**NIAM activity on PM2.5**

As one of our first activities in NIAM we would like to look at how countries are addressing PM2.5 pollution, including how they model it, how they assess the health impacts, and how this feeds into policy. As a first step we are gathering information on current work in this area towards organisation of a virtual meeting in November.

If you are interested in participating please register your interest with an e.mail to [h.apsimon@imperial.ac.uk](mailto:h.apsimon@imperial.ac.uk). And if you are already working in this area we shall be grateful if you can also send a response to the questions below which will help us in planning a focus on this topic.

1. **Modelling PM2.5**

If you model PM2.5 concentrations in your country:- NORWAY

1. Do you use GAINS, or independent modelling- in which case please give brief details. We use the uEMEP and EMEP models run by the Norwegian Meteorological Institute for 3 major webservices: forecasting, annual mapping and a mitigation calculator.
2. What distance scales do you cover- e.g. European, national, city: and with what spatial and temporal resolution? EMEP covers European and national scales (1 hour and down to 2.5 km) whilst uEMEP covers the entire country down to 50m spatial resolution and at an hourly time variation (in forecasting), from years 2016 to present.
3. What components of PM2.5 do you include- e.g. primary PM2.5, secondary inorganic aerosol, secondary organic aerosol, natural dust etc? EMEP covers all relevant species whilst uEMEP includes only primary PM2.5 from the local anthropogenic sources, i.e. combustion from road traffic, shipping and industry. Non-exhaust emissions of road, tyre and brake wear are included as well as road salt and road sand emissions.
4. What emissions data do you use e.g. a national inventory. Are there particular sources you think are uncertain, missing, or would like to discuss? The major emissions sources we use are: Wood burning, Industry, Shipping, Road Traffic (exhaust and non-exhaust), from a national inventory. Other sources we use CAMS or EMEP emission data. One source that we do not include that we are uncertain is applicable to local air quality in Norway is agriculture as well as construction and other off road stationary sources.
5. Have you undertaken validation of your model against measurements, and if so what measurements do you have available to use. Yes, model results are verified with stations in our national measurement network (approximately 40 active stations for PM2.5) for the years 2016-2019.
6. What do you think are the most important uncertainties or aspects of PM2.5 modelling that you would like to discuss. There have been some uncertainties regarding sea salt and emissions from residential heating, the major source of PM2.5 in Norway, remains uncertain.
7. **Assessing health impacts**

The health impacts of PM2.5 are a major driver to reduce air pollution.

1. We are interested in how you use data on concentrations of PM2.5, either modelled or measured or both, to assess human exposure and health impacts? We use uEMEP to calculate the population exposure (residential address) for all municipalities in Norway.
2. If you undertake such assessments of health impacts of PM2.5, do you follow WHO guidance and base this on total mass of PM2.5, or do you focus on particular components and/or differentiate relative toxicity? We use uEMEP to show PM2.5 (total mass).
3. What health impacts do you consider e.g. mortality, asthma etc; and what risk coefficients do you use? We use uEMEP to show exposure of population levels to PM2.5 concentration values from zero and up to our limit values and national goals, at the municipality level. In our PM2.5 limit value investigation, the Norwegian Public Health Institute calculated DALY's from the population exposure numbers from uEMEP.
4. Do you assess the economic costs of health impacts, and if so what do you include e.g. life years lost, hospital/medical costs, loss in productivity/working days lost etc.? We have only performed such economic analysis during our PM2.5 limit value investigation.
5. **Policy applications**

We are also interested in the application of your work, particularly as input to development of policy.

1. How do you relate your work to environmental goals e.g. compliance with regulations, or comparison with WHO guidelines? We use PM2.5 dispersion modelling maps from uEMEP in our webservices to show concentrations in regard to our national air quality limit values, national air quality criteria values, national goal values, and our guideline values for urban planning. We recently used uEMEP to investigate changes to our PM2.5 limit values (recommendation from the investigation is to change the PM2.5 annual average limit from 15 µg/m3 to 10 µg/m3).
2. **Publications**

Have you published your work, in which case please give references is available? Yes.

Published reports:

uEMEP used in PM2.5 limit value investigation (in Norwegian): <https://www.miljodirektoratet.no/publikasjoner/2020/april-2020/grenseverdier-svevestov/>

Emissions sources used in uEMEP (in Norwegian): <https://www.miljodirektoratet.no/publikasjoner/2019/desember-2019/varslingstjeneste-luftkvalitet-i-norge/>

uEMEP summary documentation: <https://www.met.no/prosjekter/luftkvalitet/dokumentasjon-av-luftkvalitetsmodellen/_/attachment/download/e868c653-0694-4ae7-807e-0901655957c0:806c862ff8c25f6a12ac5492e31f4436d16d27a0/uEMEP_fact_sheets_v7%20(2).pdf>

uEMEP validation 2019 (in Norwegian): <https://www.met.no/prosjekter/luftkvalitet/evaluering-av-luftkvalitets-modellen/_/attachment/download/5755f154-33f3-4c41-b994-9fe3a6a557ee:ef565c6f184f814b95879f02f3012e773dd7fc79/report_Stations_2019_v4_20190101_20191231_NO.pdf>

Peer reviewed documentation of uEMEP

Rolstad Denby, B., Gauss, M., Wind, P., Mu, Q., Grøtting Wærsted, E., Fagerli, H., Valdebenito, A., and Klein, H.: Description of the uEMEP\_v5 downscaling approach for the EMEP MSC-W chemistry transport model, Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2020-119, in review, 2020.

1. **Questions**

Are there particular aspects of questions that you would like NIAM to address on PM2.5, including at the virtual meetings proposed for November. Yes, see answer above to question A(iv), importance of agricultural emissions to local air quality (PM2.5 concentrations).

Please e.mail your response to Helen ApSimon: h.apsimon@imperial.ac.uk