Updates from FAIRMODE

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FAIRMODE colleagues

What is FAIRMODE

- The Forum for Air quality Modeling (FAIRMODE) was launched in 2007 as a joint response initiative of the European Environment Agency (EEA) and the European Commission Joint Research Centre (JRC). The forum is currently chaired by the Joint Research Centre.
- Its aim is to bring together air quality modelers and users in order to promote and support the harmonized use of models by EU Member States, with emphasis on model application under the European Air Quality.

Current FAIRMODE structure

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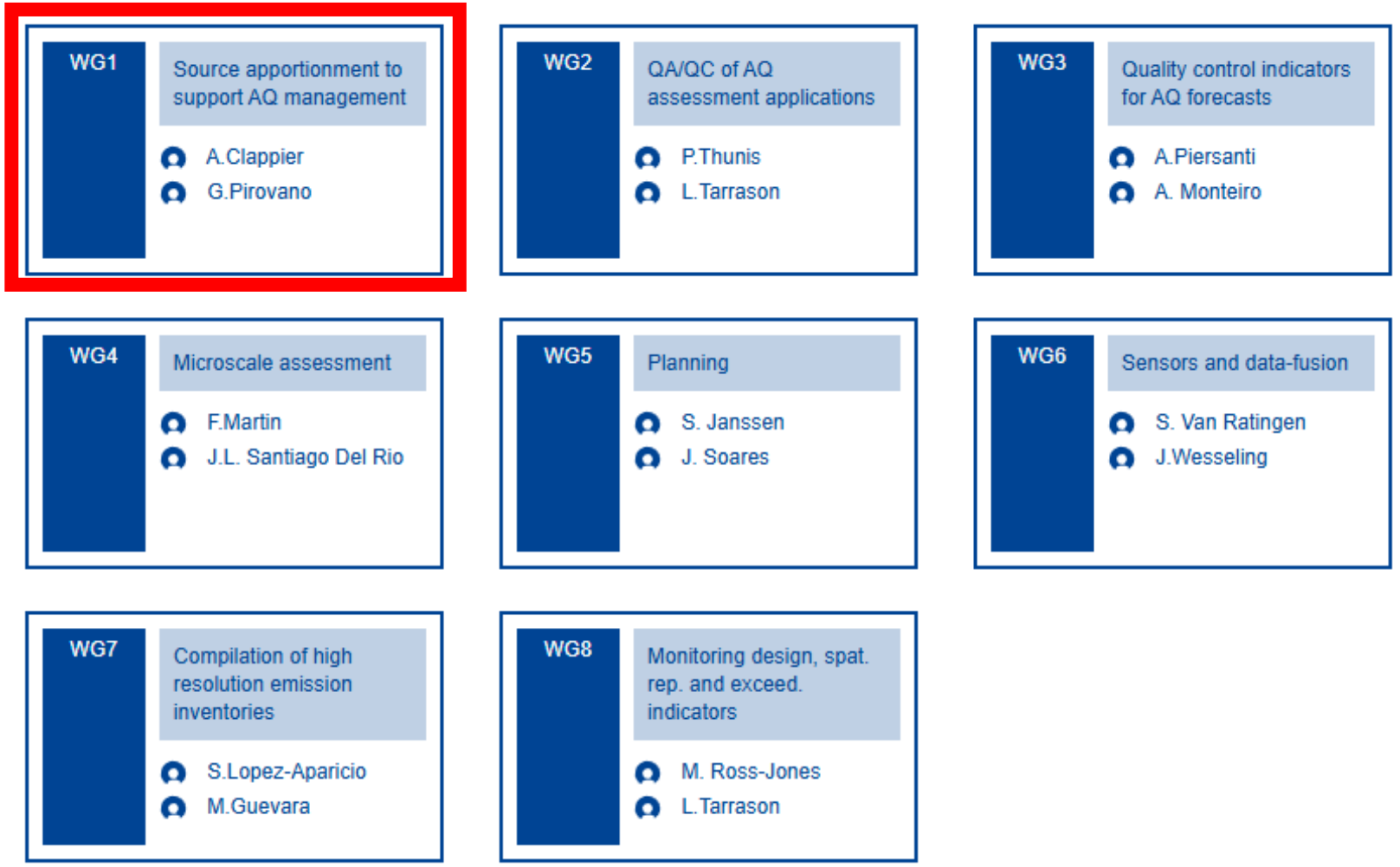
Current FAIRMODE structure



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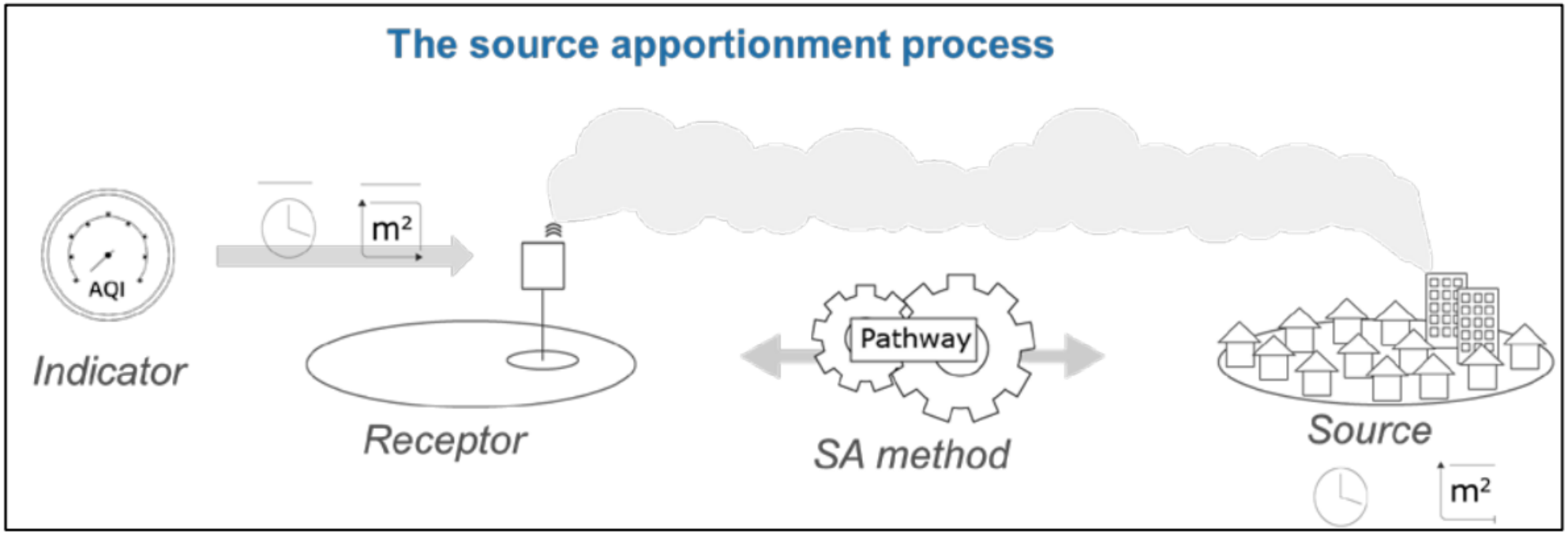
Methodological work to classify SA methods

Figure 1: Schematic flow chart representing the steps required to fully define any SA process, including the spatial and temporal dimensions associated to the source and receptor. The overbar indicates an averaging process.



Methods: impacts, contributions, increments ... local fraction...
Properties: unambiguity, additivity, dynamicity, consistency, completeness, ...
Discussion point: Which method for which purpose (assessment – planning)?

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FAIRMODE guidance document

JRC Publications Repository - Source apportionment to support air quality management practices

Brute-force is recommended for identification and quantification of sources in the context of air quality planning. For non-linear species, check range of validity.

Mass-transfer methods (tagging, receptor models) are suited for assessment, to identify sources.

The incremental approach is not recommended for air quality assessment neither for planning applications.

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What is now in the Directive (example for LT)

Air pollutant	Maximum uncertainty of fixed measurements		Maximum uncertainty of indicative measurements (1)		Maximum ratio of uncertainty of modelling applications and objective estimation over uncertainty of fixed measurements
	Absolute value	Relative value	Absolute value	Relative value	Maximum ratio
$PM_{2,5}$	3,0 µg/m³	30 %	4,0 µg/m³	40 %	1,7
PM_{10}	4,0 µg/m³	20 %	6,0 µg/m³	30 %	1,3

$$MQI = \frac{|BIAS|}{\sqrt{U_O^2(\bar{O}) + U_M^2(\bar{O})}}$$

$$U_M(\bar{O}) = \beta U_{O,fix}(\bar{O})$$

MQO is fulfilled when $MQI_{90th} \leq 1$

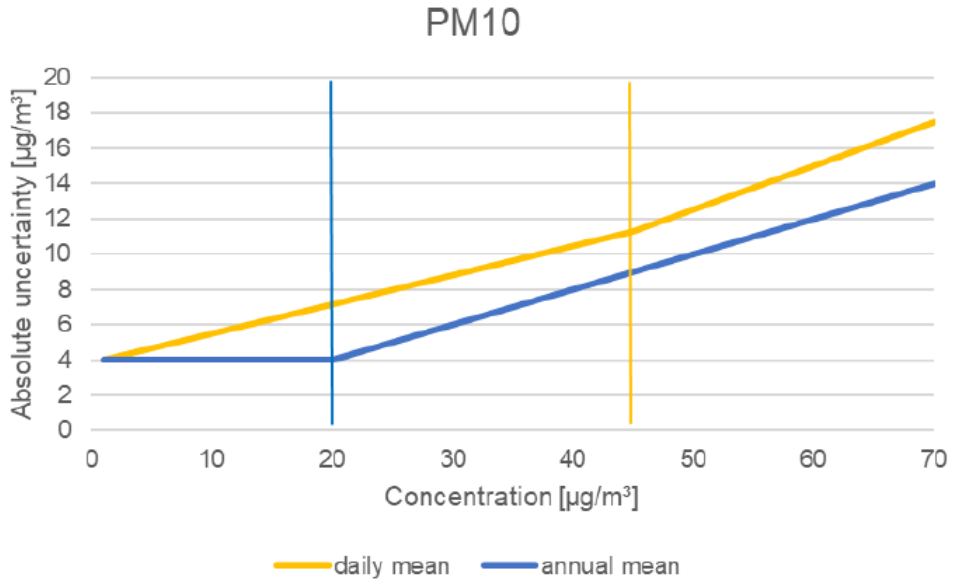


Figure 3-2 - Long-term (annual mean) and short-term (daily mean) PM_{10} measurement uncertainty to be used as reference for the MQI, as defined in the AAQD. Annual and daily mean limit values of 20 and 45 µg/m³ are given by the blue and yellow vertical lines, respectively.

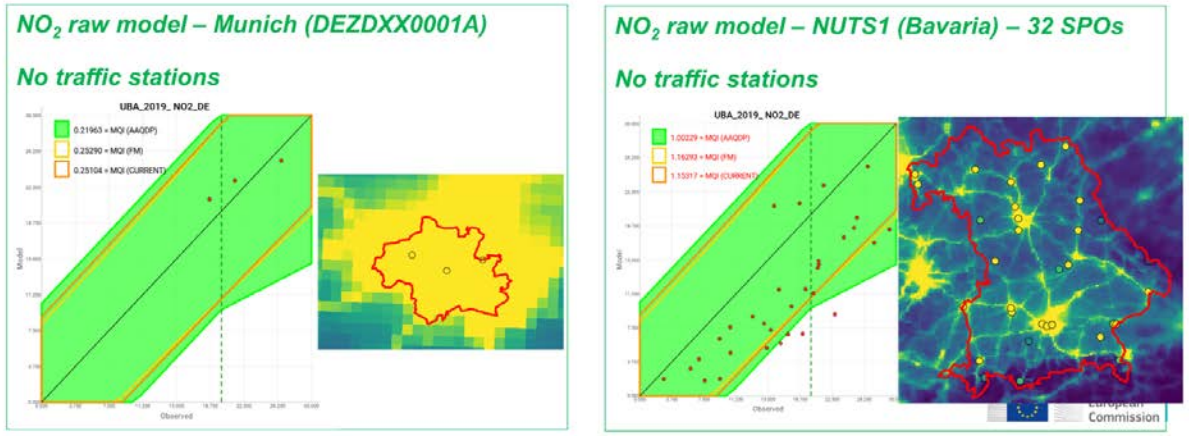
Tests for robustness of the MQI

Focus on minimum number of stations (SPOs)

The MQO easier to fulfill with few stations, appears to stabilize at around 10 SPO when larger areas are considered

WG2 MQI robustness – Germany

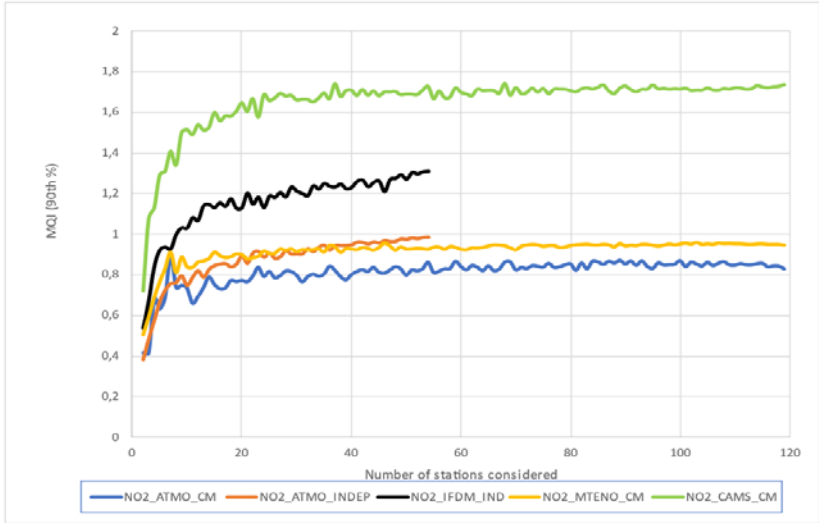
Robustness test I – MQI with respect to aggregation area (zone level vs. NUTS1)



WG2: Evaluation in Belgium

MQI for different stations and models

- stations Composite Mapper and Independent
- ATMO-Street, IFDM, METNO and CAMS



Tests for robustness of the MQI

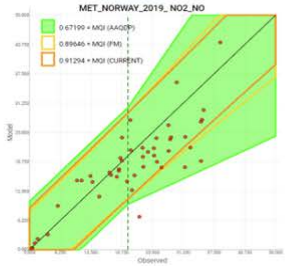
- ✓ **The yearly MQO for $PM_{2.5}$ is in general too easy to fulfill**
- ✓ MQI not stringent enough for $PM_{2.5}$ as it is formulated at the moment

WG2: Evaluation of the MQI - Norway

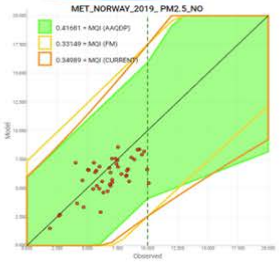
European models in Norway and local bottom-up modelling

Comparison in Norway of CAMS, EMEP, uEMEP-EU and uEMEP-NO MQI (AAQDP)

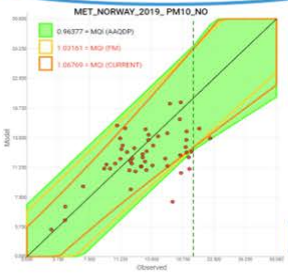
NO_2	All	BG
CAMS	1.62	1.06
EMEP	1.75	1.45
uEMEP-EU	1.16	0.69
uEMEP-NO	0.67	0.47



$PM_{2.5}$	All	BG
CAMS	0.52	0.31
EMEP	0.86	0.57
uEMEP-EU	0.51	0.35
uEMEP-NO	0.42	0.21



PM_{10}	All	BG
CAMS	1.51	0.75
EMEP	2.32	1.68
uEMEP-EU	1.67	1.15
uEMEP-NO	0.96	0.45



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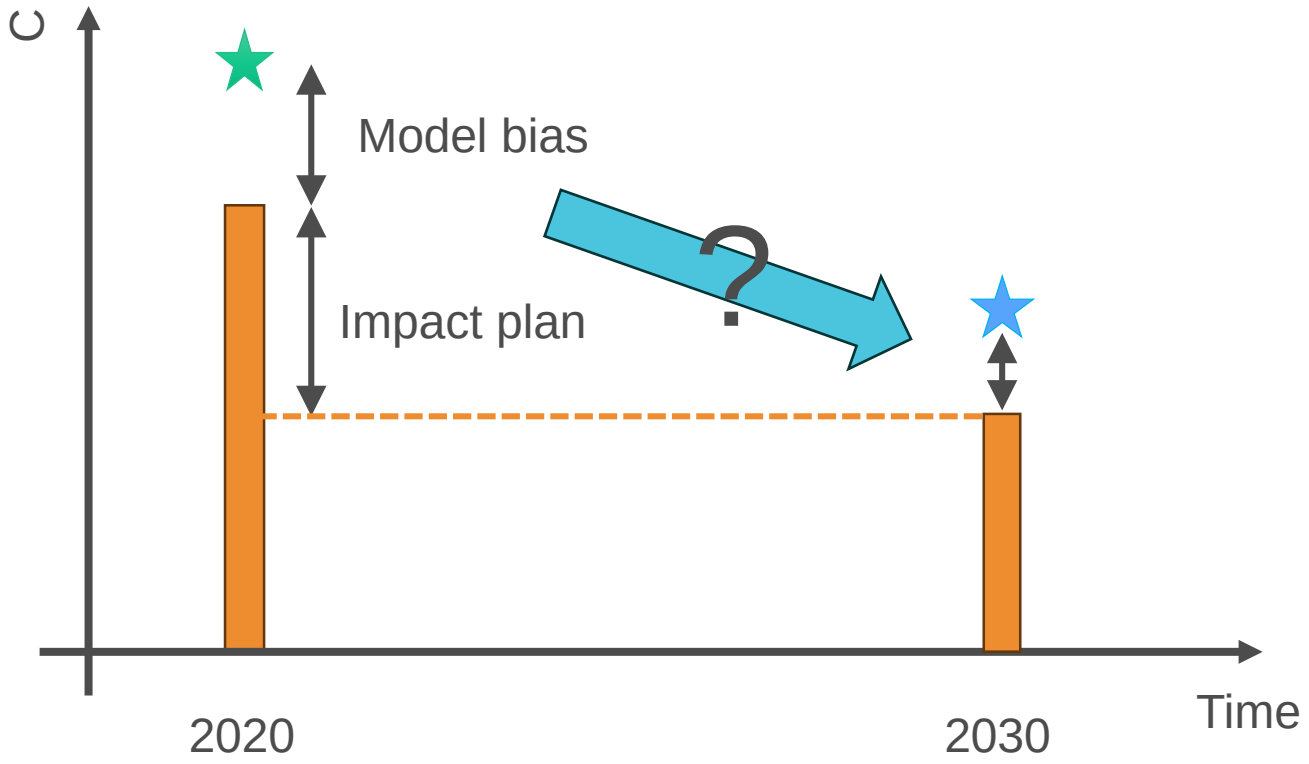
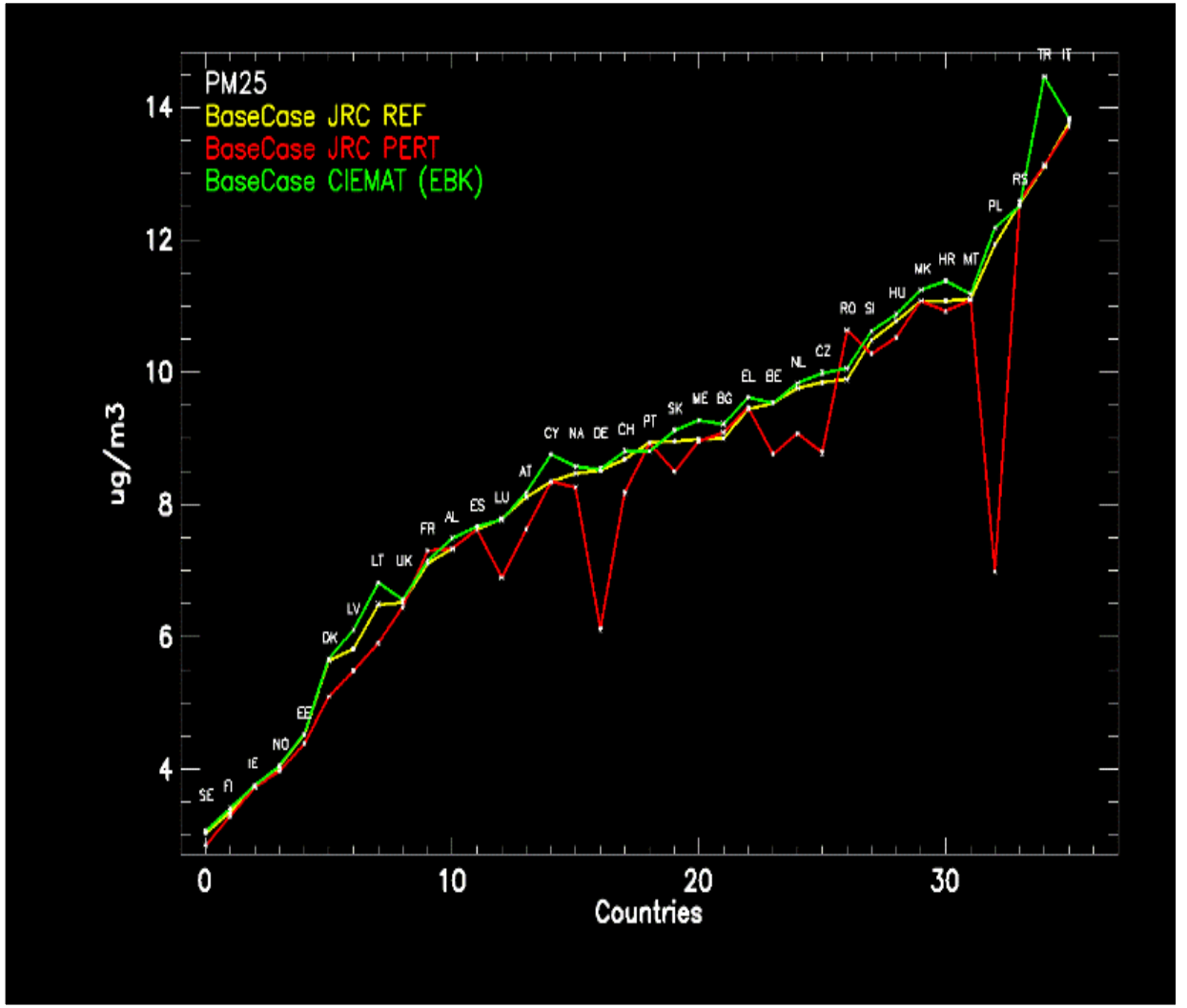
Bias projection

Additional issues:
- How to define the bias?
- How to extrapolate it in space?



- Observation
- Model
- Best estimate future concentration

First results



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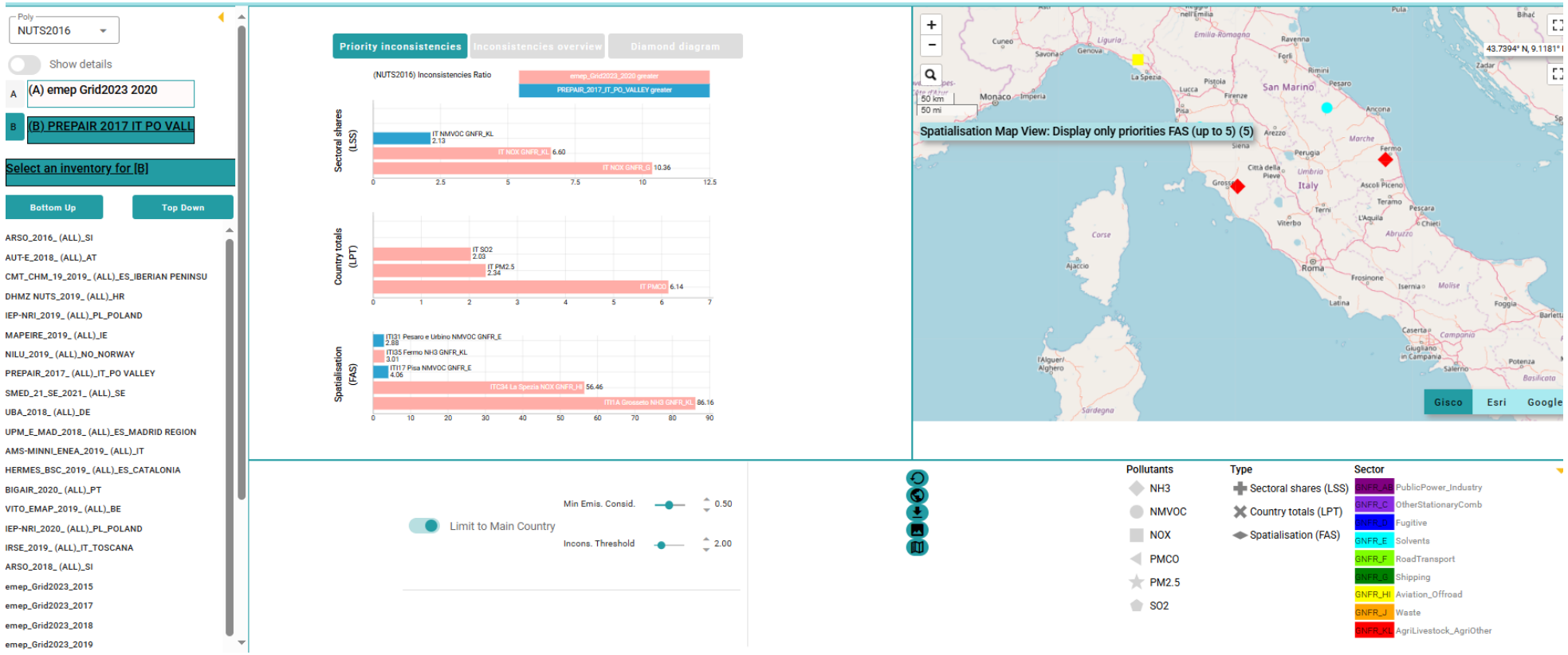
Emission benchmarking tool



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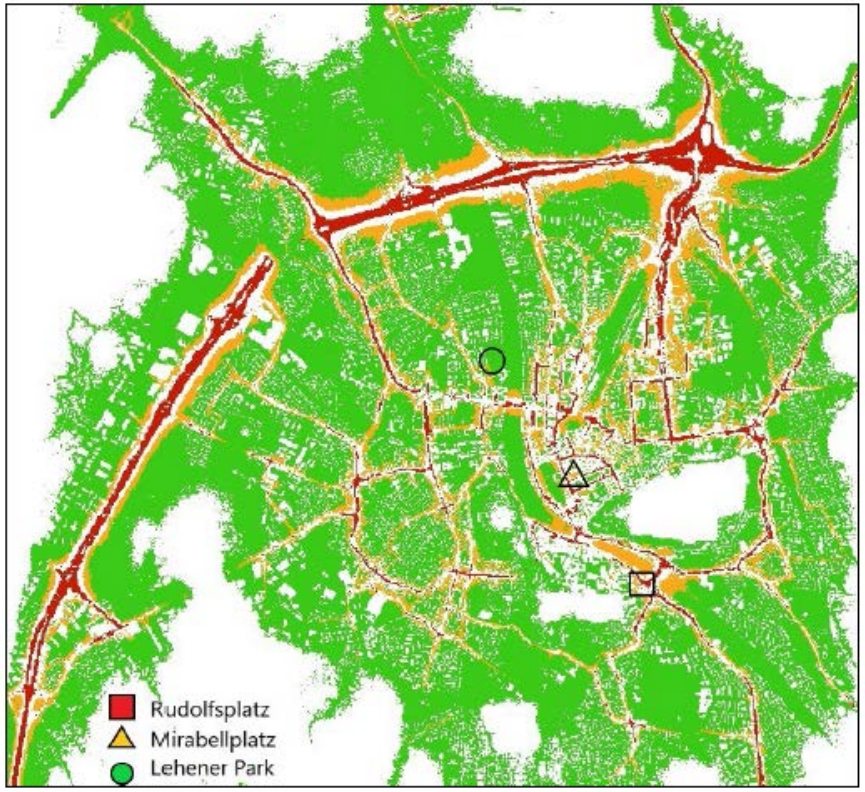
How to define spatial representativeness



Start with the best available reference air quality map for the air quality zone / country in which the sampling point is located -> starting point, modelled concentration at the sampling point (i.e. based on data fusion)

Calculate a concentration interval for estimating the sampling point's SRA (±15% with minimum tolerance)

Define the SR area

Confine it by Air Quality Zone

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Conclusions

- New AAQD -> new requests for the FAIRMODE network
- Updates on
  - WG1: impact of methodologies and of input, on SA
  - WG2: MQI evaluation
  - WG5: focus on bias projections
  - WG7: on emissions
  - WG8: on SR