An outlook for global air quality

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IIASA, International Institute for Applied Systems Analysis
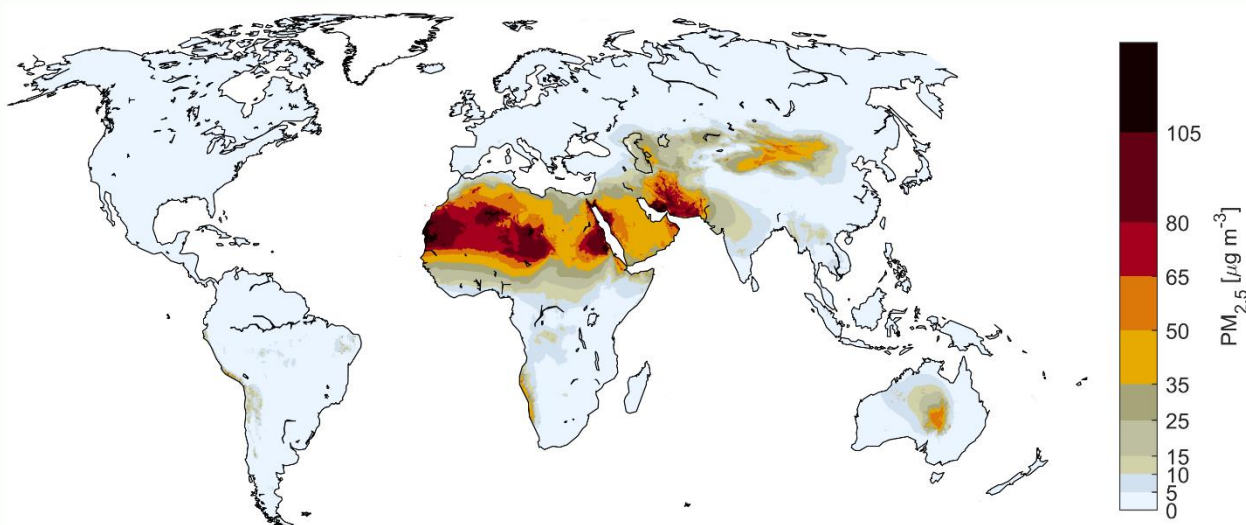
GAINS/EMEP modelling of global PM2.5: 2015

- GAINS emission estimates for 180 source regions

- Source-receptor relationships derived from the global EMEP model,
  - for 6,000 cities with >100,000 inhabitants
  - ~7-10 km * 7-10 km in rural areas
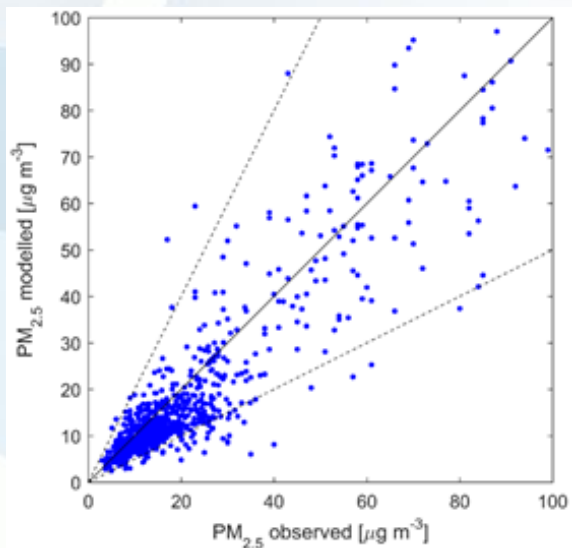
Computed PM2.5 concentrations in 2015, including natural sources
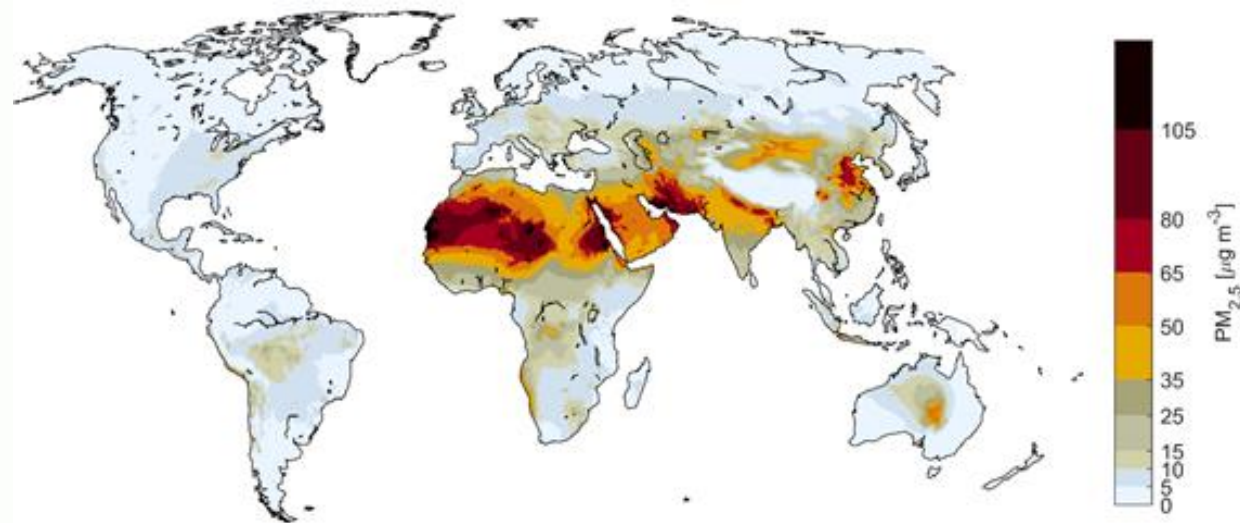
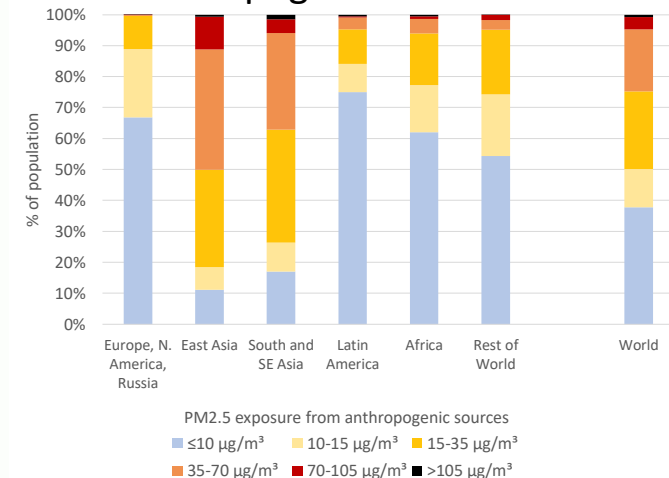PM2.5 concentrations from natural sources

PM2.5 concentrations from anthropogenic sources 2015

- While the WHO guideline for PM2.5 refers to total PM2.5, there is uncertainty about the relative impacts of different sources/chemical species

- In particular, the role of PM2.5 from natural sources (soil dust, sea salt, biogenic) is currently under review for the WHO guideline revision

Computed PM2.5 concentrations in 2015 from anthropogenic sources only
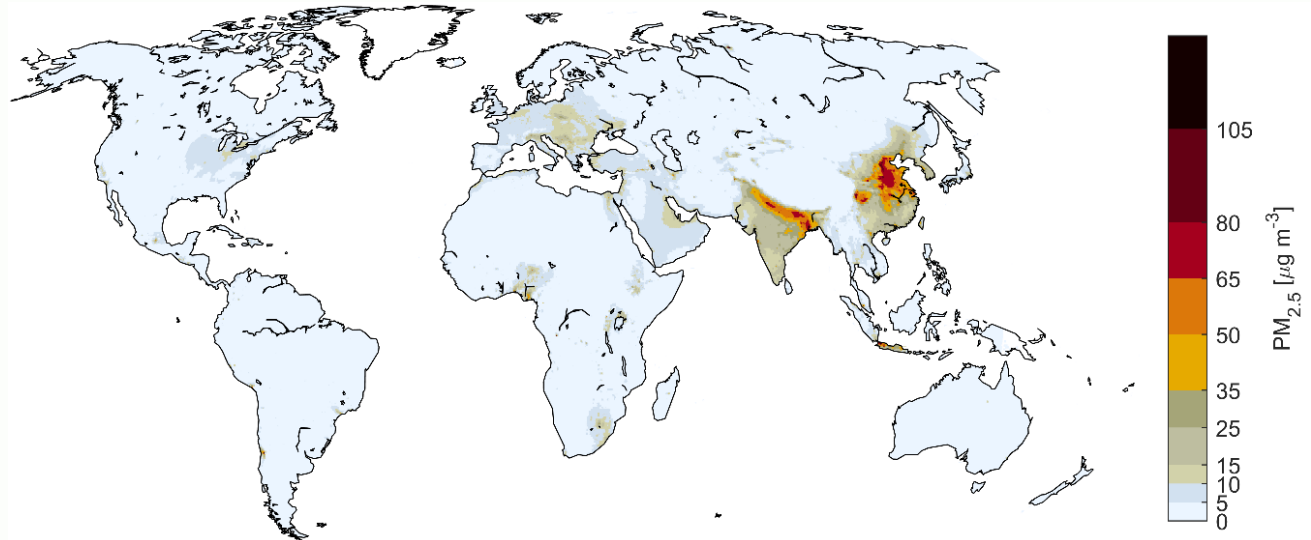
Distribution of population exposure to PM2.5 from anthropogenic sources in 2015

PM2.5 exposure from anthropogenic sources

≤10 µg/m³   10-15 µg/m³   15-35 µg/m³
35-70 µg/m³   70-105 µg/m³   >105 µg/m³

Clean Air scenario 2040: PM2.5 concentrations

- The Clean Air scenario would bring PM2.5 exposure from anthropogenic sources below the current WHO guideline for ~90% of the global population

- Over large areas, PM2.5 concentrations from anthropogenic sources would drop below 5 µg/m³

- Remaining hot spots (China, India) are related to the assumptions on the spatial intensities of population and industrial production – needs further analyses, i.a., of global trade flows

- N.B.: The linear GAINS source-receptor relationships tend to underestimate improvements from the deep emission cuts

A. Total PM2.5 including natural sources
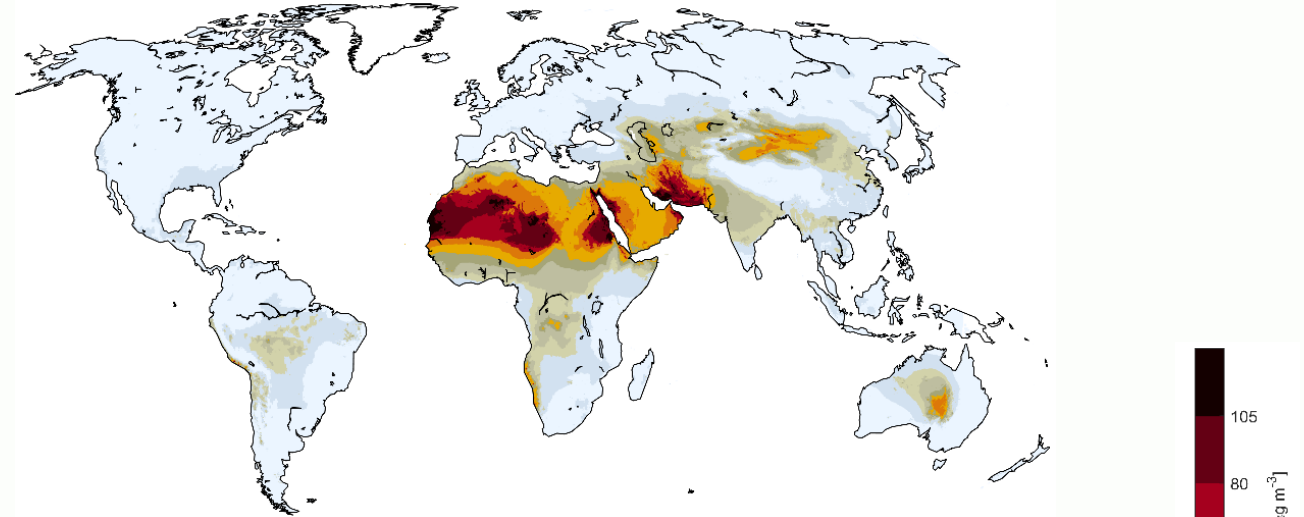
B. PM2.5 from anthropogenic sources only

Moving towards the WHO guideline requires a mix of policies

- No single policy field alone can exhaust the full potential for air quality improvements

  – About 2/3 of the potential improvements can be delivered by further air quality policies

  – The remaining 1/3 is connected to other policy fields, including
    - energy and climate policies,
    - food policies,
    - agricultural policies.

- Achieving clean air requires integrated multi-sectoral policy approaches

- **A role for the Global Forum on Air Pollution that has been launched by the Air Convention in Dec 2019!**

Population exposed to PM2.5<10 µg/m³ from anthropogenic sources in 2040

People exposed to PM2.5 <10 µg/m³ even without any policies

PM2.5 exposure can be brought below 10 µg/m³ through:

- full implementation and enforcement of the air policies of 2018

- further air pollution policies

- Energy and climate policy measures

- Agricultural policy measures

- Food policies

- Remaining population exposed to PM2.5>10 µg/m³