European Commission

AirX – Team Finland

Eye on the sky for covering the good quality of life of the European citizens

European Big Data Hackathon 2025

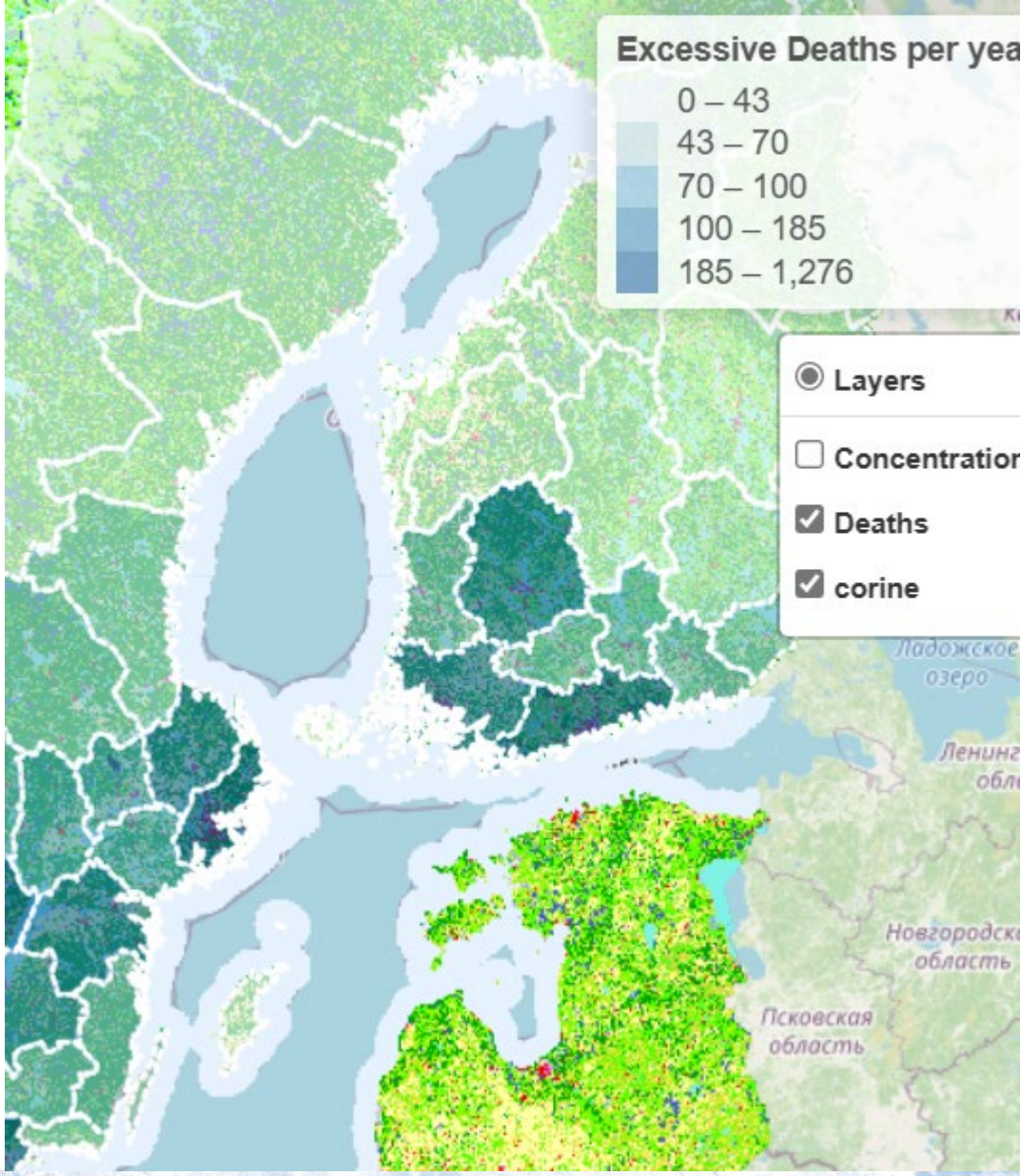
Earth Observation: from Space to European Statistics

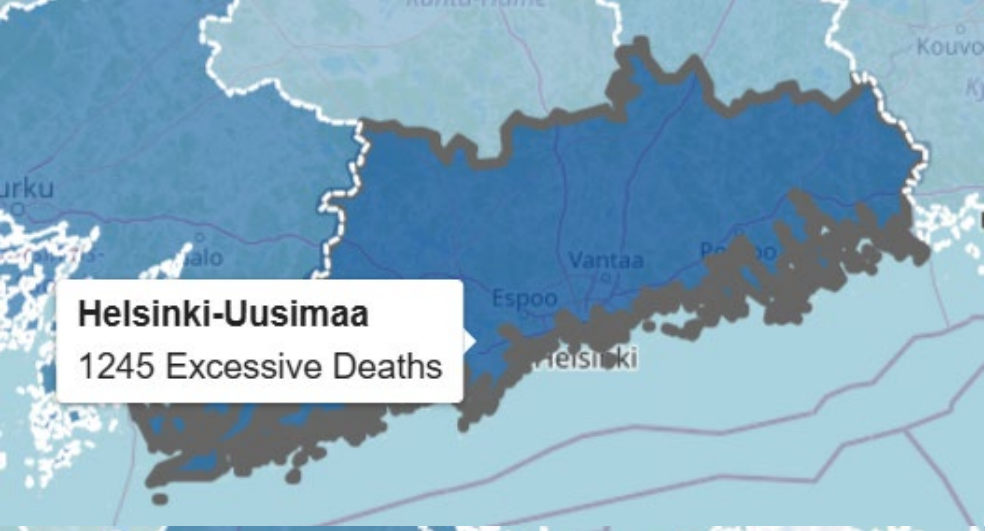
Brussels, 6–11 March 2025

eurostat

Policy question that our application provides an indicator for:

- Quality of life:
  - Clean air, healthy living
- Climate goals and pollution minimization
  - Measure the progress of EU pollution reduction goals
  - Visual representation of progress
- Current SDG indicator: Premature deaths due to exposure to fine particulate matter (PM2.5)(EEA)
  - AirX offers an improved indicator over current state in visual representation and regional reporting (excess deaths caused by pollutants)
  - Proposed methodological improvements





Description of the application

Visualize excess deaths by selecting:

- Time (year + month)
- Place (NUTS hierarchy)
- Population subgroups (men, women, total)

Can choose a bar chart visualization

- Country-wise comparison
- NUTS3 regions comparison

Tabular data also available and downloadable for further analysis

Data, role of Copernicus Services

- CAMS Global Reanalysis data (Copernicus Atmosphere Monitoring Service)
  - Refined satellite product, published with long delay
- Base rates of 5 common disease classes, published by Eurostat

- All the data used was openly available data, reproducible

Methodology

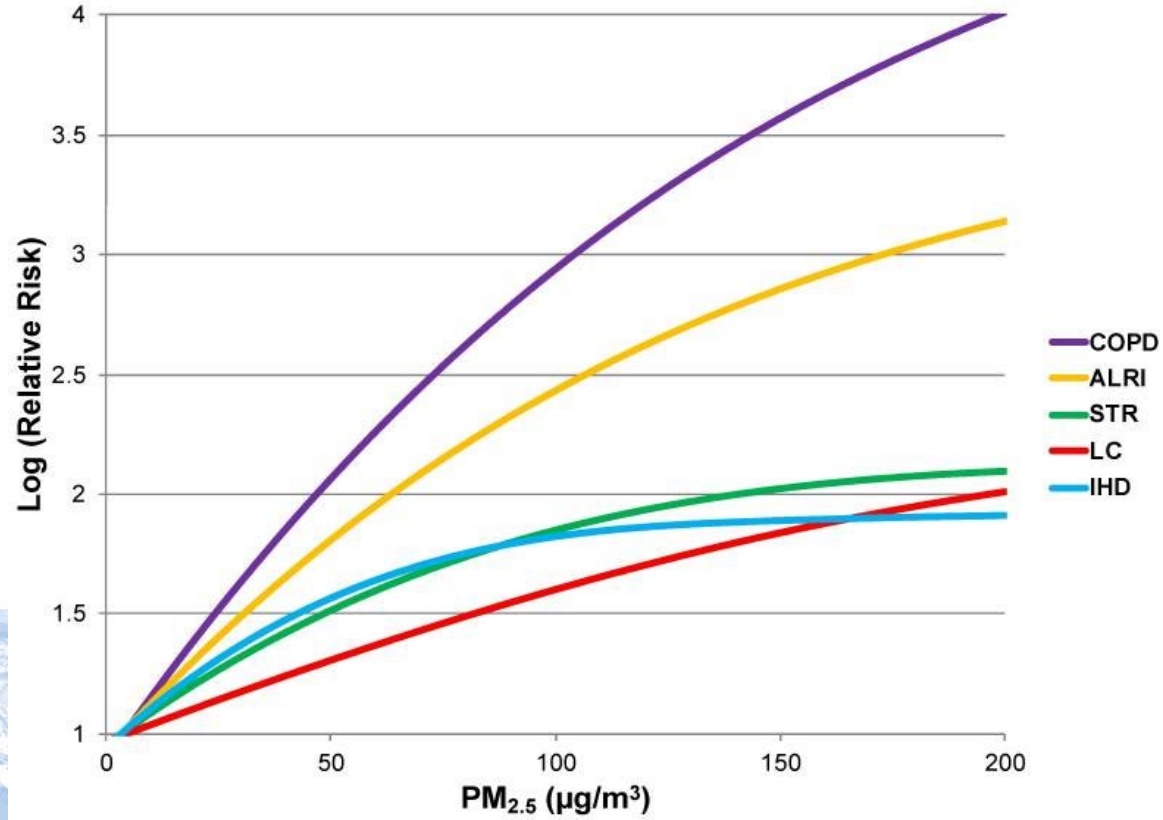
- Burden of Disease – calculation
  - BoD : negative health consequences (premature death) **caused by** air pollution
  - Model risk increase due to ambient particulate matter
  - Multiply heightened risk by base rates
  - Take population size into account
- Scientific background:
  - Risk of lung cancer, heart disease, chronic variants of pneumonia + more
  - RR modeled by Integrated Exposure-Response suggested by literature, instead of linear or spline model (WHO 2016)

Relative risk, due to pollutant X

$$RR = \begin{cases} 1 & if\ PM < z_{cv} \\ 1 + \alpha * X * \left(1 - e^{-\beta X * (PM - z_{cf})^{\delta}}\right) & if\ PM \geq z_{cf} \end{cases}$$

Z_{cf} is a lower limit, presumed safe level

Actual Risk = Relative Risk × base rate



Further development

- The analysis could be extended to cover
  - Plant health, cattle health, forestry, etc.
- The analysis is extendable for the whole European Union
- Analysis on the grid level is possible, but not yet implemented
- The BoD calculation still requires some scientific work

Link to AirX application:

http://64.225.141.255:3838/sample-apps/airx9/

Thank you!

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