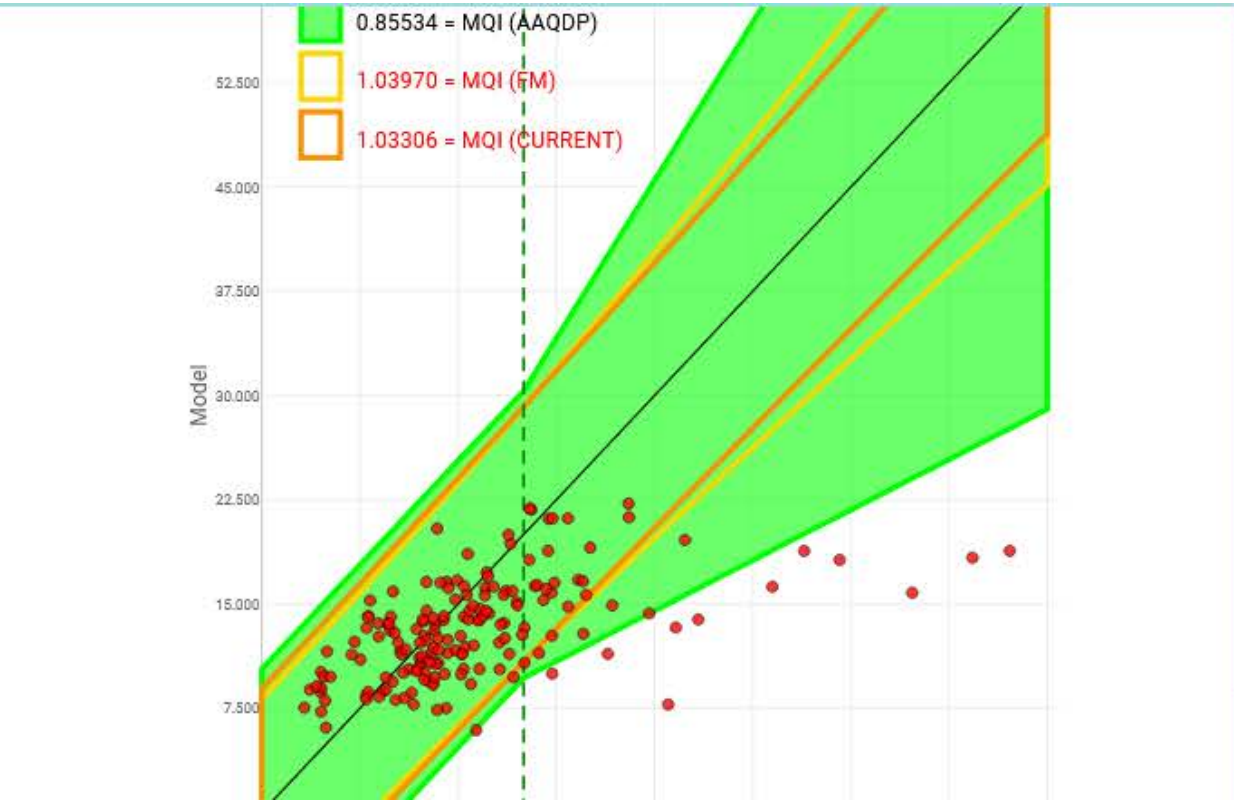


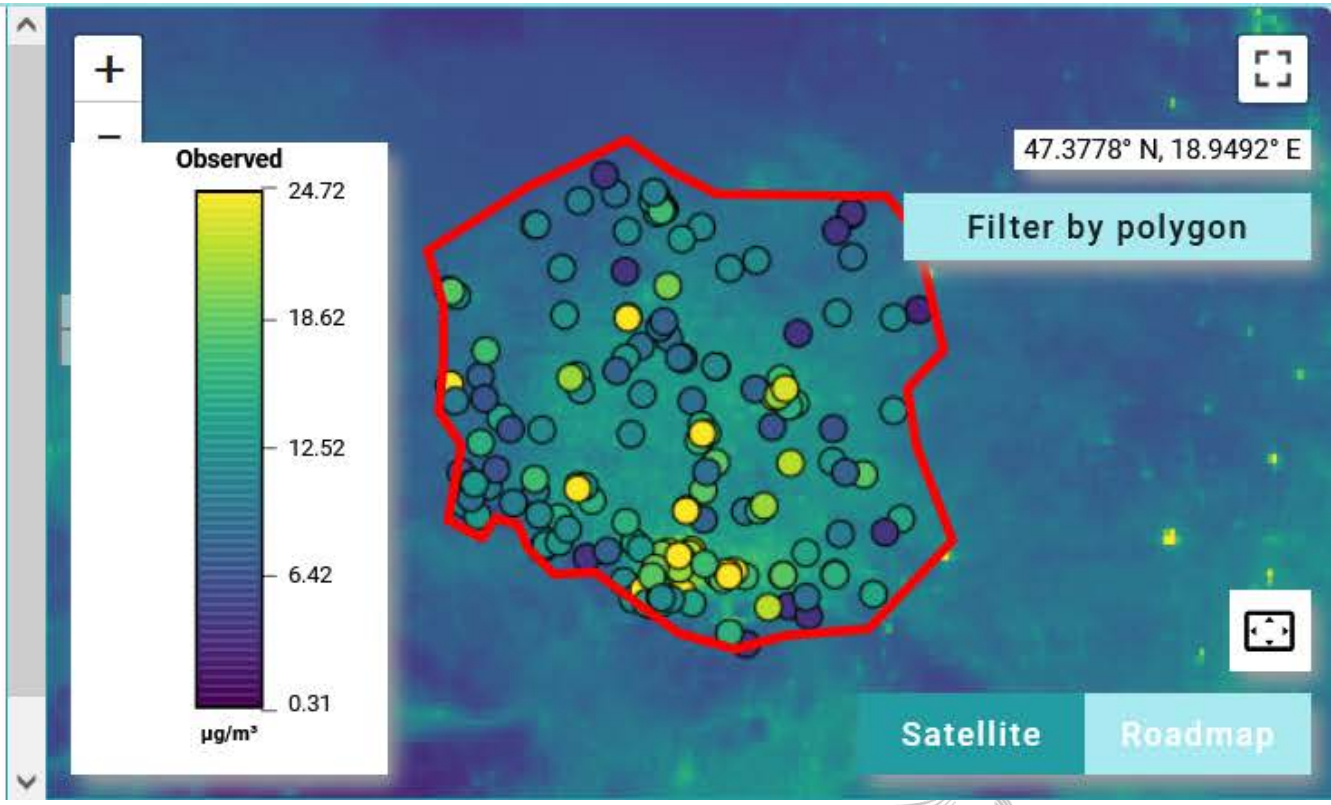


European Commission

WG2 Evaluation of the MQI robustness - Results

Robustness test III – MQI comparison– NO2 – no assimilation - EMEP





European Commission

WG2 MQI Mapping – overview

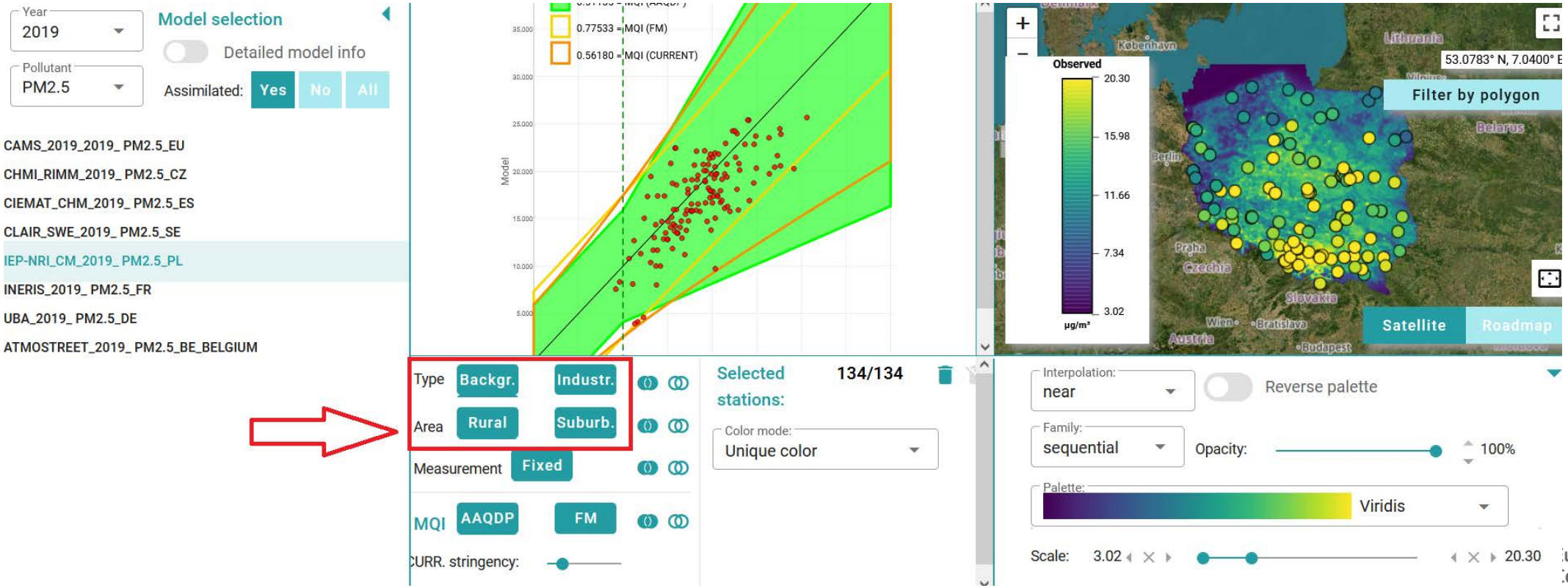
- Fast and intuitive,
- Good for quick evaluation, analysis of model MQI,
- Comparison of using different stations – best for NO2 analysis,
- Polygon vs country – find hot spots, areas where model performs better/worse – start point to talk about regionalization of emission factors,
- MQI comparison – interesting in terms of MQI robustness vs spatial distribution of pollutant

WG2 MQI robustness – Questions & suggestions

- **Is the MQI robust ? – Yes, i think it is – for the yearly assessment.**
- **Are the MQI stringent enough and consistent among pollutants? – it is stringent for PM10, PM25, NO2 – could be more demanding in terms of O3 – but this can be tricky in terms of changing uncertainty.**
- **Does the fail/pass MQO test ensure a valid distinction between Fit/non-Fit-for-purpose modelling applications? – well it depends of the purpose. 1. Good for the basic evaluation for assessment, source apportionment. 2. Debatable for station representativness. 3. For this moment not good enough for air quality forecast.**

WG2 MQI Mapping portal – small issue

- **No „traffic” type, and „urban” area on small screen (laptop 14”) – when model selection panel is closed they are visible**



Thank-you

European Commission