

The Effect of COVID-19 Social and Travel Restrictions on UK Air Quality – November Update

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Experts in air quality
management & assessment

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1 Introduction

- 1.1 Air Quality Consultants Ltd (AQC) published a report in April 2020 that presented an analysis of trends in NO_x, NO₂ and O₃ concentrations at 247 sites across the UK during the early stages of the COVID-19 social and travel restrictions¹. The analysis identified no obvious influence of the restrictions in the raw data, but isolating and removing meteorological and temporal effects revealed reductions in NO_x and NO₂ concentrations at a very large number of monitoring sites across the UK. Reductions in adjusted-measured NO_x and NO₂ concentrations at roadside monitors were substantial and coincided with reductions in traffic volumes on UK roads.
- 1.2 This new report presents an update to the analysis, which has used the same approach as described in the April 2020 report, but extending to the end of September 2020. It should be noted that the raw data have not been carefully quality controlled and there may be some isolated instances of erroneous reported measurements. Despite this, the overall patterns when averaged across all sites will be representative.

¹ Gellatly, R., Marner, B., Liska, T. and Laxen, D. (2020) The Effect of COVID-19 Social and Travel Restrictions on UK Air Quality – 06 April Update, Available: <http://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=1222ff30-3c9f-4189-b353-2f2ee50edab1>

2 Results

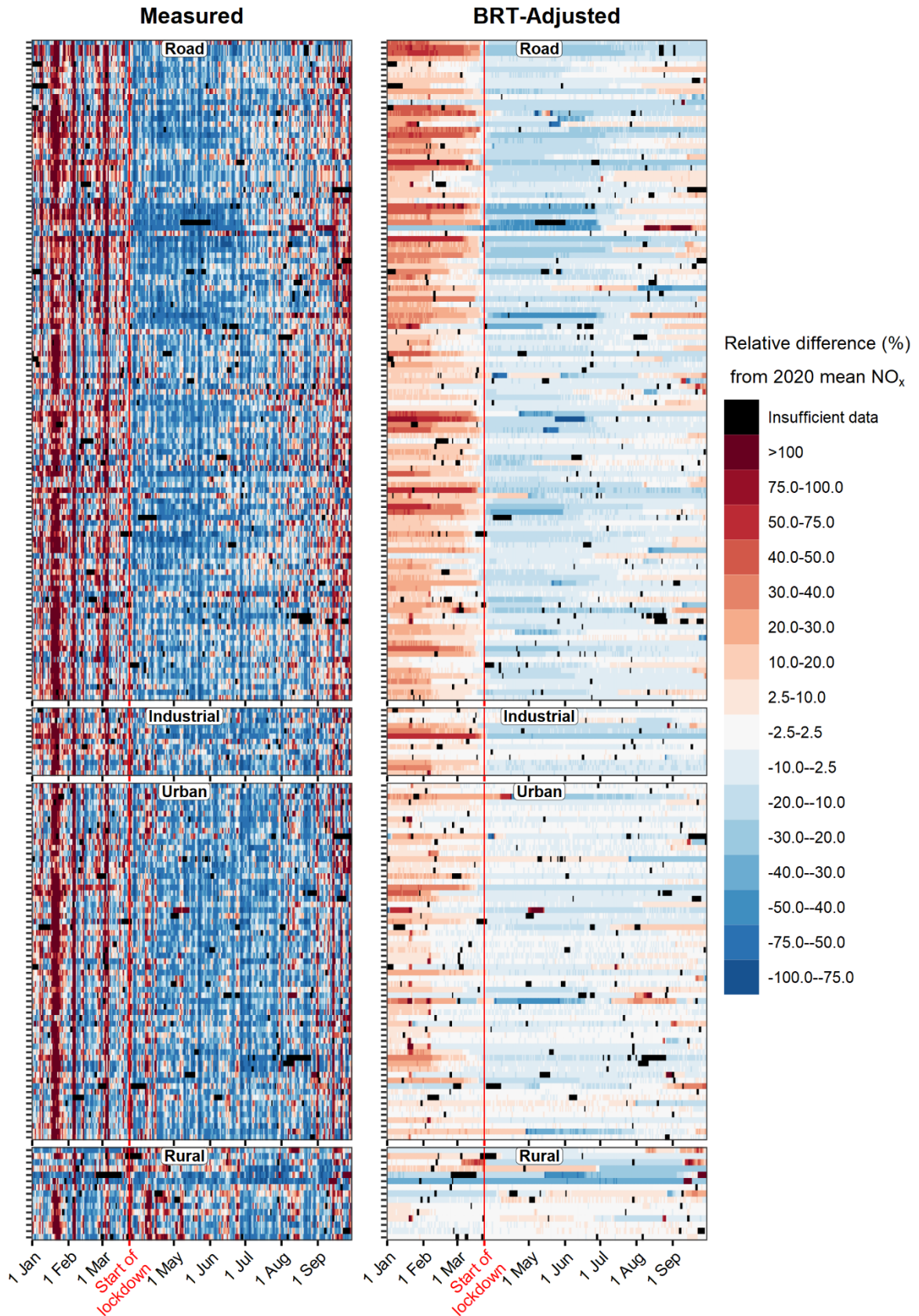


Figure 1: Relative Change in Raw Measured and BRT-Adjusted NO_x Concentrations at UK Sites – 1st January to 30th September 2020. Each row of pixels represents a single site.

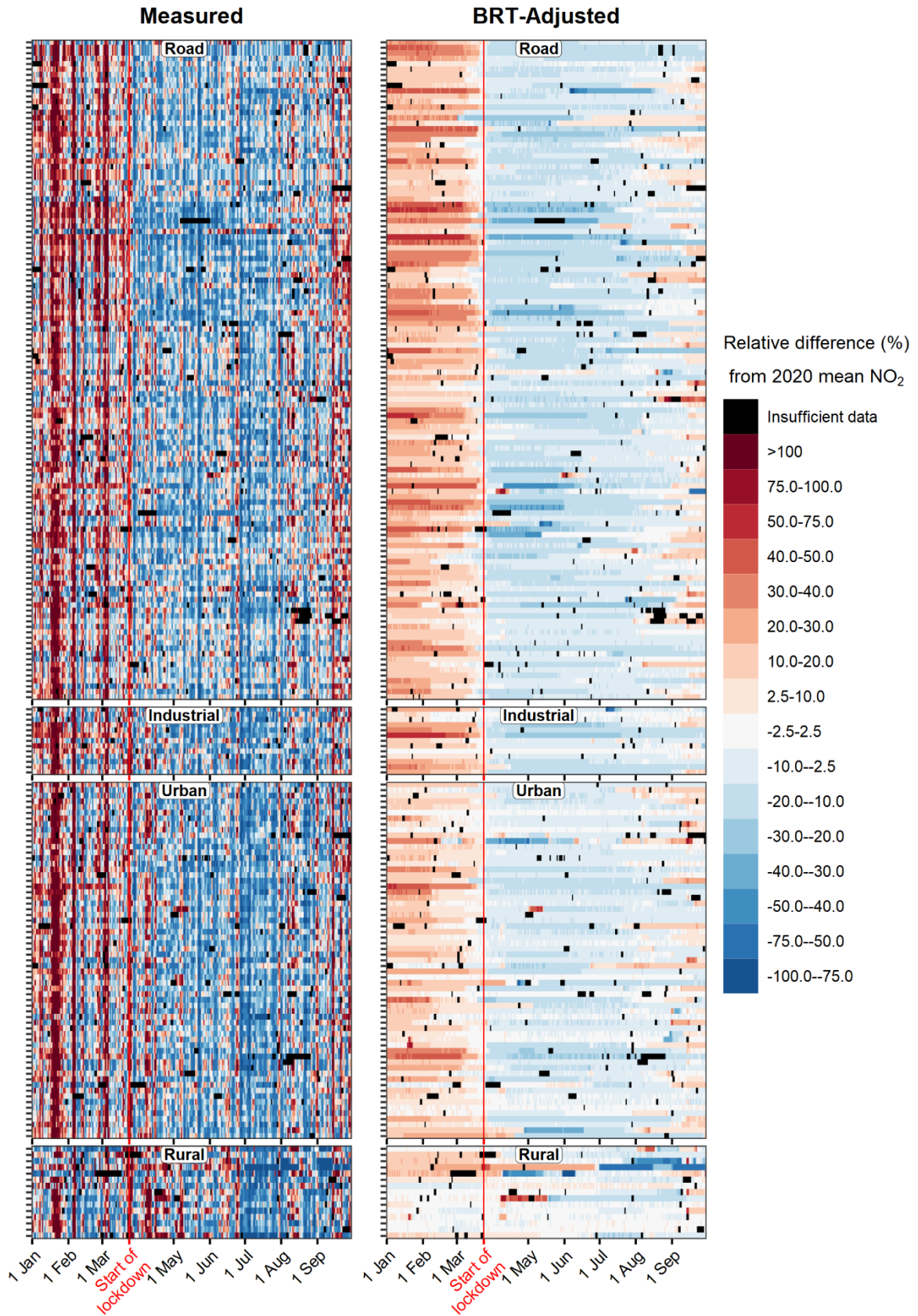


Figure 2: Relative Change in Raw Measured and BRT-Adjusted NO₂ Concentrations at UK Sites – 1st January to 30th September 2020. Each row of pixels represents a single site.

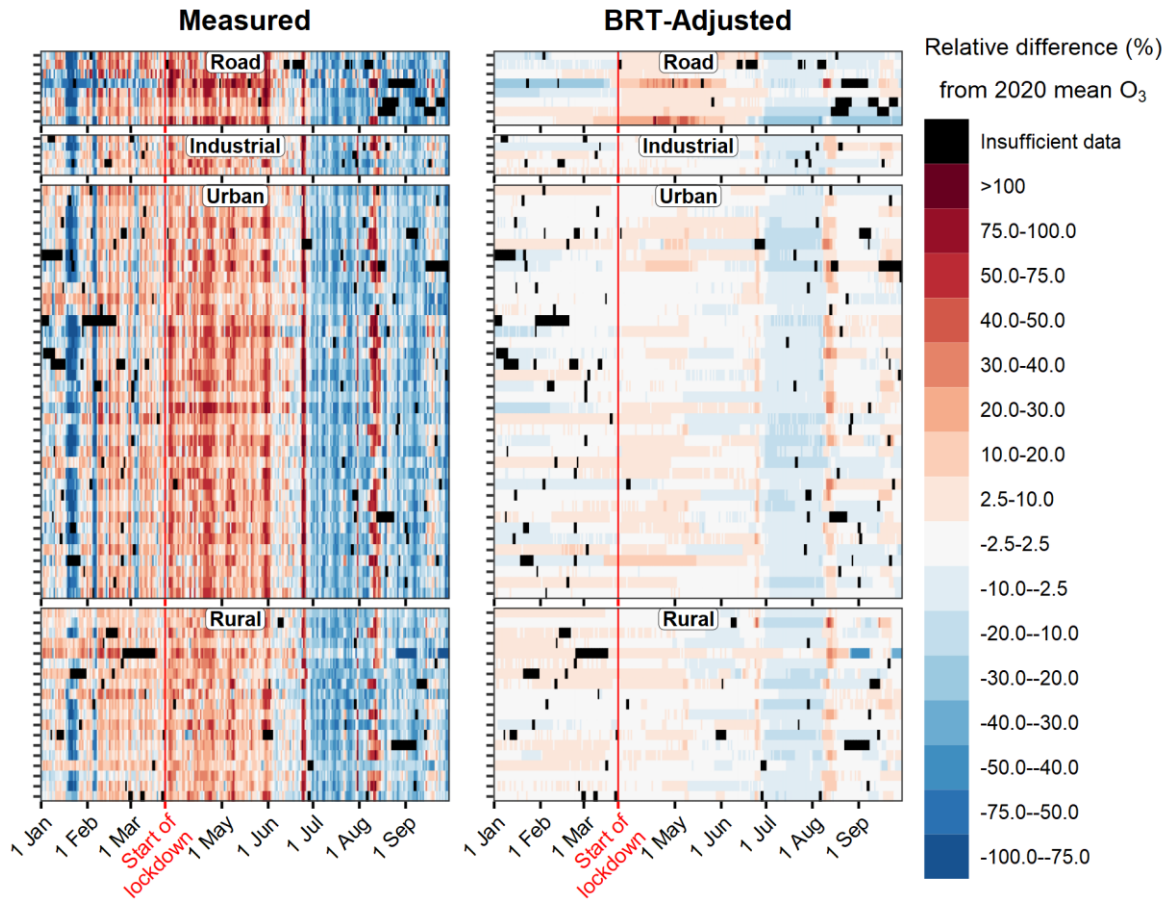


Figure 3: Relative Change in Raw Measured and BRT-Adjusted O₃ Concentrations at UK Sites – 1st January to 30th September 2020. Each row of pixels represents a single site.

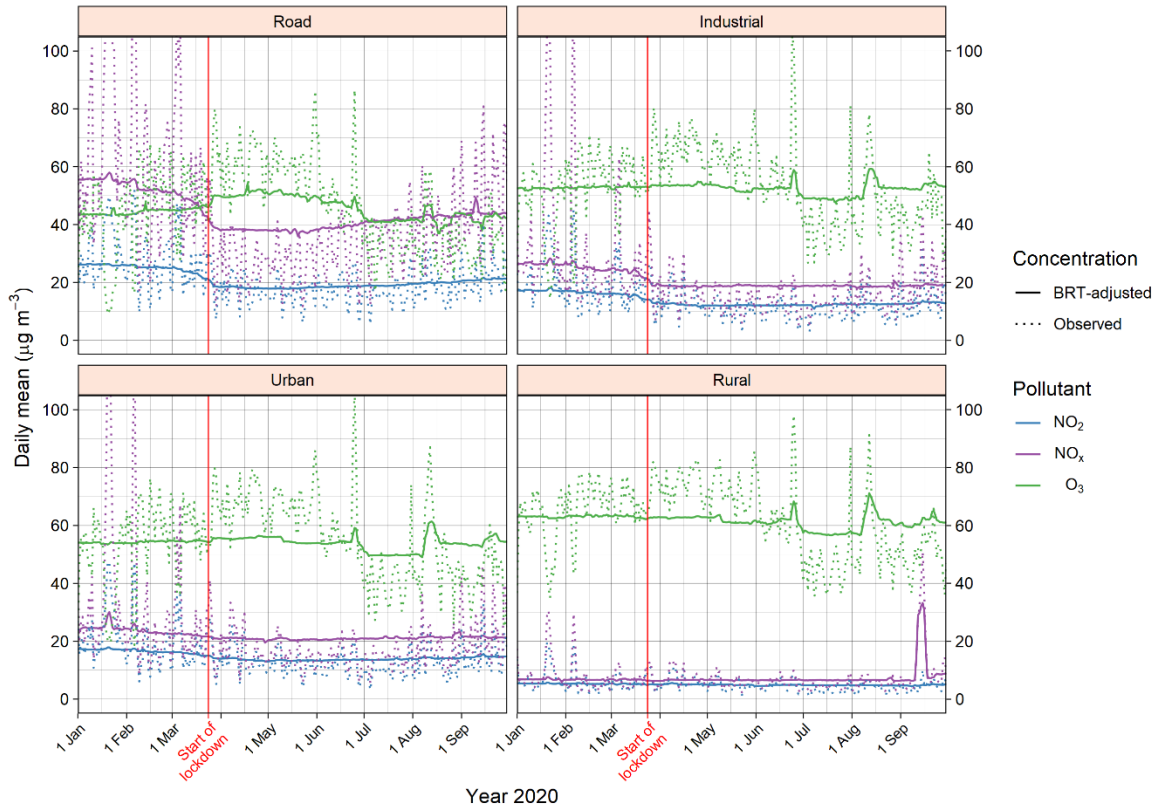


Figure 4: Daily Mean Raw Measured and BRT-Adjusted Concentrations at UK Sites – 1st January to 30th September 2020. Note that the NO_x Concentrations in the Rural plot are likely skewed by erroneous data in mid-September.

3 Discussion

- 3.1 At first glance, the updated analysis appears to display visible trends in raw NO_x, NO₂ and O₃ concentrations, with NO_x and NO₂ concentrations generally high pre-lockdown, then low through to July/August and increasing again into September, with O₃ doing the opposite. However, it is important to note that such a trend would be typical of UK seasonal conditions. This trend is controlled for in the BRT-adjusted data, which are likely to show the residual effect caused by changing social and travel restrictions.
- 3.2 The lockdown in late March had a dramatic effect on concentrations, with NO_x and NO₂ concentrations reducing notably at all roadside, industrial and urban sites, although the effect is especially clear at roadside sites (see Figure 4). Roadside O₃ concentrations also increased appreciably immediately after lockdown was implemented, although it must be noted that the BRT models appear to have struggled with the high ozone events in late June and early August, and the generally low concentrations between those events, and thus are likely less robust than those for NO_x and NO₂.
- 3.3 There is then a general trend for increasing NO_x and NO₂ concentrations, and reducing O₃ concentrations, at roadside monitors from late June/early July, which corresponds to when social and travel restrictions were widely lifted. Despite these increases, BRT-adjusted NO_x and NO₂ concentrations at most sites have remained below pre-lockdown levels; although by the end of September, concentrations at some sites were close to (or in a few cases exceeding) pre-lockdown conditions.
- 3.4 Concentrations at Rural sites do not appear to have been significantly affected by the social and travel restrictions, although the low concentrations typically measured at these sites would be expected to make it difficult to establish noteworthy changes.