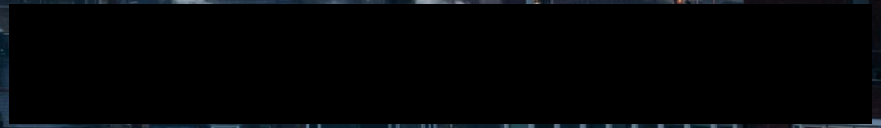
Air Quality Data Portal

Lucy Neal, Eleanor Smith, Paul Agnew, Olivia Smedley, Vivien Bright, Pedro Molina-Jimenez, Catherine Marshall

Clean Air Conference

October 2024



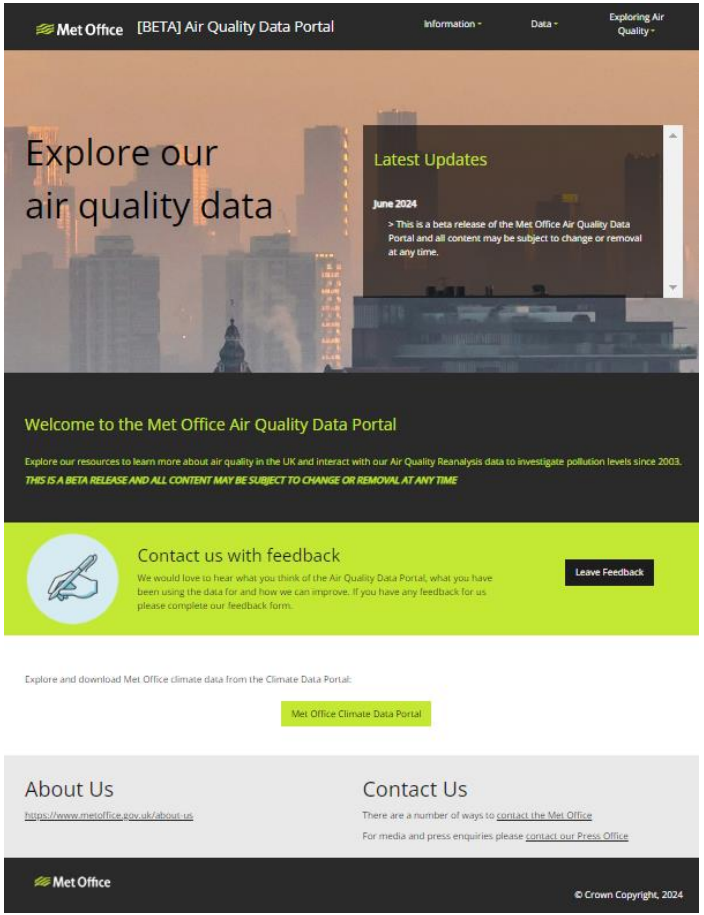
© Crown Copyright 2024, Met Office

Air Quality Data Portal

The Met Office **Air Quality Data Portal** provides an easy route to access and interact with the UK Air Quality Reanalysis data.

https://air-quality-1-themetoffice.hub.arcgis.com/

The portal has been constructed using Esri software and ArcGIS mapping tools



© Crown Copyright 2024, Met Office

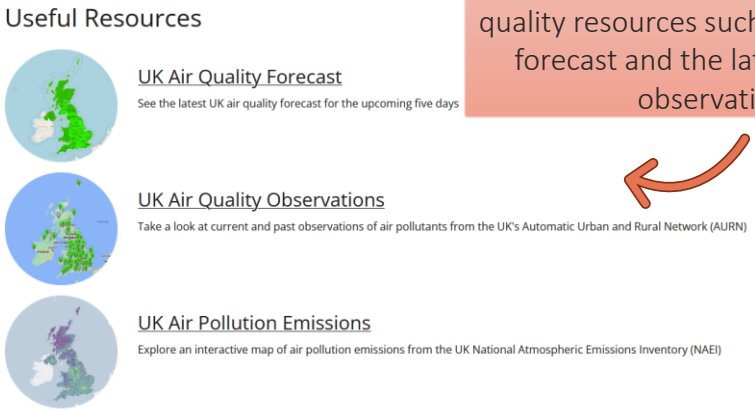
Information resources

Built using ESRI Story Maps

User guide provides detailed guidance on using the website and how to download and use the data

There is information about different aspects of air quality, including sources and impacts of different pollutants and the Daily Air Quality Index

There are also links to other useful air quality resources such as the national forecast and the latest pollutant observations

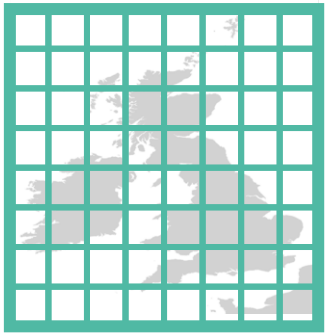


© Crown Copyright 2024, Met Office

UK Air Quality Reanalysis

17 years:
Jan 2003 –
Dec 2019

Model Data



Observational Data

The reanalysis combines model output with observations to give …

Coverage of the **whole of the UK**

Hourly time resolution for a **long time period**

Consistency in model configuration and input data

Inclusion of **all species** of interest

Enhanced data over just model output alone by incorporating observations through a bias correction method

NO_2
SO_2
$PM_{2.5}$
PM_{10}
NO
DAQI
O_3
CO

Bias corrected surface data

© Crown Copyright 2024, Met Office

Reanalysis datasets

Dataset Information

The Air Quality Data Portal hosts data from the UK Air Quality Reanalysis. This data is used throughout the portal to explore different aspects of UK air quality through a range of interactive apps and in-depth applications of the data.

UK Air Quality Reanalysis

The UK Air Quality Reanalysis has been generated as part of the SPF Clean Air Programme. It combines the Met Office's **air quality forecast system** with ground based **observations of pollutants** to produce a dataset that covers the whole of the UK over a long time period, with consistency in the configuration and inclusion of all key pollutants.

UK Air Quality Reanalysis

A description of the generation and contents of the UK Air Quali...

The dataset contains information about the concentrations of **air pollutants**, calculated **daily air quality indices** and a selection of **meteorological variables**.

The data covers the UK and Ireland at a horizontal resolution of **0.1 degree** (approximately 10 km) and **hourly time resolution** for a **17 year period** from 1st January 2003 to 31st December 2019.

If you are interested in using the UK Air Quality Reanalysis dataset we would be grateful if you would fill in this short questionnaire. We would love to hear about which parts of the dataset are of most interest, how the data is being used, and any improvements or additions you would like to see added in future.

Reanalysis User Questionnaire

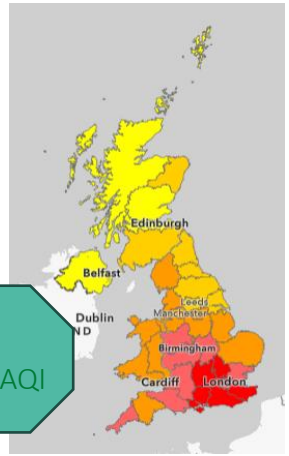
Gridded Yearly & Monthly Mean Concentrations

Data is aggregated temporally and spatially due to size limitations

There is detailed information about the air quality reanalysis dataset and a questionnaire to gather user information

Regional Monthly Mean Concentrations

Regional Monthly Max DAQI



© Crown Copyright 2024, Met Office

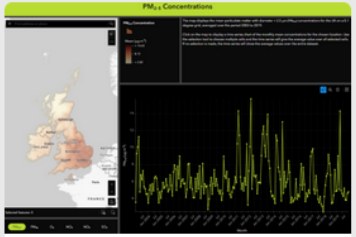
Visualising the data

The portal hosts a selection of **visualisation tools** to allow users to easily explore the reanalysis data.

These are built using ESRI tools such as dashboards and experiences

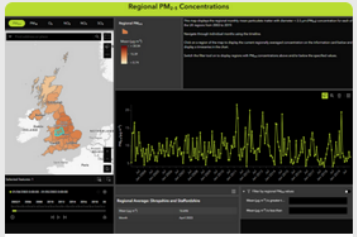
This allows quick development of useful functionality

Pollutant Concentrations



Gridded Pollutant Concentrations

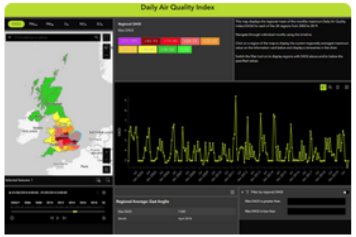
Explore maps and timeseries of pollutant concentrations across the UK on a 0.1 degree grid.



Regional Pollutant Concentrations

Explore maps and timeseries of pollutant concentrations across UK regions

Daily Air Quality Index



Regional DAQI

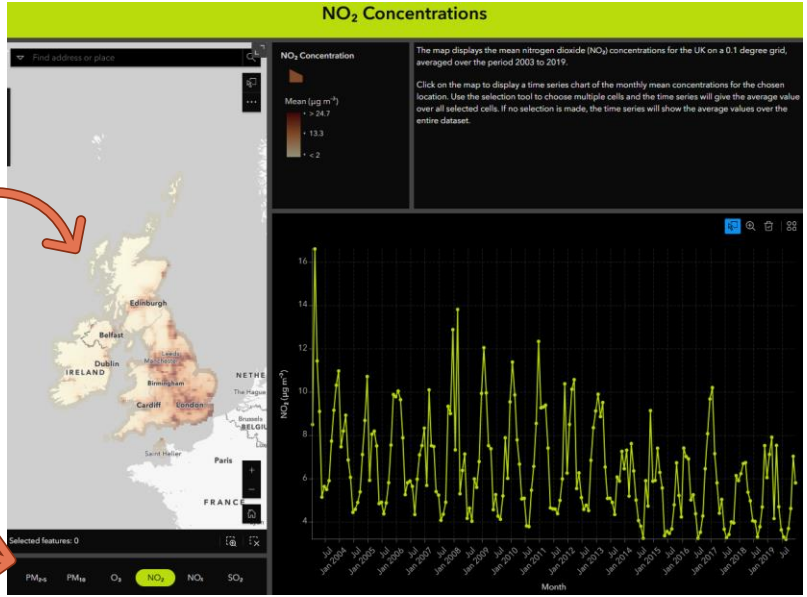
Explore maps and timeseries of the speciated daily air quality index across UK regions.

© Crown Copyright 2024, Met Office

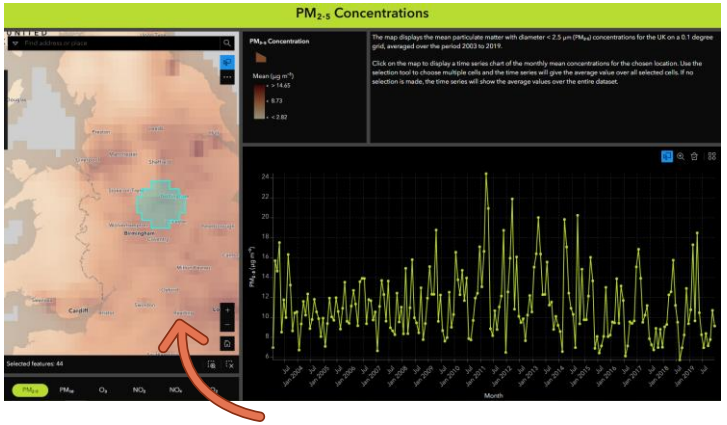
Visualising the data – gridded concentrations

Explore maps and timeseries of pollutant concentrations across the UK on a 0.1 degree grid.

17 year mean gridded concentrations



Select species



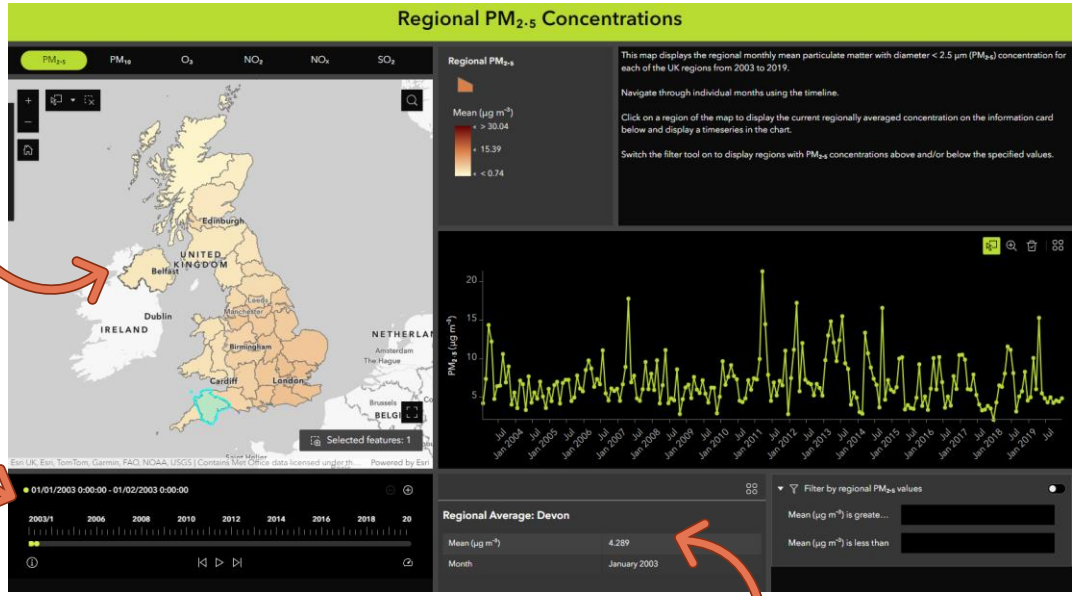
Individual locations or areas can be selected from the map to generate location-specific timeseries graphs

© Crown Copyright 2024, Met Office

Visualising the data – regional concentrations

Explore maps and timeseries of pollutant concentrations across UK regions

Office for National Statistics International Territorial Level 2 Regions



Explore how map changes over time

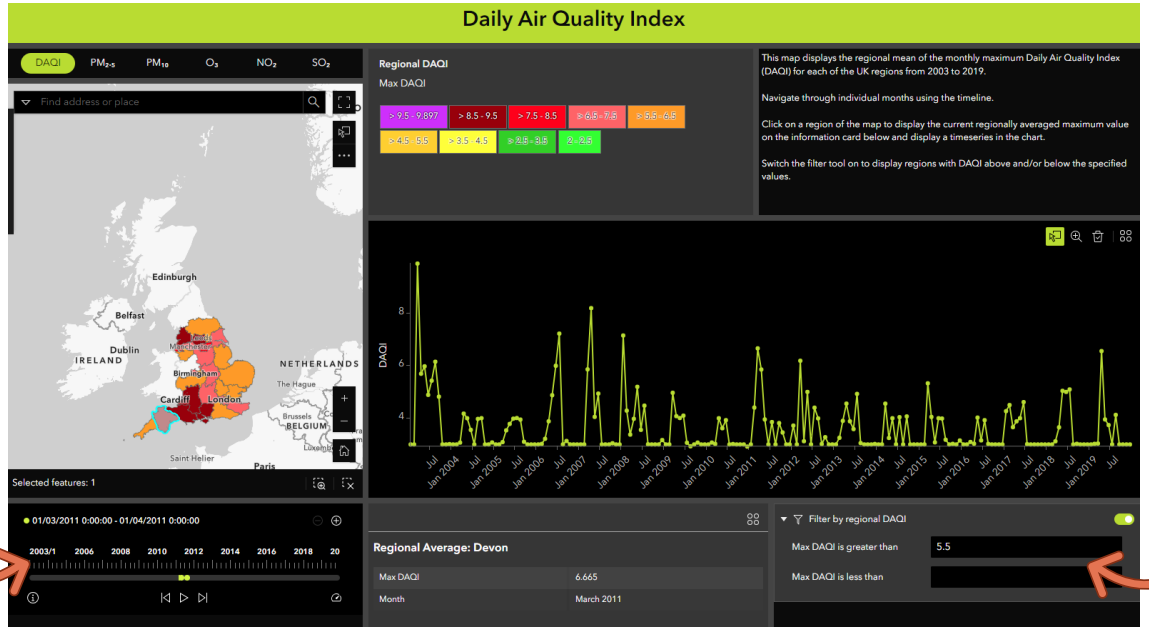
Data values for a chosen locations can be easily identified from information cards

© Crown Copyright 2024, Met Office

Visualising the data – regional DAQI

Explore maps and timeseries of the speciated daily air quality index across UK regions.

Time sliders can be used to move through the months and years to look at seasonal and interannual changes

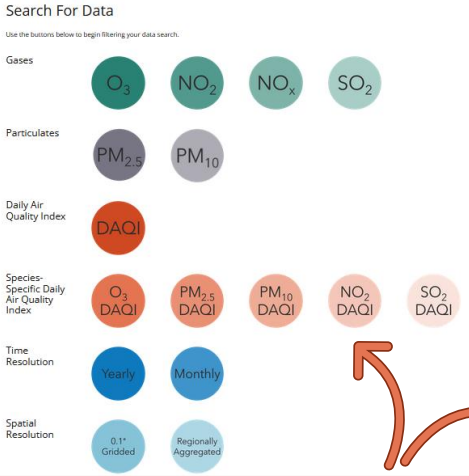


Filtering tools are included to allow the user to specify the value range of interest

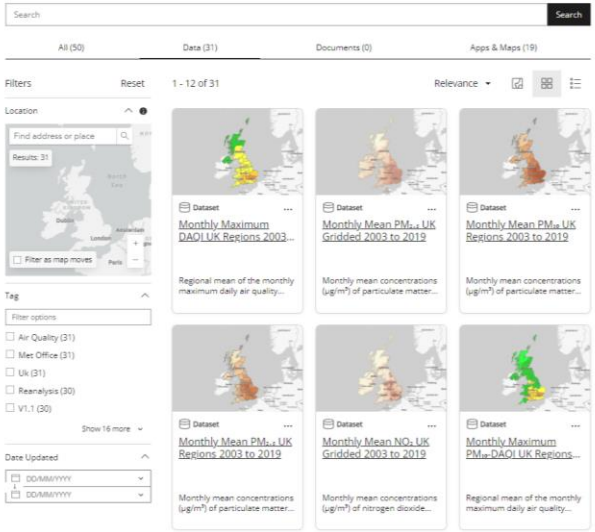
© Crown Copyright 2024, Met Office

Accessing the data

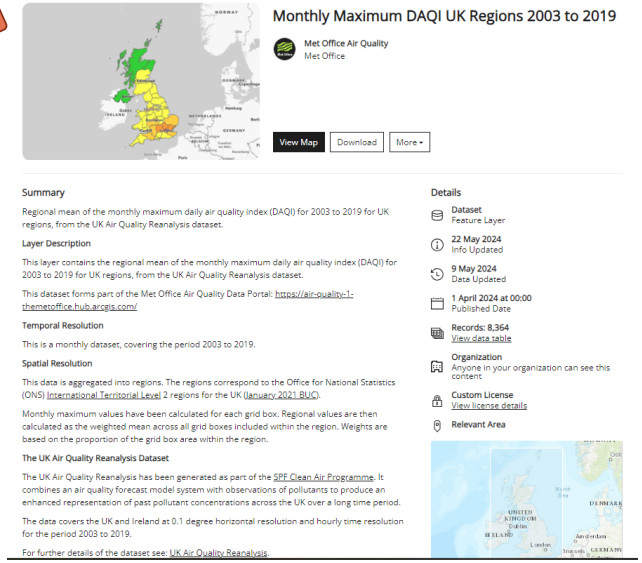
The **datasets** available on the portal can be explored through a data catalogue.



A series of search buttons have been designed to allow for quick data searches and the full catalogue can be browsed and filtered using different tags



Each dataset is accompanied by metadata which fully describes the contents of the dataset, information about the reanalysis dataset that was used to generate it, licencing information and use guidelines



© Crown Copyright 2024, Met Office

Met Office

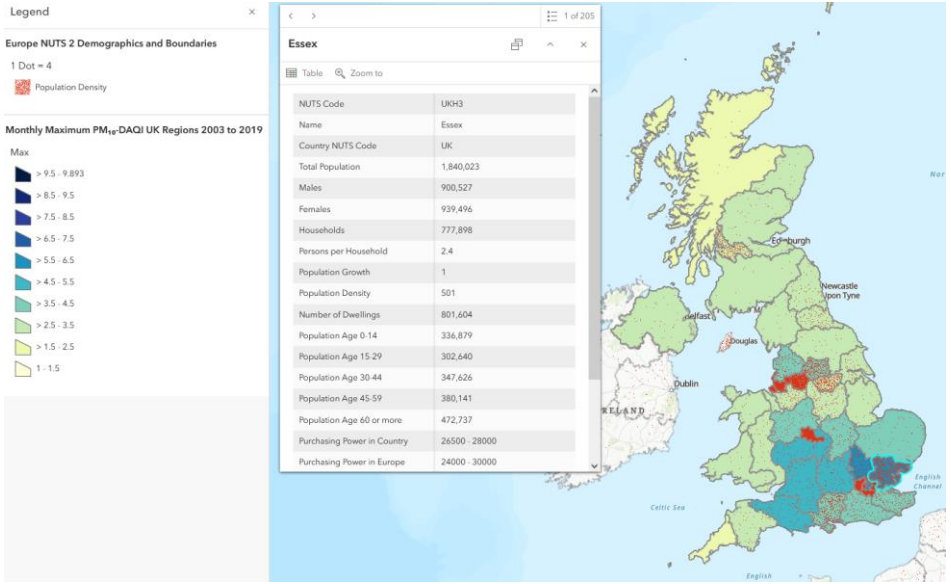
Plan to add into Living Atlas soon!

Accessing the data

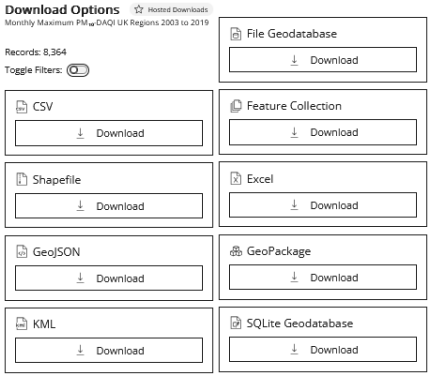
The data can be added into your own **maps** or **downloaded**

Add additional map layers

Customise legends



Download data in a variety of formats

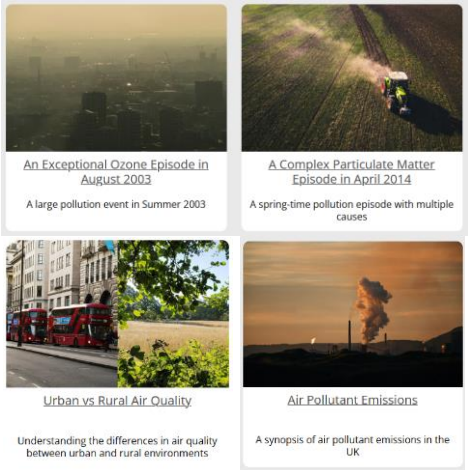


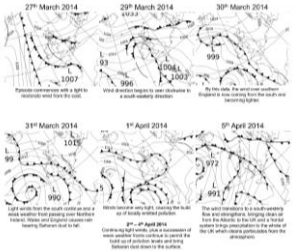
© Crown Copyright 2024, Met Office

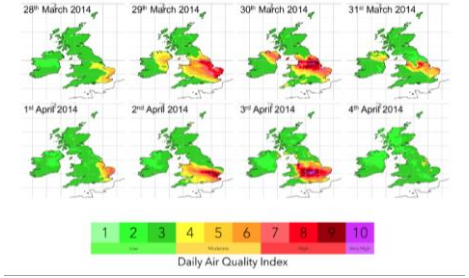
Story Maps

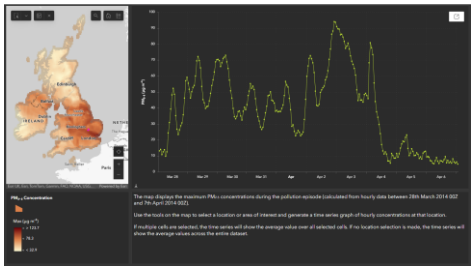
Used to explain different aspects of air quality and specific applications of the reanalysis data in more detail.

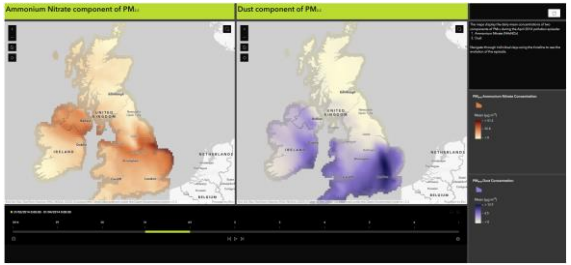
They combine text information with images and interactive maps and apps to explore the data and explain a topic.







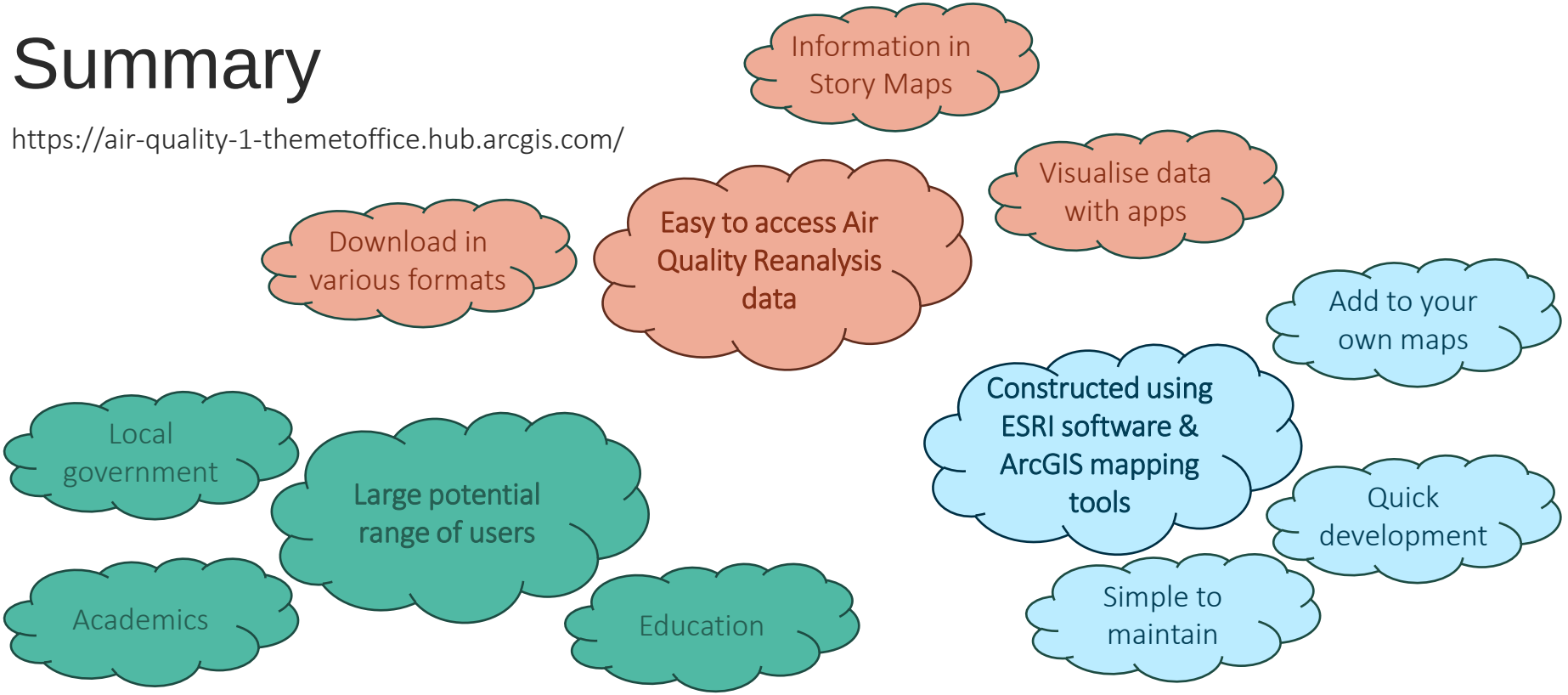




© Crown Copyright 2024, Met Office

Summary

https://air-quality-1-themetoffice.hub.arcgis.com/



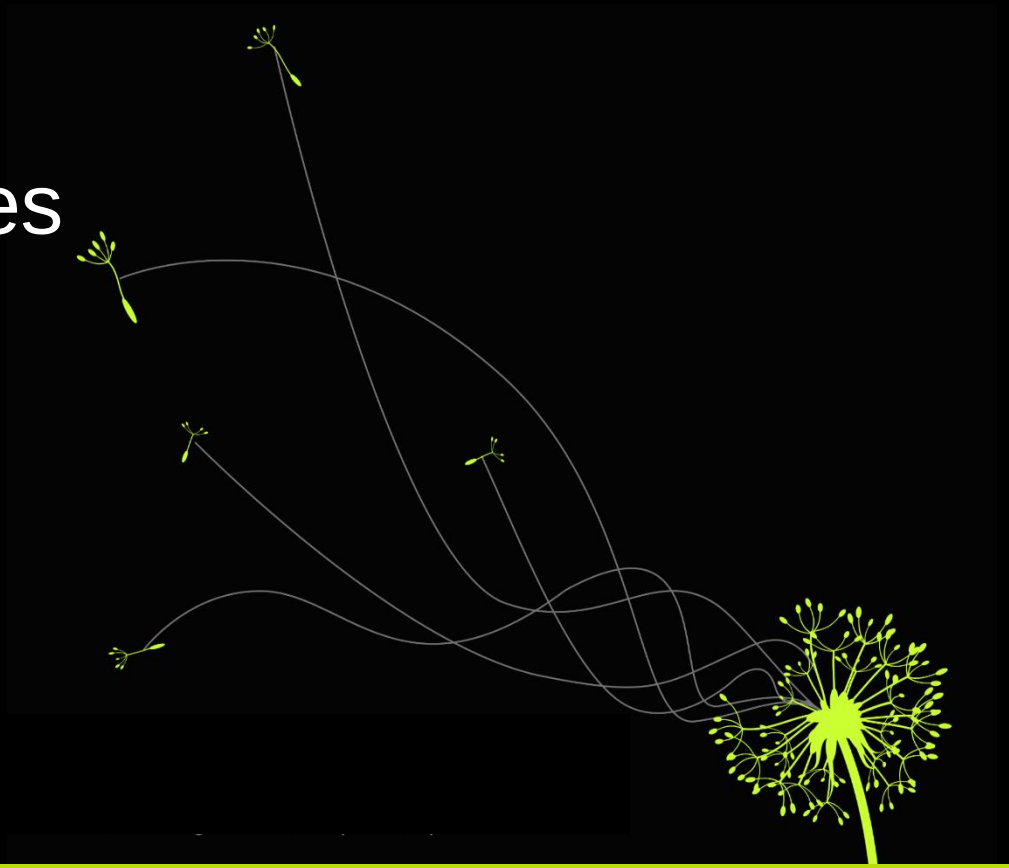
© Crown Copyright 2024, Met Office

Questions?

https://air-quality-1-themetoffice.hub.arcgis.com/

© Crown Copyright 2024, Met Office

Supplementary Slides

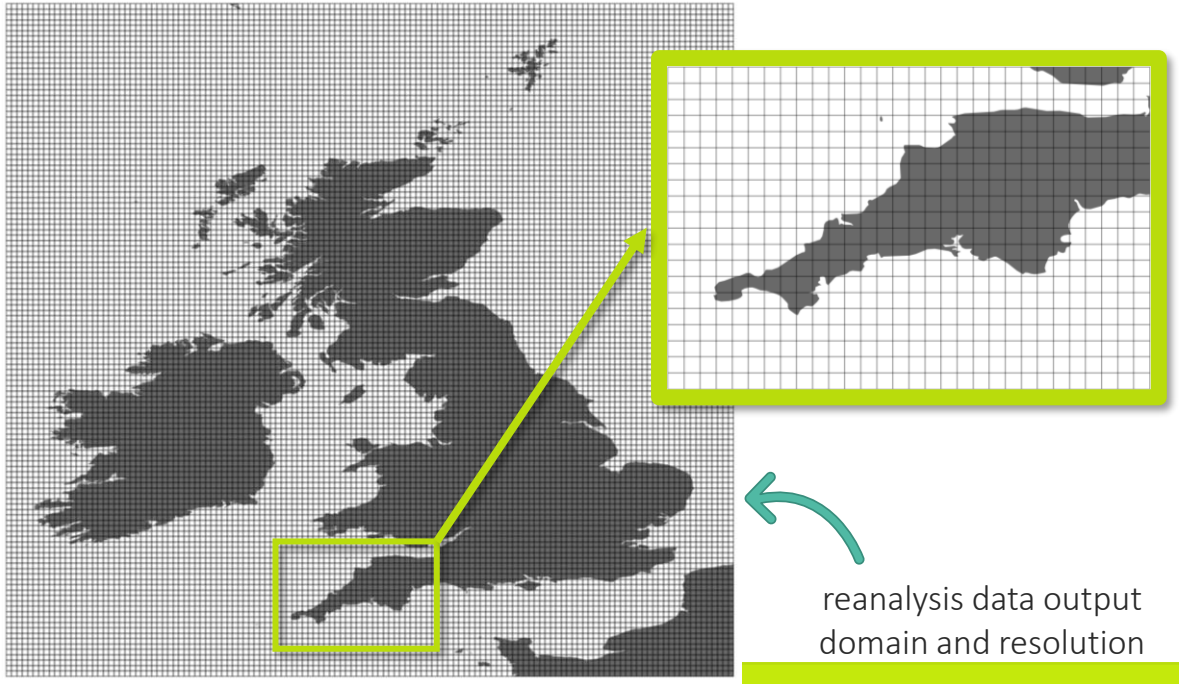


© Crown Copyright 2024, Met Office

UK Air Quality Reanalysis (AQREAN)

The reanalysis data is re-gridded from the native model rotated pole grid to a WGS 84 coordinate system with a horizontal resolution of 0.1 degree.

All data is saved into monthly NetCDF files containing hourly data.



reanalysis data output domain and resolution

As only land-based observations are used in the bias correction method, the bias corrected data is masked to remove data over the oceans.

© Crown Copyright 2024, Met Office

UK Air Quality Reanalysis (AQREAN)

The dataset contains the bias-corrected surface level concentrations of key gaseous and particulate pollutants along with calculated daily air quality indices.

Gaseous Pollutants	Ozone O_3	Nitric Oxide NO	Nitrogen Dioxide NO_2	Nitrogen Oxides (as mass of NO_2) NO_x	Sulphur Dioxide SO_2	Carbon Monoxide CO
Particulate Pollutants	Particulate Matter d < 2.5 µm $PM_{2.5}$	Particulate Matter d < 10 µm PM_{10}				
Daily Air Quality Indices	Daily Air Quality Index DAQI	Daily Air Quality Index of Ozone O_3 DAQI	Daily Air Quality Index of PM d < 2.5 µm $PM_{2.5}$ DAQI	Daily Air Quality Index of PM d < 10 µm PM_{10} DAQI	Daily Air Quality Index of Nitrogen Dioxide NO_2 DAQI	Daily Air Quality Index of Sulphur Dioxide SO_2 DAQI

Raw Model Surface Level Data

Contains additional gaseous pollutants (ammonia, isoprene, NMVOC), speciated particulate matter and meteorology (including temperature, humidity, precipitation, cloud, wind speed and direction).

Raw Model Vertical Data

Contains O_3, NO, NO_2, SO_2, CO, NH_3, $PM_{2.5}$, PM_{10}, temperature, pressure, height above sea level.

© Crown Copyright 2024, Met Office