WG4
2023 – 2025 roadmap

Vera Rodrigues (UA), Fernando Martin (CIEMAT)

WG4 MICROSCALE ASSESSMENT

FAIRMODE Plenary Meeting

Paris, February, 2024

WG4 session agenda

- Status
  - Last results of the SR and LV exceedances areas intercomparison in the Antwerp domain.
- Future work
  - Keep on and finish the SR and LV exceedance intercomparison (papers, guidance). Interesting for WG8.
  - Need for another intercomparison exercise in another city (Gyor, Hungary)?
  - Elaboration of recommendation/guidance document?
- Discussion and feedback from the audience regarding the status and future work.

WG4 2023-2025 roadmap

- How good are microscale models to estimate LV exceedances or spatial representativeness areas? (new results will be presented)

- Test robustness of the wind sector approach for all AAQD indicators (annual avg, percentiles…) and check new approaches. (Percentiles study is pending)

- Understand differences between unsteady full-year simulations vs scenario (wind sector) approach.

- Setup a new intercomparison exercise at a new location (e.g., Gyor)? Or explore more deeply the Antwerp case?

- Preparation of scientific papers for publishing (1st submitted, 2nd to be written after ongoing additional analysis)

- **Preparation of a Recommendations/Guidance Document** (2024, but some questions pending to answer)

Future Recommendations/Guidance Document

Some findings and conclusions (methodologies for long-term concentrations):

- The more complex the model is, the more realistic the predicted spatial distribution of NO_2 concentrations seems to be.
    - Simple Gaussian models are recommended for initial screening of hot spots if high-resolution emission data are used.
    - Gaussian models with street-canyon parametrizations give rather good results.
    - CFD ➜ Lagrangian ➜ AI modelling trained with CFD simulations can accurately simulate the very notable spatial gradients of NO_2 concentration inside the streets.
- Need for good and detailed pollutant emission data resolution traffic, covering all the streets (not only the main ones).
- Methodologies using a limited number of CFD simulated scenarios (wind direction scenarios) provide quite similar monthly NO_2 maps to those obtained with the long-term CFD unsteady simulation.
- At least, 8 wind direction scenarios could be enough.
- Atmospheric stability does not seem to be a relevant issue for long-term averaged concentrations

Future Recommendations/Guidance Document

States

○ Open

🕐 Pending

🕐 In Progress

✅ Completed

❌ Cancelled

- **Discussion on open questions/challenges** or new ones:
  - Do the needed number of wind sectors or the model/methodology results depend on urban morphology?
  - How to derive other AAQD indicators than the annual average (percentiles related with the limit values) in a wind sector approach?
  - Can the NO_X-O_3 chemistry be taken into account?
  - How many stations do we need for a proper validation at micro scale? Passive samplers? Sensors? (**Link with WG6**)
  - Are models/methodologies analysed suitable for computing LV exceedances areas and spatial representativeness? What models/methodologies are better? (see previous presentation)
  - More…