# WG2: QA/QC and fitness for purpose of AQ assessment modelling applications

*P. Thunis, L. Tarrason*

*March 2023*

# Agenda

- Status of WG2 (P. Thunis)
- QA/QC of CAMS assessment policy products (F. Meleux)
- Modelling quality objectives & AAQD 2022 (P. Thunis)
- Future activities and links to AAQD (L. Tarrason)
- Discussion

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# *Status*

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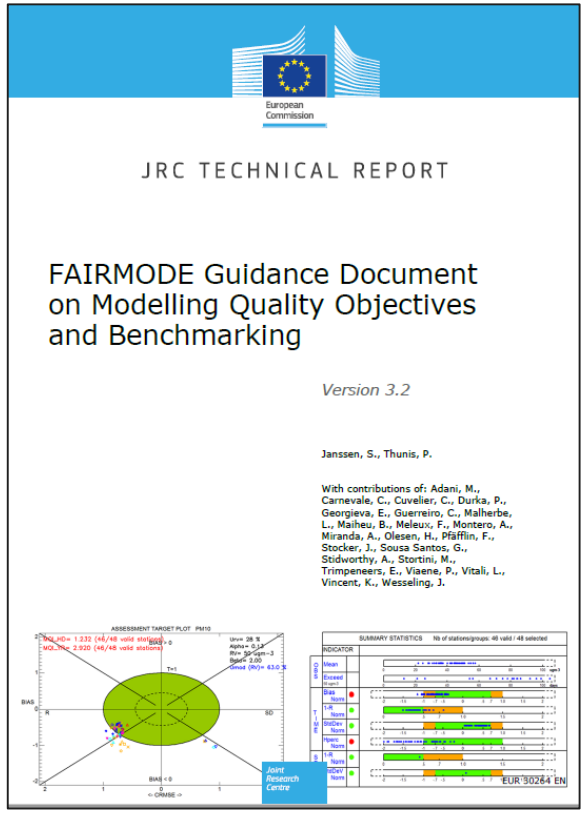
# Modelling Quality Objective (MQO)



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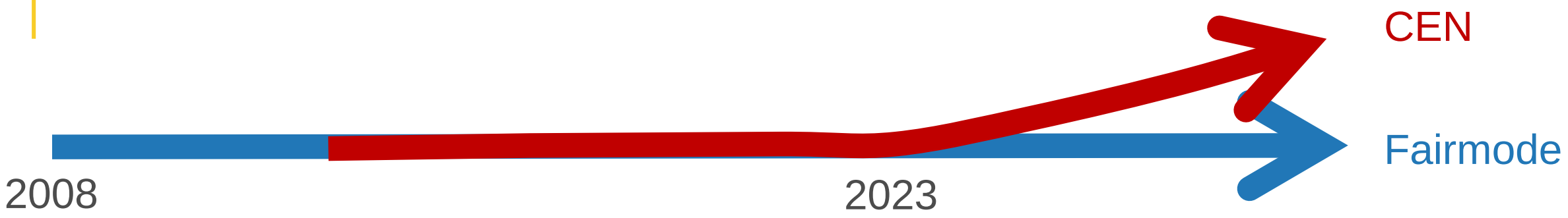
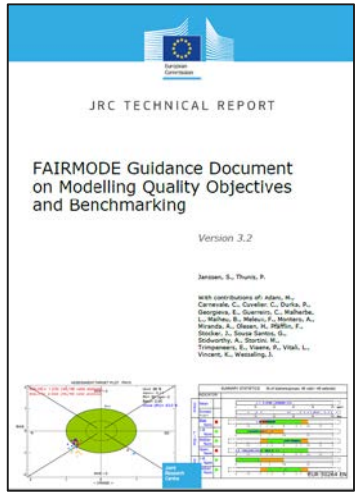
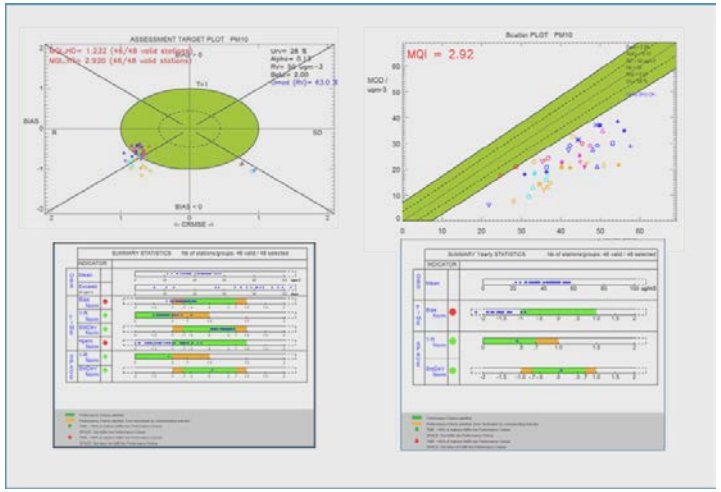
# CEN 43 (MQO) vs FAIRMODE




- On the CEN side:
  - Currently: Finalisation of the formulation, including a working set of parameters
    → technical specifications
  - Future: validation work to assess robustness
- On the FAIRMODE side:
  - Testing, testing …
  - Develop further specific aspects (options to cope with few stations, high percentiles…)

# Background



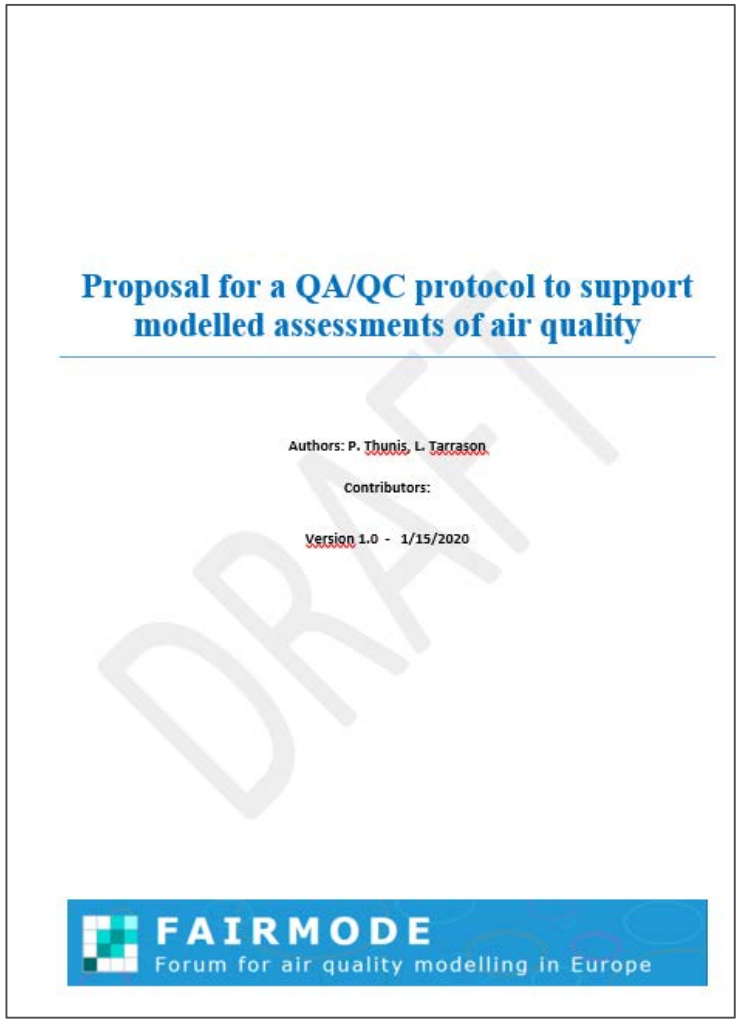

The MQO is not sufficient to ensure quality of modelling applications

The main drawback of the MQOs is that they provide a **single summary pass/fail** information.

It provides limited information on the capability of the model to reproduce **hot spot areas** (spatial variability) or the timing of the **pollution peaks** (temporal variability).

This key information for the AAQD is only partially addressed with the current MQO proposal.

# Proposal for a QA/QC protocol (2020)




- Additional indicators for spatial variability
- Additional indicators for temporal variability
- Screening indicators for emissions (link to WG7)

- Need for additional testing!
  - Composite mapping exercise (at least for some of these indicators)
  - JRC on CAMS data

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# E-reporting of AQ model results

- Data flow D1b: Assessment methods – modelling metadata
  - Do we need to add/remove information to the modelled proposed metadata?
- Data flow E1b: modelling results and actual MQI
  - Is the current MQI reporting demand with both information on the measurement stations and on the aggregated situation appropriate?
- Do we need to include more detail emission information as proposed in WG7 for assessment purposes?

https://discomap.eea.europa.eu/App/AirQualityModels/index.html#.eu/

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# Proposed metadata for modelling

| | | |
|---|---|---|
| Basic information | Model name | |
| | Version | |
| | Contact information | |
| | Model type | Eulerian, Gaussian.. |
| | Model documentation | Schemes, parametrizations |
| Coverage & Resolution | Model domain/ spatial coverage | Geographical extent |
| | Year | |
| | Temporal resolution | |
| | Spatial resolution | |
| Input data | Emissions | Do we need more than just the name ? |
| | Meteorology | |
| | Initial & boundary conditions | |
| | Data assimilation / fusion | Requested by FAIRMODE, currently not required |
| Data Quality – MQI and MPI | Actual values FAIRMODE methodology | MQI ( no need for MPI too complicated) |
| | Observations - measurements | Basis for MQI calculations / ASCII or CSV |

# Way forward

- Use the MQI composite exercise to:
  - Test MQI and additional MPI (wherever feasible)
  - Test medata reporting scheme (completeness vs. burden)

# Thank-you

# Future activities and links to the AAQD

*L. Tarrason and P. Thunis*

*March 2023*

# WG2 Roadmap 2023-2025 – Linked to AAQD

The Commission revised AAQD proposes an enhanced role of modelling for air quality management and assessment purposes "Making better use of modelling to a) detect breaches of air quality standards, b) inform air quality plans and c) the placement of sampling points – which requires improving the quality and comparability of air quality modelling"

- MS are to **ensure the accuracy** of the modelling applications (Article 5)
- MS are to complement assessment of **exceedances** to LV and TV with modelling (Article 8)
- New **quality objectives for modelling** introduced (Article 11 and Annex V)

***Modelling Performance Indicators – role of FAIRMODE***

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# WG2 Roadmap 2023-2025

WG2 roadmap for the next 3 years to identify good modelling quality assessment practices

Proposed further development of the composite mapping platform by adding

- An **on-the fly  MQI/MQO** aligned with the AAQD
- A **benchmark EU map** linked to ensemble **emission benchmark**
- Structured and regular **inter-comparisons**

***Modelling Performance Indicators – role of FAIRMODE***

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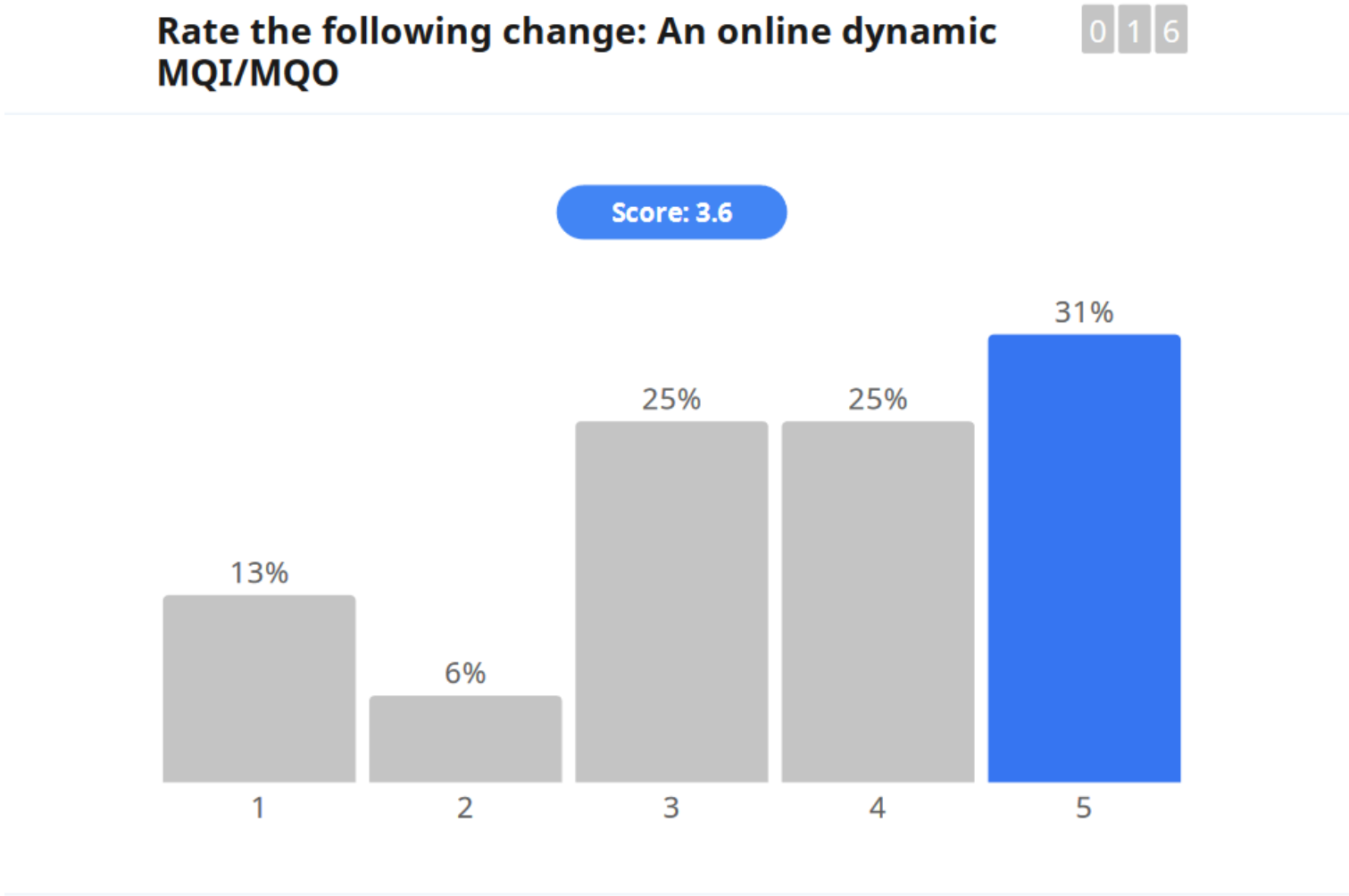
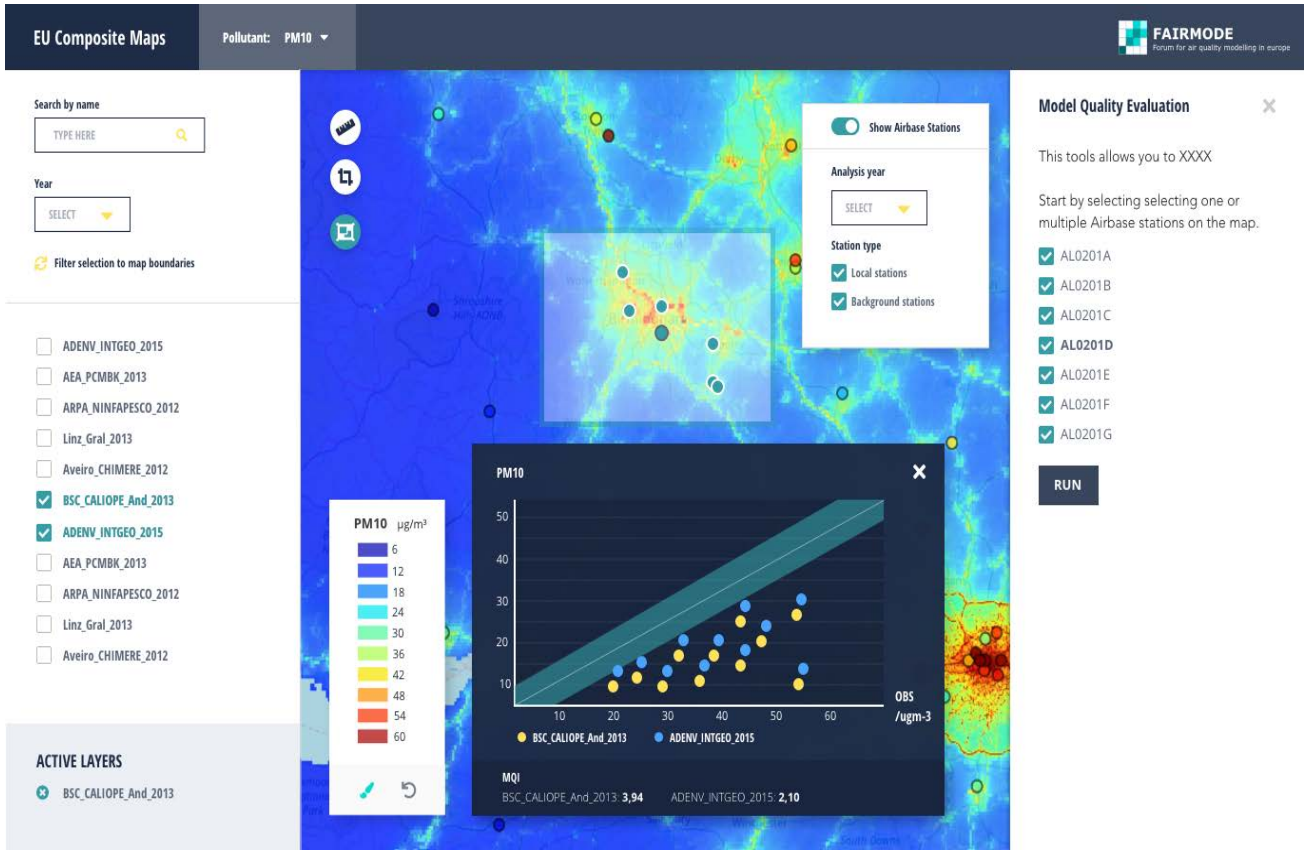
# Step 1: On-the-fly MQI

***Definition better aligned with the revised AAQD***



# Step 1: On-the-fly MQI




- User-defined set of AIRBASE stations for the MQI calculation
- Available for $NO_2$, $PM_{10}$, $PM_{2.5}$ and $O_3$
- Only possible for the annual MQI

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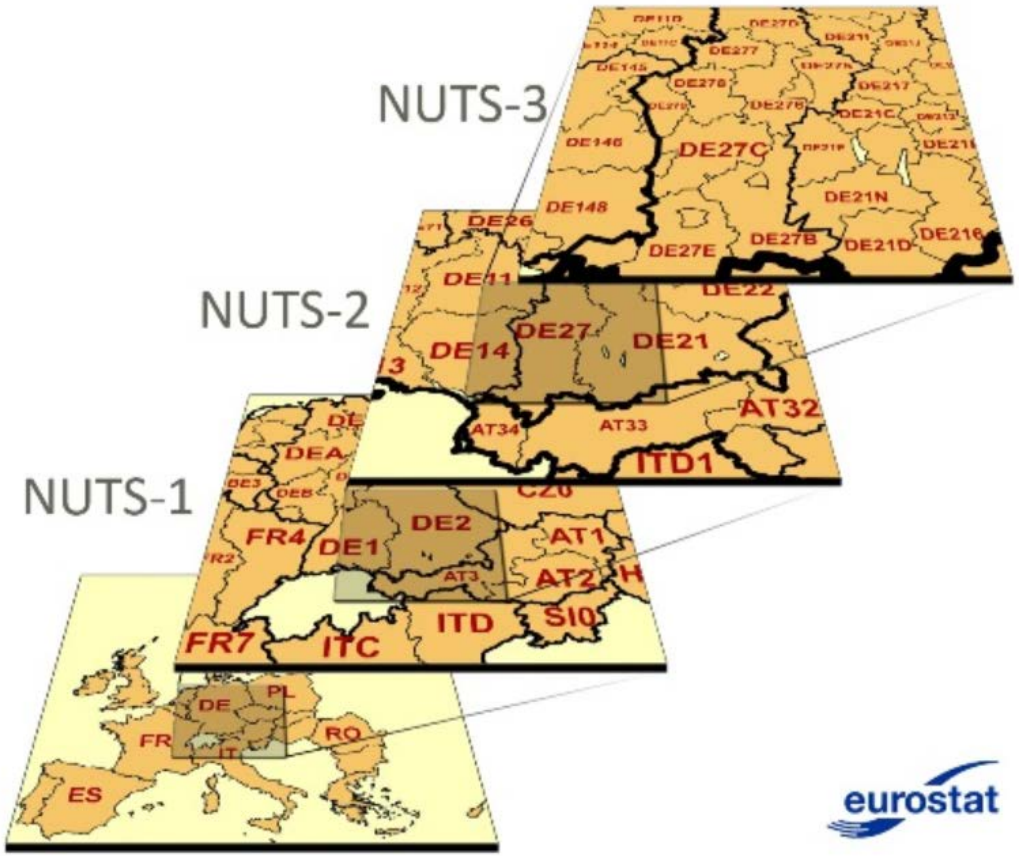
# STEP 2: Collation of MQI map




- From EU to NUTS3 (AQ zone?) and where possible (minimum monitoring station) and available (modelling) to city scale
- Based on all available AIRBASE stations (regardless of classification)
- For $NO_2$, $PM_{10}$, $PM_{2.5}$ and $O_3$
- Only possible for the annual MQI

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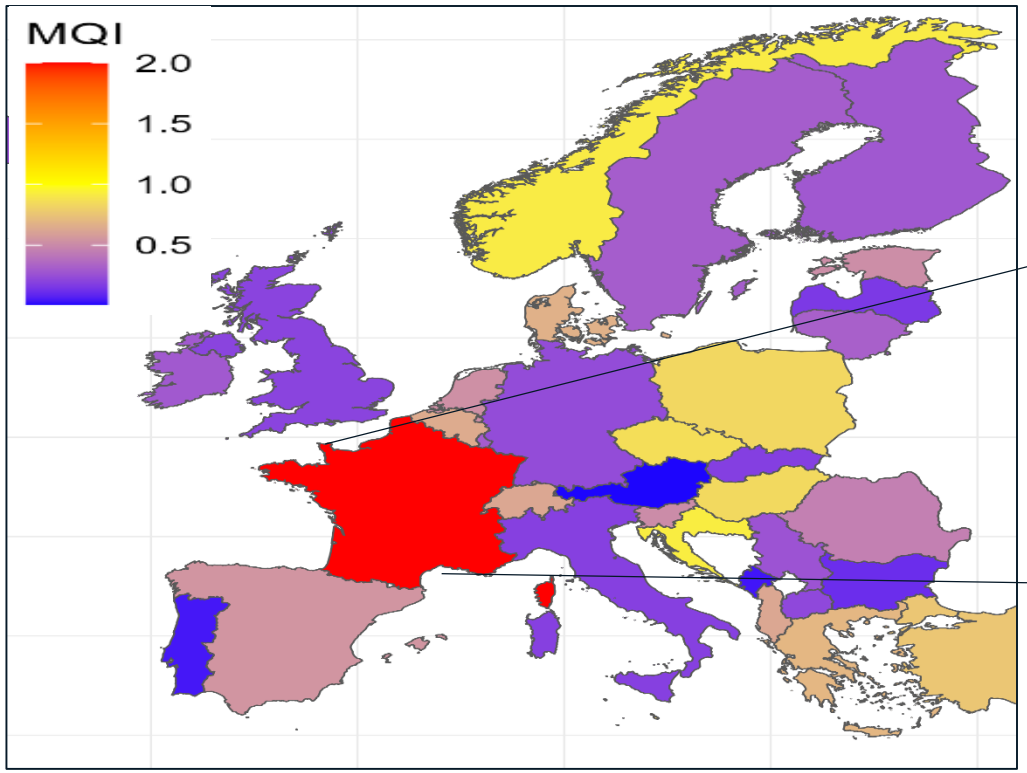
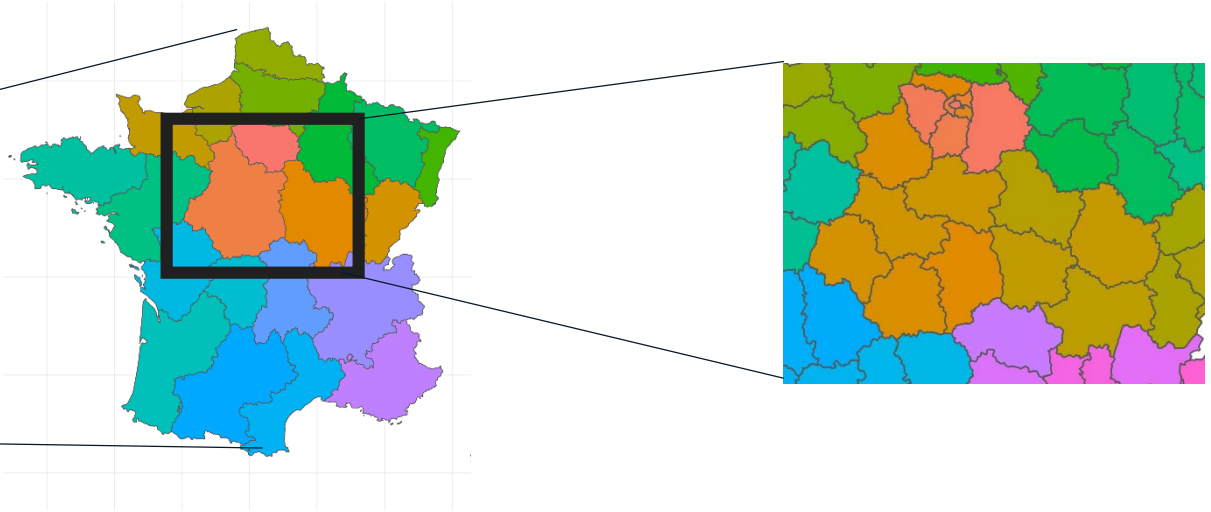
# STEP 2: Collation of MQI map




- Allows evaluation of modelling capabilities across Europe



FAIRMODE WG2 MQI map to steer discussions and improvements

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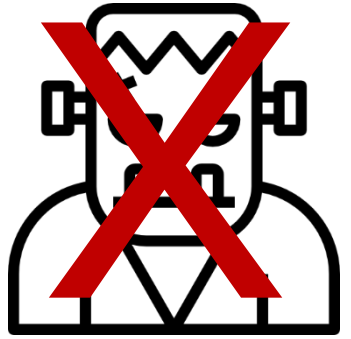
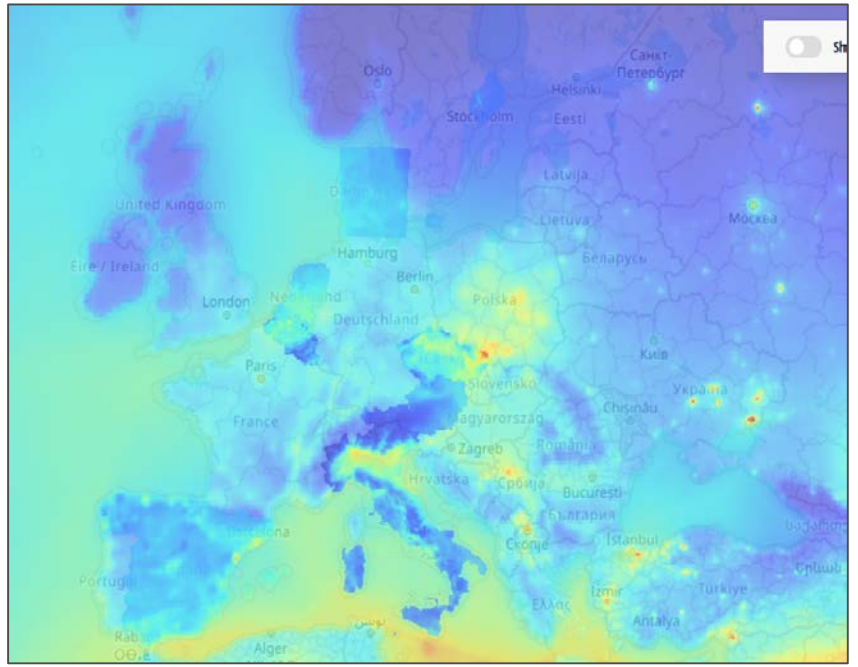
# STEP 3: AQ benchmark assessment map



- From larger (country - NUTS0) to smaller scale (NUTS3 – city), compare MQI for all available EU maps at a given spatial scale.
- Best MQI map gets selected!
- Benchmark assessment for testing other parameters than MQI:
  - exposure, station representativeness, design of monitoring networks, evaluation of data-assimilation…
  - Linked to emission benchmarking




- For $PM_{2.5}$, $PM_{10}$, $NO_2$ and $O_3$
- Unique fixed year

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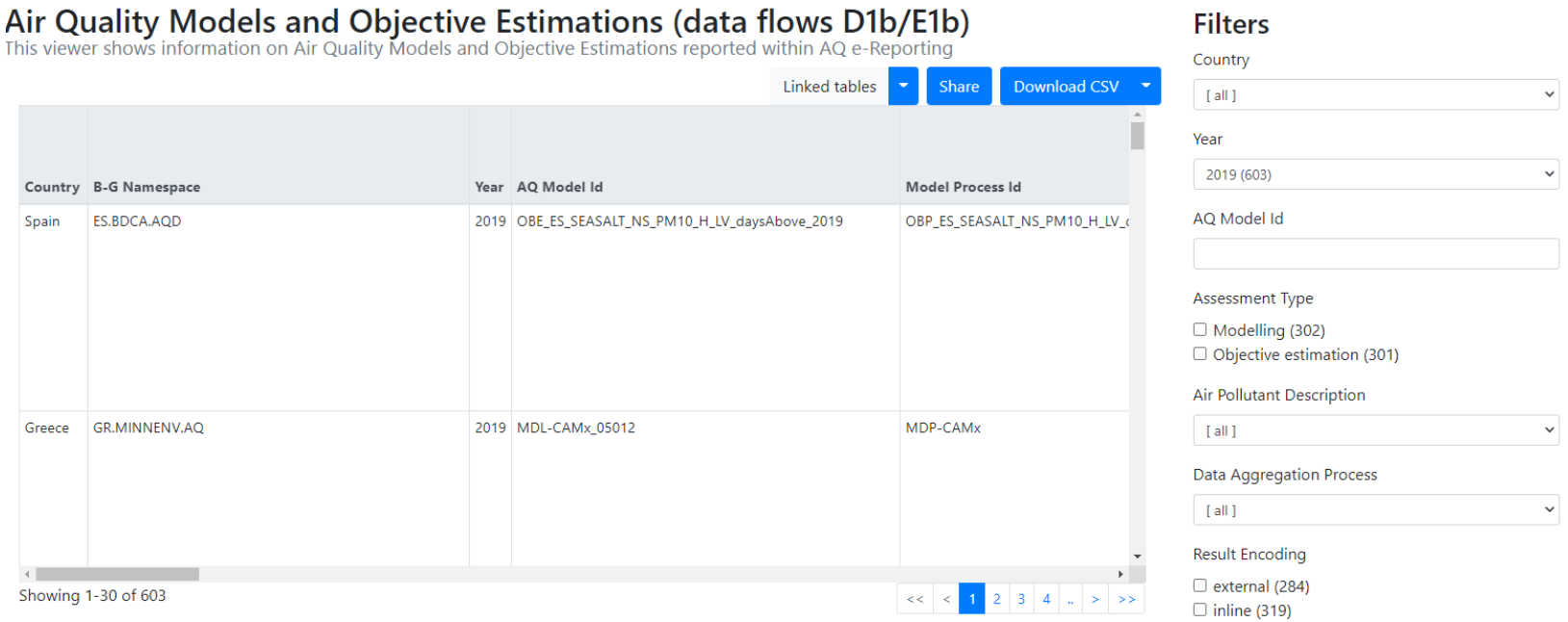
# STEP 4:  Feedback for e-reporting

- E-reporting Air Quality Models – Data flows  D1b and E1b




**D1b assessment methods – modelling Metadata**

**E1b modelling results and actual MQI**

https://discomap.eea.europa.eu/App/AirQualityModels/index.html#.eu/

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# Time schedule for activities in 2023

- On the fly MQI/MQO
- Benchmark assessment map
- QA/QC aggregated emissions

**Summer 2023**

- Delivery of results for inter-comparisons

**Before summer 2023?**

- Required input
  - Best map at EU, country, regional or urban scale for NO2, PM10, PM2.5 or/and O3
  - Sector/pollutants emission totals (over largest administrative area and a set of defined  smaller areas
  - For one specific fixed year
  - Meta data (to be agreed)

# WG2 Roadmap 2023-2025  Priorites

- Regular inter-comparisons and targeted analysis
  - Targetted  analysis of the MQI across Europe  (based on the comparison of on-the-fly and reported MQI)
  - Testing usability and usefulness of modelling metadata
- Guidance on model application, documentation and validation
  - Support to AAQD guidance on model use
  - Support to CEN WG43 (MQO)  on the equivalence and the implementation of MQI

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# Questions

- Do you agree with this approach?
- Would you like to participate in the first compilation of the MQI map?
- Do you have any recommendations to WG2 roadmap ?

# Thank-you

# Questions

- Added value of the MQI/MQO on-the fly mapping
- Traffic light maps over Europe

- Best practice for the calculation of MQI
- Comparisons of MQIs reported and calculated
- Recommendation on metadata
- Links to Composite mapping  - WG8 Spatial representativeness
- Border inconsistencies – Baseline for WG1, WG5

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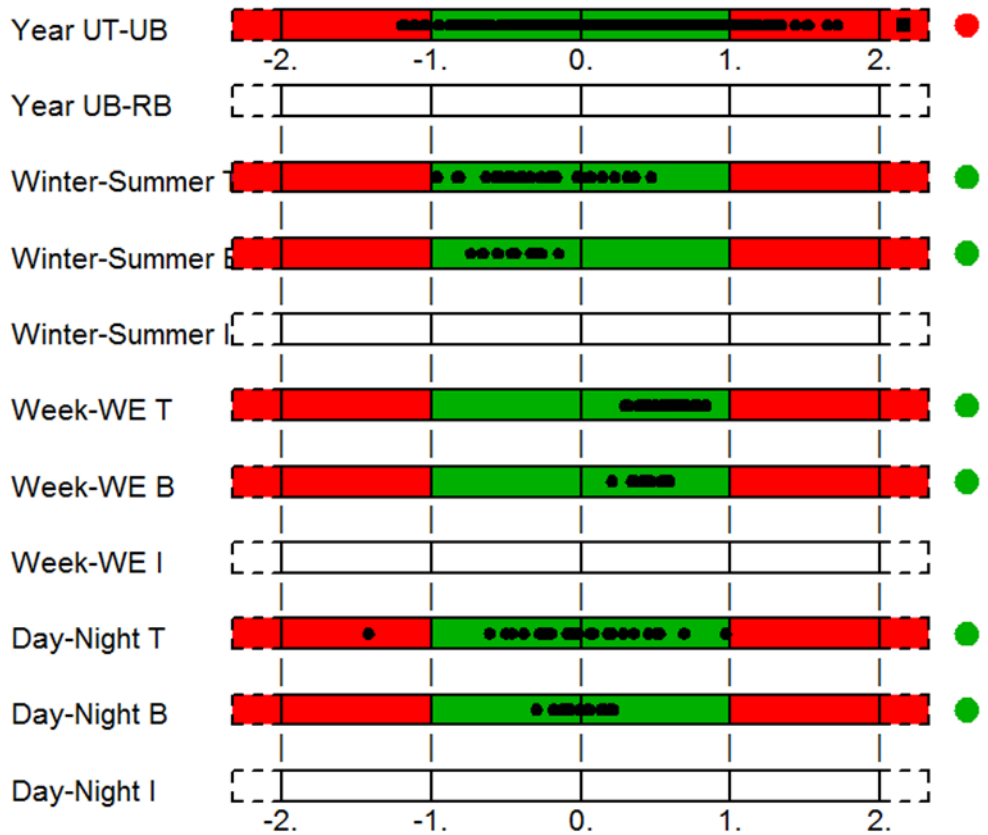


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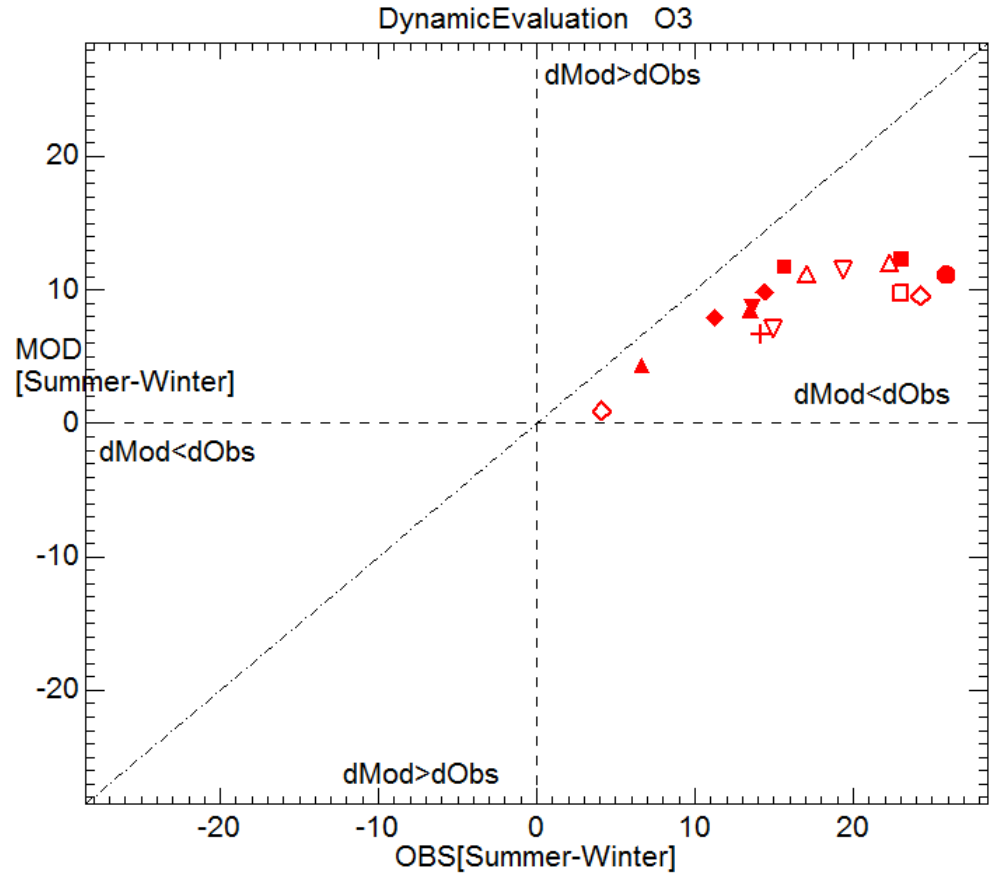
Scen: 2012
Extra Values: 12
Season: Year
Day hours: All 24h
Time Average: Preserve
Daily stats: preserve




BL0
BX1
GB6
GN3
GR4
GR8
GR9
HK6
KC1
MY1
NM2
NM3
RB1
ST3
TH1
TH4

Strt/end Ind: 1-8784
Model (s): ADMS2012
Parameter: O3
Scen: 2012
Extra Values: No
Season: Summer-Winter
Day hours: All 24h
Time Average: 8h
Daily stats: Max

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