

Air Quality Programs

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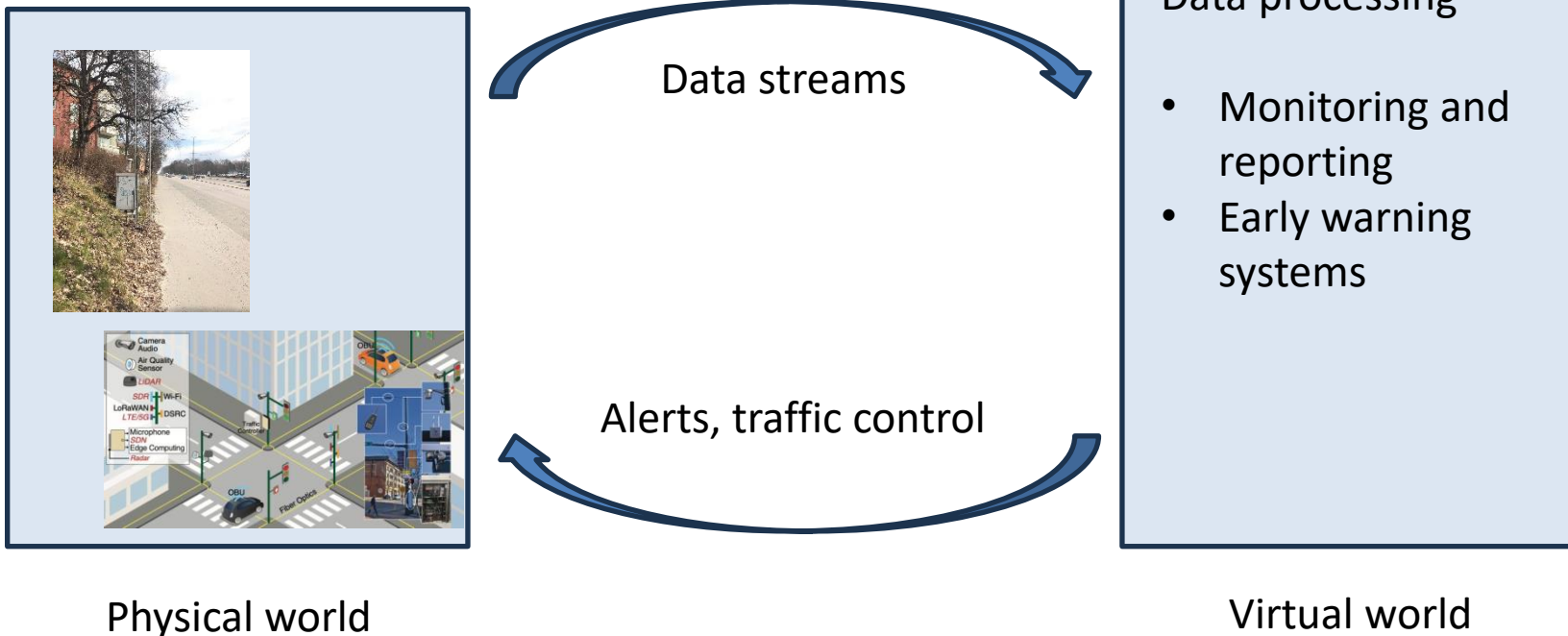


Learning outcomes

- At the end of this lecture, the learner is expected to be able to
 - Explain motives for the European Clean Air Policies
 - Describe basic components of the EU Ambient Air Quality Directive
 - Describe actions which might reduce air pollution in cities
 - Describe basic structure of current and future air quality monitoring networks

Air quality networks and digital twins

Sources: Östra Sveriges Luftvårdsförbund and
cities-today.com



EU Clean Air policies

- 300 000 premature deaths caused by fine particulate matter annually
- EU target: 55 % reduction by 2030
- Economic cost of air pollution more than 330 B€
- Zero pollution vision for 2050
- Main policies
 - Air quality standards (Ambient Air Quality Directive) – thresholds for air pollution
 - National Reduction Commitments (NEC Directive)
 - International Cooperation (Sustainable Development Goals)
 - Air pollution from key sectors (EU regulations) - energy, transport, agriculture, industry, waste etc.

European ambient air quality directive

- Directive 2008/50/EC on ambient air quality and cleaner air for Europe is the current directive
- Directive (EU) 2024/2881 is the updated directive, to be implemented in the member states by December 2026, cutting allowed air pollutants
- Rules for assessment of ambient air quality in relation to sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter, lead, benzene and carbon monoxide
 - Thresholds
 - Procedures
 - Density of sampling points
- Air Quality Plans
- Information and reporting
- Implementation, penalties etc

PM 2.5 limits, current situation

- PM2.5 (Particular Matters 2.5 μm) = Particles (aerosols) having maximum size of 2.5 μm .
- WHO (2021)
 - 24-hour average: 15 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 4 times in any calendar year
 - Annual average: 5 $\mu\text{g}/\text{m}^3$
- Air Quality Directive (2008) – measurements at fixed stations in urban areas
 - Annual average: 17 $\mu\text{g}/\text{m}^3$
- Air Quality Directive (2024)
 - Meet the WHO guidelines by 2050
 - Thresholds to be met by 2026 and 2030

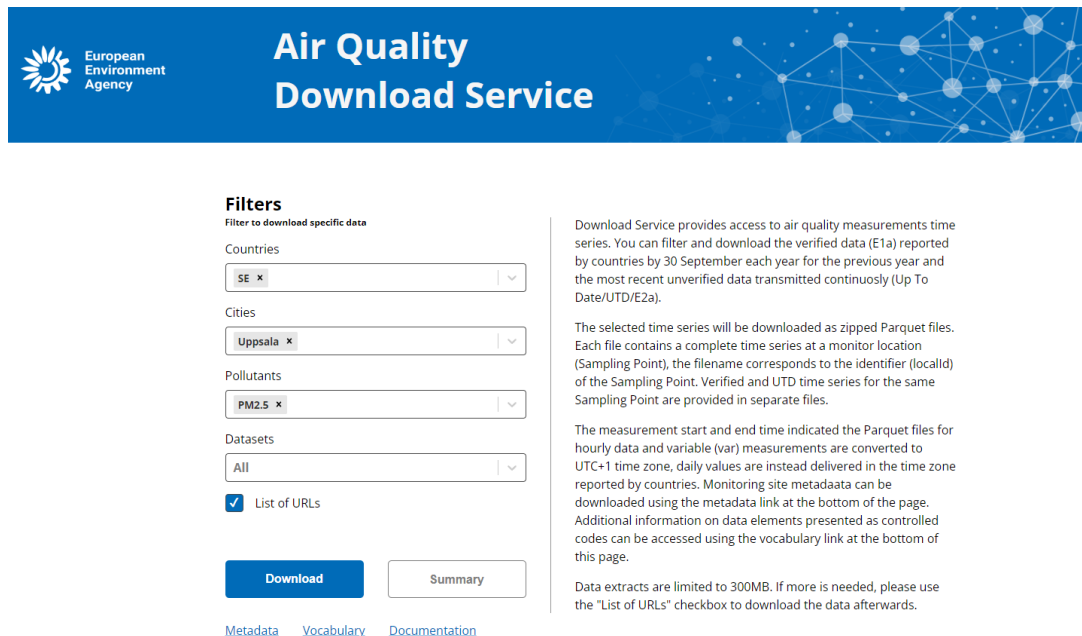
PM 2.5 limits, EU targets

- WHO (2021)
 - Daily average $< 15 \mu\text{g}/\text{m}^3$
 - Annual average $< 5 \mu\text{g}/\text{m}^3$
- Air Quality Directive (2024)
 - By December 2026, annual average $< 25 \mu\text{g}/\text{m}^3$
 - By January 2030, daily average $< 25 \mu\text{g}/\text{m}^3$
 - By January 2030, annual average $< 10 \mu\text{g}/\text{m}^3$
 - By 2050, aligned with WHO
- Alert threshold, daily average $= 50 \mu\text{g}/\text{m}^3$
- Exposure Reduction obligations, based on three-year averages

Improving air qualities in cities

- Road traffic was responsible for 56% of NO_x emissions and 23% of PM_{2.5} emissions in Paris (2018). Other important PM_{2.5} emission sources are heating (wood, oil, ...), non-road mobile machineries (NRMM) (construction machineries, inland shipping etc) and industrial sites.
- Air quality planning (no common tool for assessing the impact of air quality plans). Better modelling and forecasting tools required
- Air quality monitoring (hot spots, micro sensors, smart home (IKEA Vindriktning))
- Air quality management
 - Planting trees,
 - Redirecting and regulating traffic
 - New vehicles (electrical, Euro 6 etc)
 - Low emission zones (LEZ), Zero emission zones (ZEZ)
 - Alerts to hybrid vehicles to switch to electric mode

EEA Air Quality Download Service



The screenshot shows the EEA Air Quality Download Service interface. It features a blue header with the EEA logo and the title 'Air Quality Download Service'. Below the header, there are filters for Countries (SE), Cities (Uppsala), Pollutants (PM2.5), and Datasets (All). A checkbox for 'List of URLs' is checked. There are 'Download' and 'Summary' buttons. To the right of the filters, there is explanatory text about the data provided, including a note that data extracts are limited to 300MB and a link to the 'List of URLs' checkbox.

Filters
Filter to download specific data

Countries
SE x

Cities
Uppsala x

Pollutants
PM2.5 x

Datasets
All

☒ List of URLs

Download **Summary**

[Metadata](#) [Vocabulary](#) [Documentation](#)

Download Service provides access to air quality measurements time series. You can filter and download the verified data (E1a) reported by countries by 30 September each year for the previous year and the most recent unverified data transmitted continuously (Up To Date/UTD/E2a).

The selected time series will be downloaded as zipped Parquet files. Each file contains a complete time series at a monitor location (Sampling Point), the filename corresponds to the identifier (localid) of the Sampling Point. Verified and UTD time series for the same Sampling Point are provided in separate files.

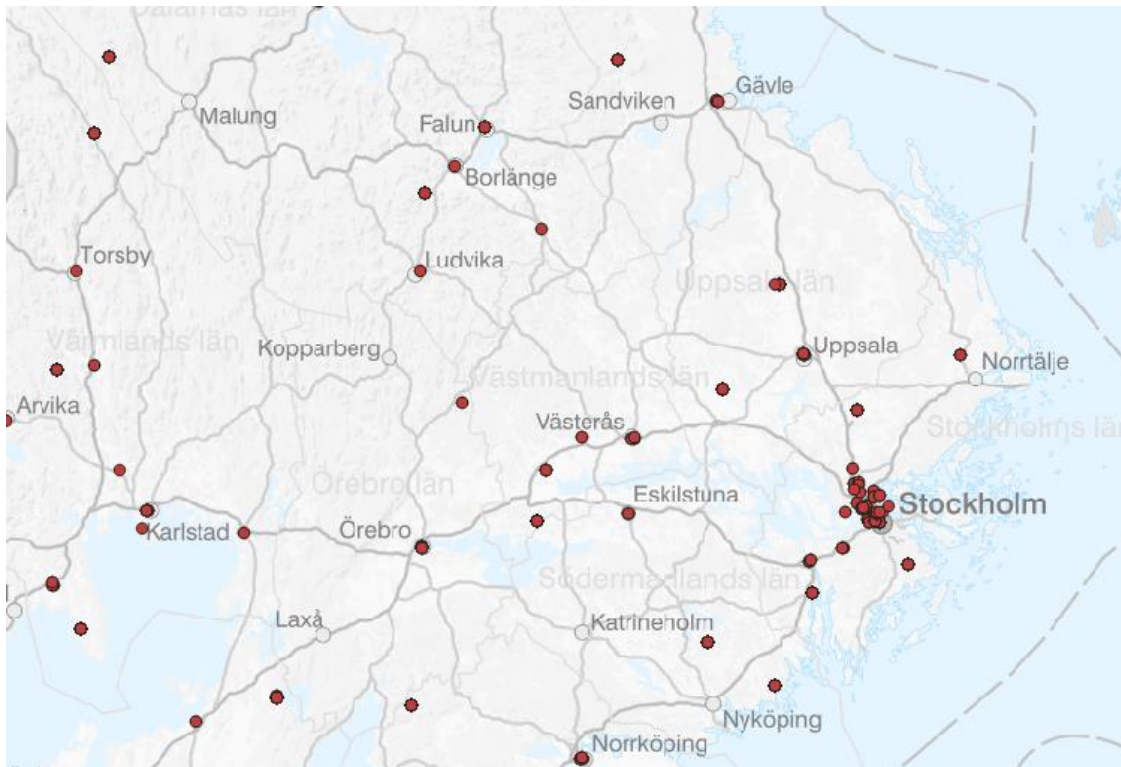
The measurement start and end time indicated the Parquet files for hourly data and variable (var) measurements are converted to UTC+1 time zone, daily values are instead delivered in the time zone reported by countries. Monitoring site metadata can be downloaded using the metadata link at the bottom of the page. Additional information on data elements presented as controlled codes can be accessed using the vocabulary link at the bottom of this page.

Data extracts are limited to 300MB. If more is needed, please use the "List of URLs" checkbox to download the data afterwards.

- Search for air quality data in any country / larger city
- Data reported by countries by 30 Sept each year
- Data available in Apache Parquet files (open-source file format)

Source: <https://discomap.eea.europa.eu/map/fme/AirQualityExport.htm>

Swedish Air Quality Monitoring Network



Case study: City of Bristol

Source: <https://www.smartcitiesworld.net/news/bristol-reports-10-per-cent-improvement-in-air-quality-9811>

- National government directed city of Bristol to reduce NO₂ pollution
 - Cleaner cars reduced fee for entering the inner city
 - Modernized public transportation
- 170 air quality monitoring stations established (off-line)
- After 1 year, 10 – 15 % reduction in NO₂ pollution



List of references

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WHO, 2021. Global Air Quality Guidelines. <https://iris.who.int/handle/10665/345334>.

Thank you for your attention



<https://birgitproject.eu/>

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