**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:

1. Do you use GAINS, or independent modelling- in which case please give brief details.

We use different independent modelling results and do own CTM simulations:

**EURAD** for chemical transport modelling in the context of the national air pollution control programme (NAPCP), only modelling results

**REM-Calgrid (RCG)** for the annual assessment of air pollutant concentrations on national level, own simulations

1. What distance scales do you cover- e.g. European, national, city: and with what spatial and temporal resolution?

**EURAD:**

Horizontal resolution:

Nest 1: Europe: 50 x 50 km2

Nest 1: Central Europe: 10 x 10 km2

Nest 2: Germany: 2 x 2 km2

Vertical resolution: height: 16 km, 23 layers (15 layers below 3000 m)

Temporal resolution: Model output on hourly basis

**RCG:**

Horizontal resolution:

Nest 1 (Europe): 0.5° x 0.25°

Nest 2 (Germany and surrounding countries): 0.125°x0.0625°

Nest 3 (Germany): 0.03125°x 0.015625°

Vertical resolution Nest 3: 5 Layers between 0 and 2000m. Top boundary conditions from Nest 2 are used.

Temporal resolution: Time step depends on the model resolution and on the windspeed and is therefore variable. For Nest 3 it is around 3 minutes. The output is usually written as hourly average.

1. What components of PM2.5 do you include- e.g. primary PM2.5, secondary inorganic aerosol, secondary organic aerosol, natural dust etc?

Primary PM2.5, SIA, SOA, natural dust

1. 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?

For chemical transport modelling (e.g. in the context of the NAPCP) we use emissions data from our national inventory. For emission projections we have a separate database based on the emission inventory database. For the spatial gridding of the national anthropogenic emissions we use our gridding tool GRETA implemented in ArcGIS.

1. Have you undertaken validation of your model against measurements, and if so what measurements do you have available to use

For evaluation of our modelling results we use the official measurements in Germany, which are reported to the EEA. Due to legislation, there are less observations for PM2.5 than for PM10.

1. What do you think are the most important uncertainties or aspects of PM2.5 modelling that you would like to discuss

Description of particle formation in models e. g. condensables

1. **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 combine our REM-Calgrid modelling results with observations using the technique of optimal interpolation. This data is then used for exposure calculations.

1. 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?

Yes, we follow the general WHO recommendations and only consider total mass PM2.5 and do not focus on particular components.

1. What health impacts do you consider e.g. mortality, asthma etc; and what risk coefficients do you use?

For PM2.5 we consider mortality and morbidity outcomes related to ischaemic heart diseases, stroke, chronic obstructive pulmonary diseases (COPD), lung cancer and diabetes type 2.

We use the effect estimates provided by the Global Burden of Disease Study. Currently we use the data from the 2017 cycle (<https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)32225-6/fulltext>)

1. 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.?

Yes, we assess the economic costs of health impacts and include i.a. years of life lost, hospital costs and work loss days. However, the data we used for the assessment are outdated. We are currently planning to develop a new assessment tool.

1. **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 our modelling results for compliance checking (regulations of the EU Air Quality Directive), and we also compare the results with WHO guidelines.

1. **Publications**

Have you published your work, in which case please give references if available?

National Air Pollution Control Programme (in English): <https://ec.europa.eu/environment/air/pdf/reduction_napcp/DE%20final%20NAPCP%2022May19%20EN.DOCX>

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.

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