CERC Experiences of using the CAMS Atmosphere Data Store
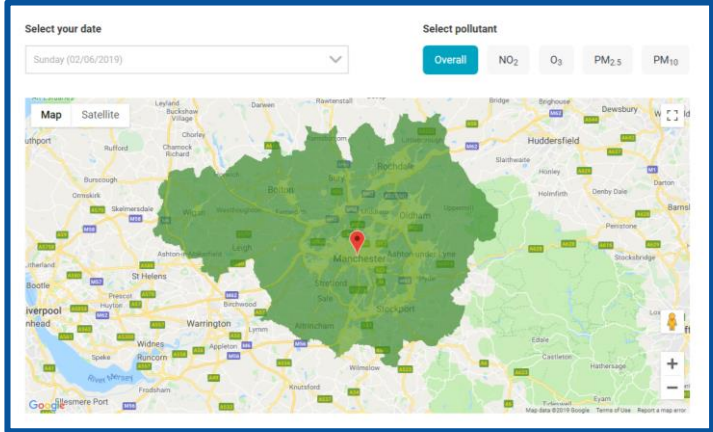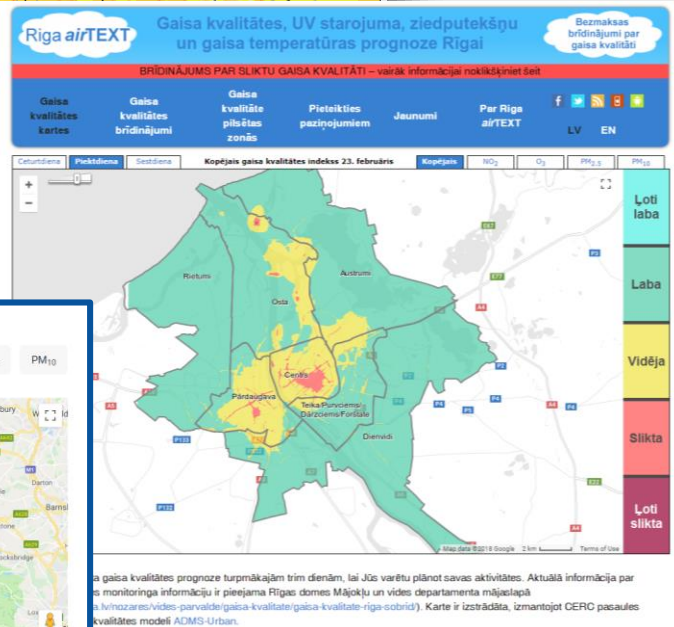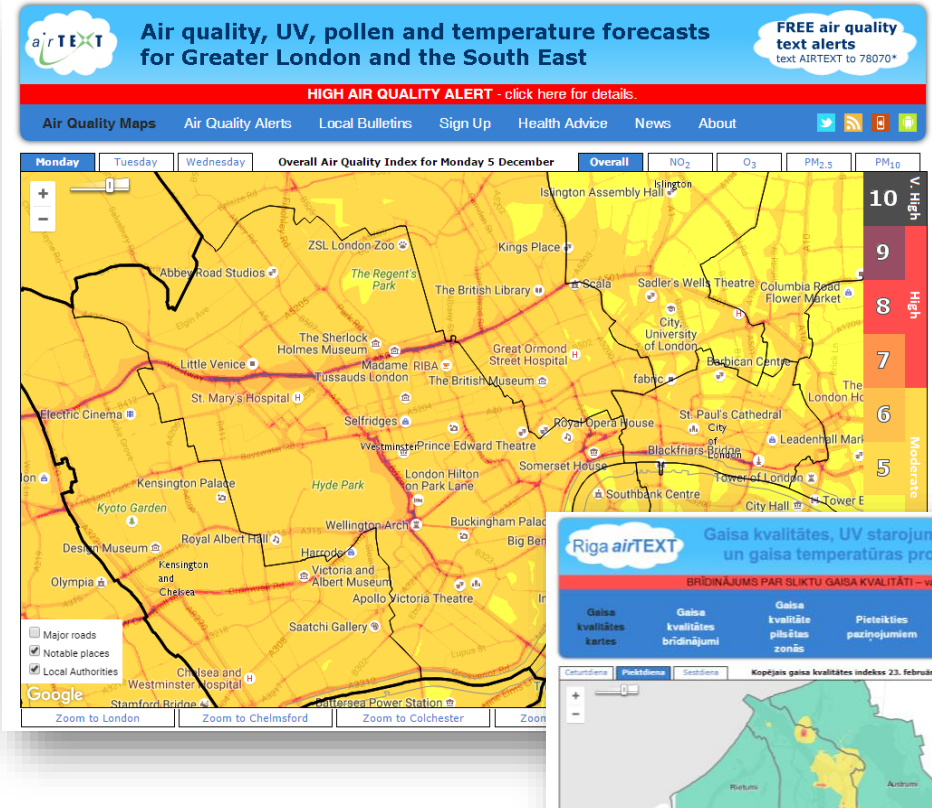
Amy Stidworthy
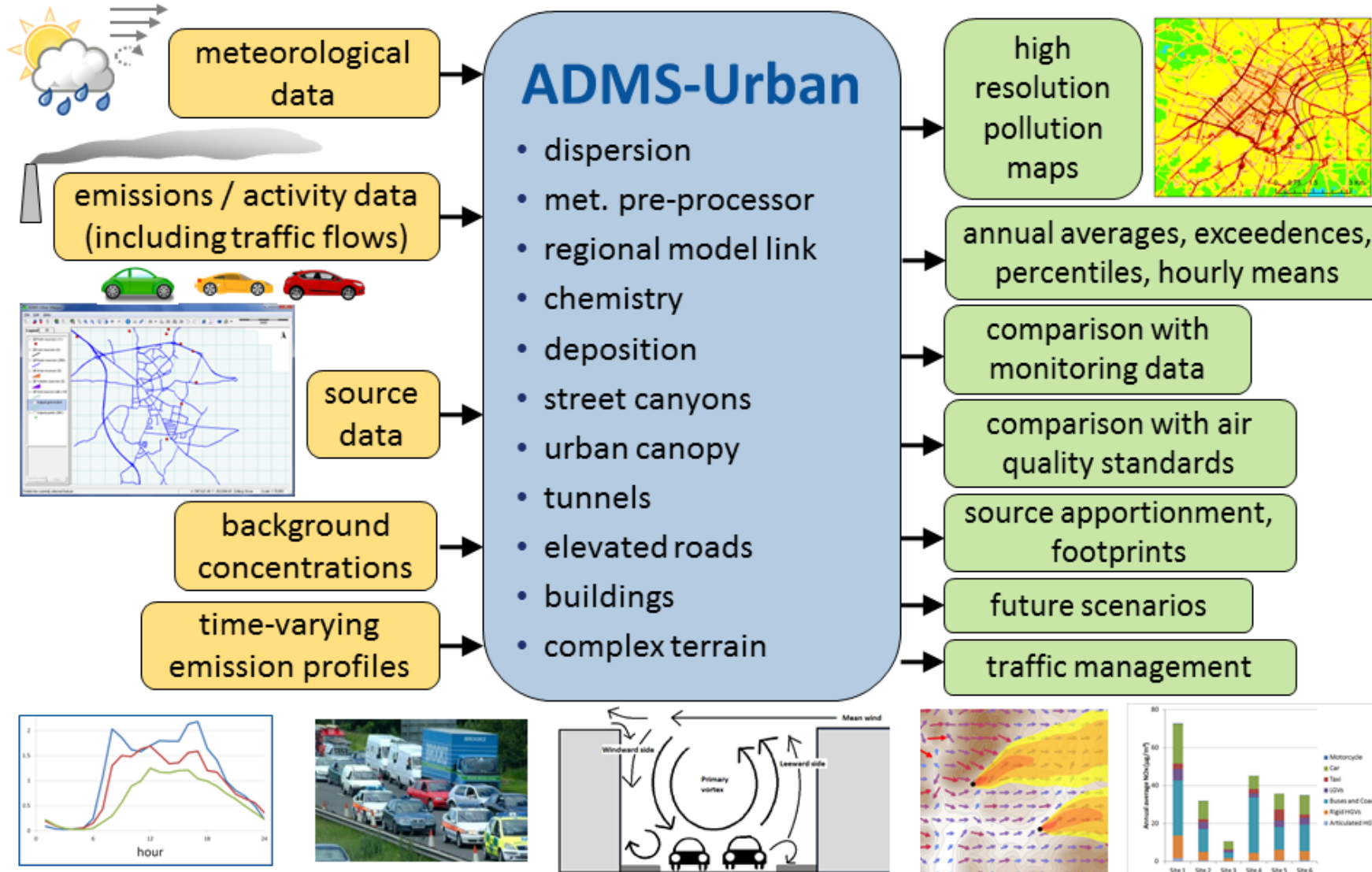
CAMS User Workshop

24 – 25 March 2021

CERC

Cambridge Environmental Research Consultants
Environmental Software and Services

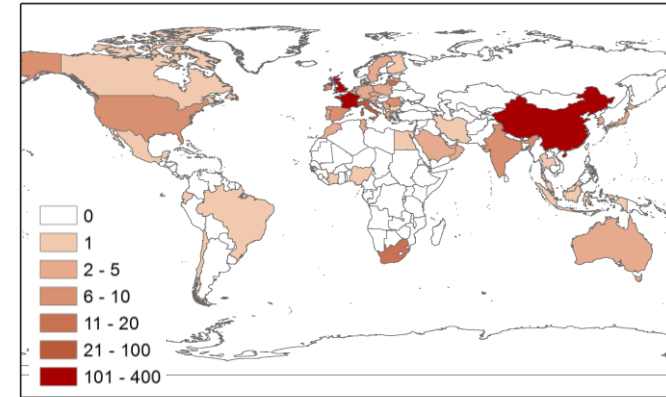# CERC Air Quality Forecasting Services

- London *air*TEXT
  - www.airtext.info
  - Launched 2007
  - 20,000 subscribers
  - Consortium of all 33 London Boroughs plus Slough, Thurrock, Chelmsford, Colchester and the GLA
- Riga *air*TEXT
  - www.rigaairtext.lv
  - Launched 2018
  - 600 subscribers
  - Stakeholders are Riga City Council and the Latvian Ministry for the Environment
- Manchester
  - www.cleanairgm.com
  - Launched Jan 2019
  - Commissioned by Transport for Greater Manchester
- Also systems in Hong Kong, Barcelona and France using ADMS-Urban

ADMS-Urban: Atmospheric Dispersion Modelling System

meteorological data

emissions / activity data (including traffic flows)

source data

background concentrations

time-varying emission profiles

ADMS-Urban
- dispersion
- met. pre-processor
- regional model link
- chemistry
- deposition
- street canyons
- urban canopy
- tunnels
- elevated roads
- buildings
- complex terrain

high resolution pollution maps

annual averages, exceedences, percentiles, hourly means

comparison with monitoring data

comparison with air quality standards

source apportionment, footprints

future scenarios

traffic management

Hundreds of ADMS licences worldwide
Organisations using ADMS per country

|	
0	
1	
2 - 5	
6 - 10	
11 - 20	
21 - 100	
101 - 400	

Widely used by…
- Companies
- Regulatory bodies
- Local government
- National government
- Research organisations

Provided with…
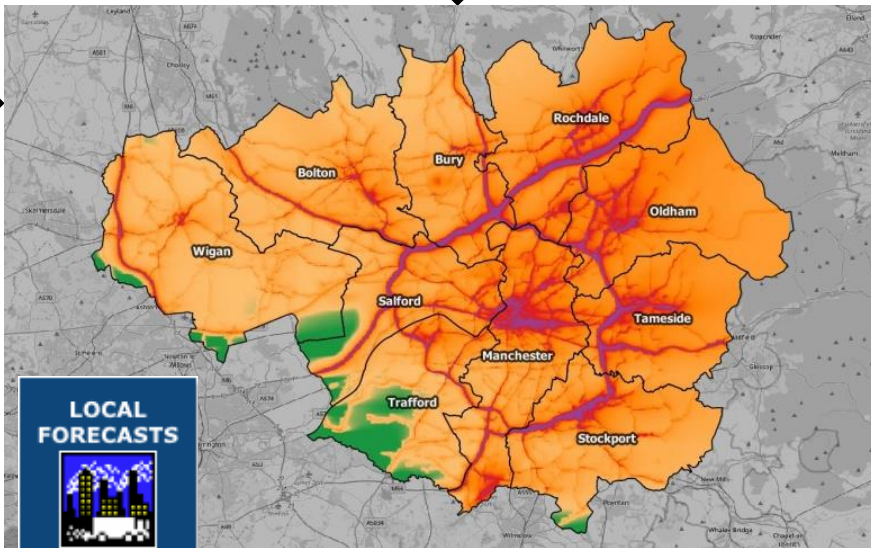- Professional Helpdesk Service
- Training (online available)
- Detailed user documentation

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www.cerc.co.uk/ADMS-Urban

CERC's Air Quality Forecasting System

Copernicus Atmosphere Monitoring Service (CAMS)

Atmosphere Monitoring
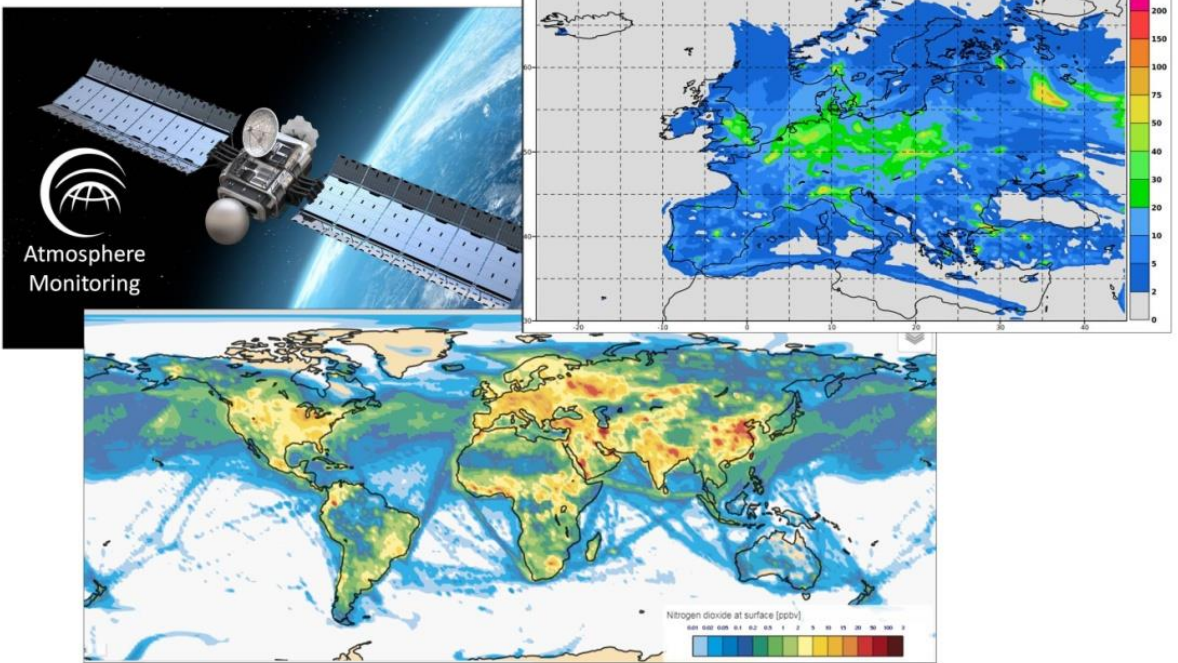
Weather Forecast
(e.g. Met Office, Meteogroup)

LOCAL FORECASTS

ADMS-Urban

3-day pollution forecasts expressed using Air Quality Index (AQI), e.g. UK DAQI, EU AQI

NO₂   Ozone   PM₁₀   PM₂.₅

Forecasts and alerts

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How we use CAMS products in our operational systems

- Air quality:

  - CAMS Regional Ensemble forecasts for PM_{10}, $PM_{2.5}$, Ozone, NO_2, NO, NMVOC

  - Download in netCDF format between 8am and 11am each day

  - Our 3-day forecasts are updated twice per day:

    - 7am update: forecast calculations begin at 00:00, so we use the CAMS forecasts from the previous day

    - 7pm update: forecast calculations begin at 12:00, so we use the CAMS forecasts for the current day

- Riga airTEXT Pollen:

  - Download birch and grass pollen in the same way as air quality data

  - CAMS pollen forecast data in units of grains per cubic metre

  - For Riga airTEXT pollen data are converted to a 4-point index scale from 'Low' through to 'Very high', using pollen concentration thresholds already in use in Latvia

- *Riga airTEXT UV: CAMS 'total sky' (cloud-adjusted) UV index forecast*

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Using the Atmosphere Data Store (ADS)

- In May 2020 we switched all operational systems from the previous CAMS API to the new CAMS ADS API

- <u>Straightforward transition</u>: we developed **Python scripts** to download data in exactly the same format as previously, to reduce the need for further changes to our systems 👍

- A few ways we could develop our system to take advantage of new CAMS ADS flexibility:

Before	Possibilities with ADS 👍
Download entire European domain	With the ADS we could download just the areas we need.
One data file per 24 hours per species	The ADS allows you to select species and lead times
Surface data for all apart from NO and NMVOC, all levels data for NO and NMVOC	With the ADS we could just download surface data for NO and NMVOC, since this is what we need

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Looking ahead...

👍 New ADS makes **archive** of all Ensemble member models available in the **same format** as NRT forecast – we can more easily explore whether the Ensemble is the right CAMS forecast product for each of our services, or whether an Ensemble member would perform better

👍 **Global Reanalysis** dataset already in the ADS – looking forward to **Regional Ensemble Reanalysis** dataset also being available through the ADS (we have used this as "background" for historical modelling with ADMS-Urban where rural measurements are not available)

👍 ADS means **consistent output formats** = we don't need to develop so many different processing tools!

Thank you for listening

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