Met Office

SPF Clean Air

UK Air Quality Reanalysis

Dataset Version History

Met Office

Version History Summary

Version Number	Release Date	Comments
1.0	March 2023	Initial release of the AQREAN reanalysis dataset. Includes bias corrected surface level data and surface level data.
1.1	January 2024	Update to the bias corrected surface level and surface level data files. Includes modified land-sea mask, inclusion of additional variables, correction of negative values and corrections to the missing timesteps at the end of each month.

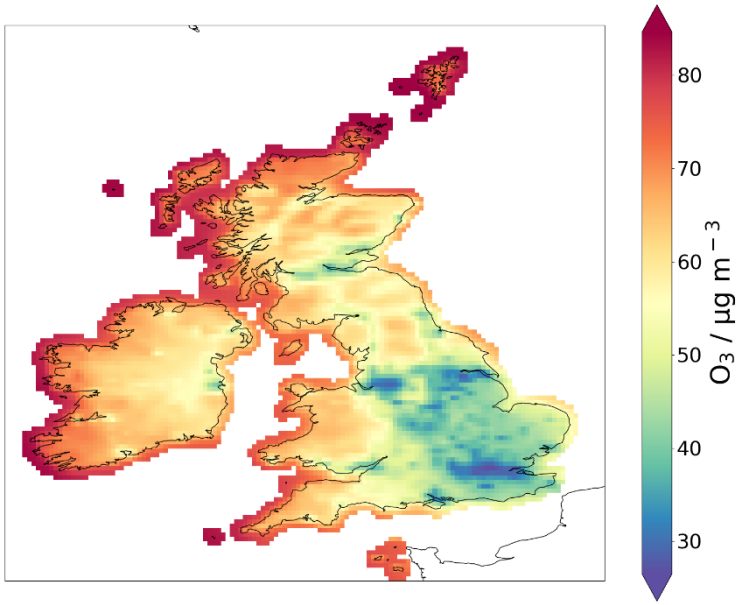
Version 1.1 – Details of Changes

Land-Sea Mask

In Version 1.0, the land based data was determined based on whether the centre point of that grid box was within the land-sea mask. For Version 1.1, this has been modified so that all grid boxes which contain any land are included, and a buffer region is also added to add an additional grid box around all of the land. These changes are illustrated in the images below.

The dark green areas show the grid boxes included in Version 1.0. The light green areas show the additional grid boxes included in Version 1.1. The changes are shown more clearly for the west of Scotland which shows the islands and buffer region and the additional data included for Version 1.1.

The modified land-sea masking means that all land areas, including small islands, are included in the dataset. It also means that data is included for large areas of sea. It is important to be aware of this if using the reanalysis dataset to calculate properties such as dataset averages using the full dataset without further masking of ocean based locations. For many species, the difference in concentrations over land and over sea mean that the inclusion of the wider area with a large proportion of sea-based locations, could have a large impact on the average value making it unrepresentative of a land based average. The map below shows the monthly mean ozone concentrations for January 2019, illustrating the higher concentrations around the coastlines which are present in the revised version of the data.



NO_x as Mass of NO_2

The concentration of NO_x (as mass of NO_2) has been calculated from the NO and NO_2 concentrations and included as an additional variable.

NO_x (as mass of NO_2)	µg m^{-3}

NO_x is included in both the bias corrected and non bias corrected surface level data files. In the bias corrected data files, the NO_x concentration is calculated using the bias corrected concentrations of NO and NO_2.

Ammonium Component of Particulate Matter

The ammonium (NH_4) component of particulate matter (both $PM_{2.5}$ and PM_{10}) was missing in the Version 1.0 data files. In Version 1.1, this component is now included. Two additional variables are therefore present in the surface level (non bias corrected) data files:

Ammonium in Particulate Matter d < 2.5 µm ($PM_{2.5}$)	µg m^{-3}
Ammonium in Particulate Matter d < 10 µm (PM_{10})	µg m^{-3}

Ammonium Nitrate and Ammonium Sulphate Particulate Matter Components

As well as including the ammonium, nitrate and sulphate components of particulate matter, the ammonium nitrate (NH_4NO_3) and ammonium sulphate ($(NH_4)_2SO_4$) concentrations are also included. Four additional variables are therefore present in the surface level (non bias corrected) data files:

Ammonium Nitrate in Particulate Matter d < 2.5 µm ($PM_{2.5}$)	µg m^{-3}

Ammonium Sulphate in Particulate Matter d < 2.5 µm ($PM_{2.5}$)	µg m^{-3}
Ammonium Nitrate in Particulate Matter d < 10 µm (PM_{10})	µg m^{-3}
Ammonium Sulphate in Particulate Matter d < 10 µm (PM_{10})	µg m^{-3}

Additional Meteorological Variables

Relative humidity at 1.5 m and cloud fractions have also been added to the surface level (non bias corrected) data files:

1.5 m Relative Humidity	%
Very Low Cloud Fraction	N/A
Low Cloud Fraction	N/A
Medium Cloud Fraction	N/A
High Cloud Fraction	N/A

Negative Precipitation

In Version 1.0. there were a couple of instances where the values for the total precipitation amount (kg m^{-2}) was negative, due to the re-gridding process. In Version 1.1, any negative precipitation values are captured and set to zero.

Missing Timesteps

The last hour of each month was missing in the original data files.

The timestamps associated with the data are reported as ‘hour ending’. So the missing timesteps would have the label YYYY-MM-01 00:00:00 and would represent the data for the last hour of the previous month (from 23:00 to 00:00). This has been corrected and the data for this hour is now present in the files.

All data for a given month is present in that month’s file. For example, for January 2003 the timestamps begin at 2003-01-01 01:00:00 and end at 2003-02-01 00:00:00.