



Proposal for a QA/QC protocol for modelling applications

Summary report for CT2

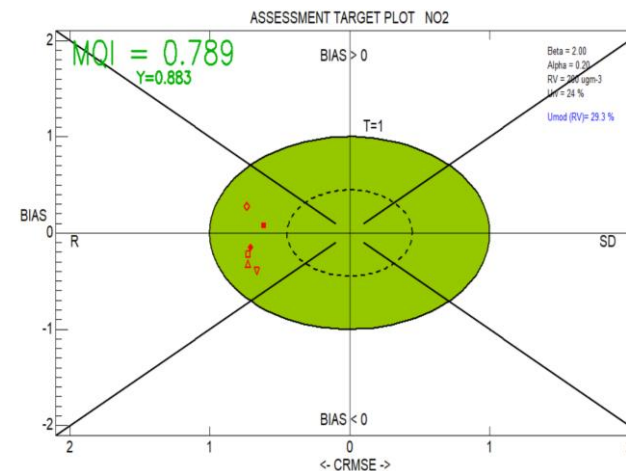
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FAIRMODE Technical meeting – September 2020

Current situation

No prerequisites on the actual modeling APPLICATION to be used as long as it complies with the Modelling Quality Objectives (MQO)

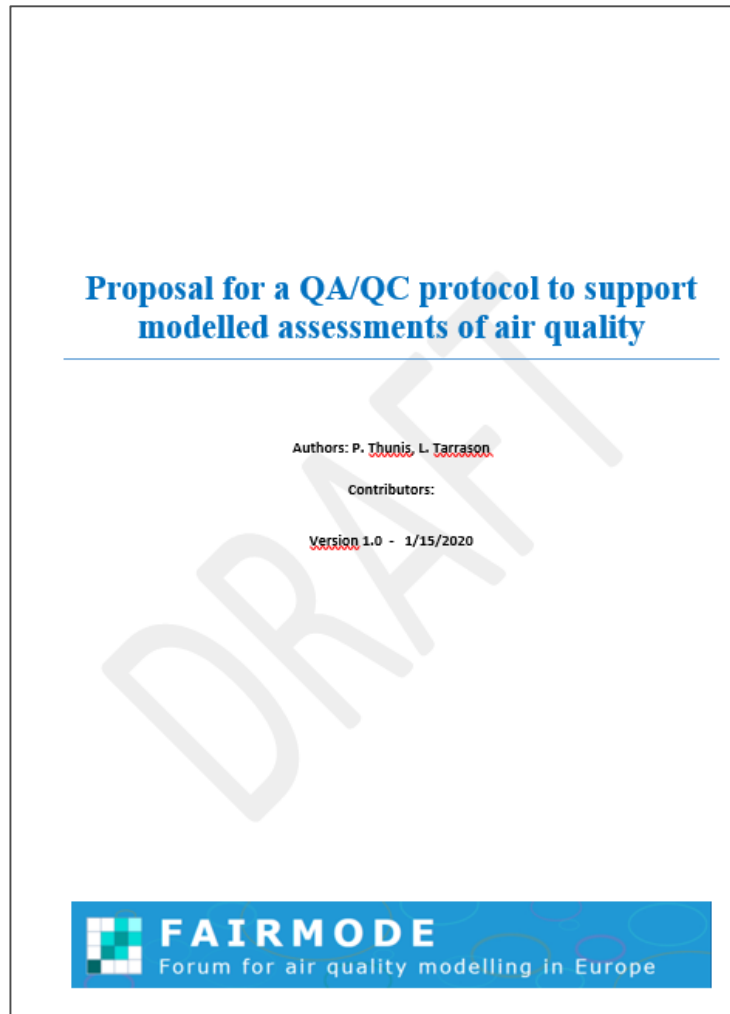
FAIRMODE &
CEN TC264 / WG43



The drawback of the MQOs is that it provides a single pass/fail for a modelling application.

Is this sufficient to ensure quality of modelling applications?

Draft proposal for an advanced QA/QC protocol



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Purpose and scope

The document proposes a QA/QC protocol to

- (1) ensure that sufficient information (metadata) is associated to the modelling results for their interpretation and
- (2) supplement the quality of the modelling results with different QA/QC tests to account for the variability of the air quality modelled situation.

*The proposed QA/QC protocol is **NOT** intended to be mandatory*

Proposed advanced QA/QC (main steps)

1. MQO - Passing the Modelling Quality objective
2. Spatial variability - How accurate is the representation of spatial variability?
 - Fulfilling the spatial Model Performance Criteria (MPC) as currently developed in CEN
 - Introducing a new Incremental assessment (rural vs. urban vs. street)
3. Temporal variability – Is the temporal variability well captured?
 - Fulfilling current percentile MPI for high concentrations
 - Introducing indicators for each station type to assess the seasonal, day/night and week/week-end behavior when appropriate
4. Input consistency - concerning meteorology, BC and emissions
5. Ex-post assessment
6. Multi-pollutant checks

Agenda

CT2 – QA / QC (1.5h) 30/09 11:15 – 12:45

11:15-- 11:20	Welcome
11:20 -- 11:30	Current legislative requirements on QA/QC and related work in CEN (Philippe Thunis)
11:30 -- 11:40	The Fairmode QA/QC Protocol: ambition and initial feedbacks (Leonor Tarrason)
11:40 -- 11:45	QA/QC for annual assessment: Dutch practice & comments to CT2 (Joost Wesseling)
11:45 -- 11:50	Comments on proposal to enhance the MQO by including additional metrics and QA/QC protocol (Jenny Stocker)
11:50 -- 12:05	QA/QC using hierarchical clustering of hourly data (Joana Soares)
12:05 -- 12:25	Interactive discussion - Split up sessions
12:25 -- 12:40	Summary of discussion and on-line survey
12:40 -- 12:45	Session conclusions and way forward

Outcome of the QA/QC Break-out sessions (1)

In the context of air quality **assessment for the AAQD**, would you say that the **QA/QC indicators** proposed to complement the existing FAIRMODE/CEN model quality objectives are **general enough** to address the needs of your modelling applications (please detail if not)

- Additional temporal and spatial indicators are welcome
- The proposed indicators are relevant, but all will not apply to all models
- Consider whether to include also data-fusion, data-assimilation

- Make sure this is not mandatory!
- What if the number of stations is limited?
- Guidance on the interpretation of the indicator results (and on model use) is needed.
- It is up to the modeler to validate intermediate modelling results in a modelling chain.

Outcome of the QA/QC Break-out sessions (2)

In the context of air quality **assessment for the AAQD**, would you say that the **QA/QC indicators** proposed to complement the existing FAIRMODE/CEN model quality objectives are **complete enough** to address all aspects of your model evaluation needs (please detail if not)

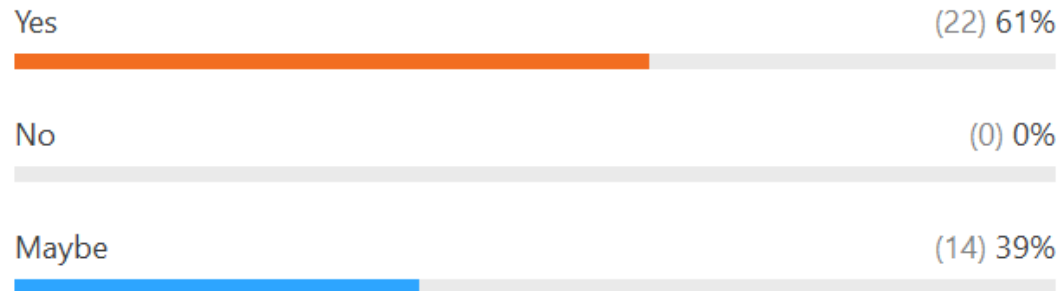
- Recommend to extend indicators to address meteorology, AQ index, multicomponent (NO/NO₂), PM components, heavy metals, other input data
- Need for “cross” indicators to reinforce the “trust” into the existing indicators
- Need to secure good balance between number of indicators and barriers for participation
- Are indicators intended for policy makers, model users/developers? MQO is already difficult to explain to policy makers.
- Importance to use standard template for reporting so all MS do the same
- Station classification and the representativity of stations becomes even more relevant issue with this type of additional QAQC indicators

A couple of clarifications

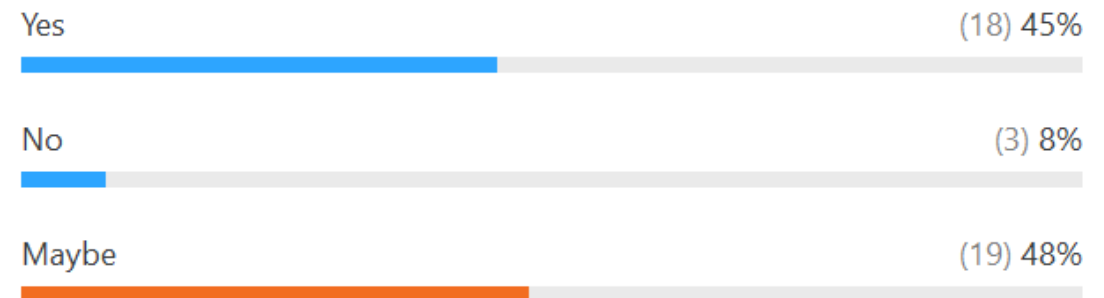
- The QA/QC protocol is **NOT mandatory**. It is proposed as a complement to the existing MQO with the aim to **harmonize** the reporting of an **additional set of model performance indicators** to allow for a better understanding of the modelling results for relevant AQ policy applications.
- This QA/QC protocol is mostly addressing **model users and developers**, not policy makers

Outcome of the surveys

1. Should the additional proposed indicators be implemented in the DELTA tool, would you test them?



1. Should the "clustering / dendogram" approach be implemented in a user-friendly tool, would you test it?



Next steps

- Implement a set of additional indicators in DELTA and send for testing (end 2020)
- Share a user-friendly tool to produce dendrograms
- Compile experiences of use of the additional indicators before next FAIRMODE technical meeting (dedicated workshop for CT2)
- Update QA/QC document (Fall 2021)

Thank you

Comments received so far (BE, IT, NL, UK)

- Comments concerning classification of sampling points
 - Should the QA/QC hold irrespectively of representativeness/classification or not?
Not just for 90% of all available stations as in the AAQDs?
 - Proposed protocol imposes stronger demands on assessing the spatial representativeness of stations
 - what stations to use ? How to select twin sites?
 - what to do with industrial sites?
 - Consider a additional analysis per meteorological situation

Comments received so far (BE, IT, NL, UK)

- MQO sufficient – QA/QC as a complementary approach
- Metadata in composite mapping vs MDS
- Proposed QC/QA interesting to test with FAIRMODE Delta tools
- Comments concerning indicators – proposed use of dendrograms as QA/QC
- Comments concerning modelling applications
 - Should the proposed QA/QC apply for data fusion, intelligent interpolation applications?
 - How to consider Gaussian models? Or models only concerned with annual values?

QA/QC Break-out session questions

In the context of air quality **assessment for the AAQD**, would you say that the **QA/QC indicators** proposed to complement the existing FAIRMODE/CEN model quality objectives are **general enough** to address the needs of your modelling applications (please detail if not)

- The indicators proposed are relevant but all will not apply to all models
- Include data-fusion, data-assimilation

- Make sure this is not mandatory !
- What if the number of stations is limited?
- Indicators should be adapted to the objectives (purpose) of the model use.
- Fitness for purpose is the most important but this can be different from a country to another.
- Guidance on the indicators results (how to use it to improve the model results?).
- It is up to the modeler to validate intermediate modelling results in a modelling chain.
- on top of Indicators, we need more guidance on how to use models (i.e. on how to properly operate the meteorological driver, how to produce boundary conditions...).

QA/QC Break-out session questions

In the context of air quality **assessment for the AAQD**, would you say that the **QA/QC indicators** proposed to complement the existing FAIRMODE/CEN model quality objectives are **complete enough** to address all aspects of your model evaluation needs (please detail if not)

- Additional temporal and spatial indicators are positive
- Meteorology, AQ index, multicomponent (NO/NO₂), PM components, heavy metals
- Indicators should be useful to evaluate the input data.
- “Cross” indicators to reinforce the “trust” into the existing indicators, (models can be in good agreement with observation with regards to the indicators but for the wrong reasons)
- Balance between number of indicators and participation (indicators should not go into too much details).
- Are indicators intended for policy makers, model users/developers? MQO is already difficult to explain to policy makers.
- Importance to use standard template for reporting so all MS do the same
- Station classification can be an issue