Local Air Quality Management
Updating and Screening Assessment 2015

Calderdale Metropolitan Borough Council

April 2015

Table 1: Report authorship

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Executive Summary

This report includes monitoring data for 2014. The only pollutant monitored locally is nitrogen dioxide, although data for other pollutants is available from the Automatic Urban Remote Network (AURN). Both automatic and non-automatic monitoring has been undertaken. The data indicates that nitrogen dioxide concentrations have remained similar to those for 2013 at most of the monitored sites. There is some suggestion from the trends over the past ten years that concentrations are stable or falling, but this is not evident at all locations. The regional pollutant $PM_{2.5}$ is measured at AURN sites in Leeds, Manchester and Wigan, and this data is mentioned in this report in part because of the Council's decision to monitor for $PM_{2.5}$ locally in relation to public health.

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1 Introduction

1.1 Description of Local Authority area

The Borough of Calderdale is a mixed rural and urban borough, with the South Pennine Moors to the west and large areas of open countryside surrounding the urban centres of Todmorden, Halifax, Elland and Brighouse. The tourist centre of Hebden Bridge is served by the A646, which takes all the through traffic from Halifax to Lancashire. The A58 and A646 major commuter routes run through the Borough, and the M62 skirts the southern edge.

Calderdale, in common with many former manufacturing areas, has seen a shift away from large scale manufacturing industries, although there is industrial activity centred on industrial estates such as Lowfields Business Park and Armytage Road, as well as smaller mixed sites across the Borough. Some of the industrial installations hold environmental permits. There are some Part A1 sites regulated by the Environment Agency, including chemical manufacturers and combined heat and power plant. The Council regulates one Part A2 foundry at Todmorden, and around 75 Part B installations including petrol filling stations, quarry processes and timber and combustion installations. There is also a small waste incineration plant at the south eastern edge of the Borough.

1.2 Purpose of report

This report is intended to fulfil the requirements of the Local Air Quality Management reporting process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The Environment Act 1995 process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

1.3 Air quality objectives

The air quality objectives applicable to LAQM in England are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1 of [TG09]. This table shows the objectives in units of microgrammes per cubic metre (milligrammes per cubic metre for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

1.4 Summary of previous reviews and assessments

The previous reviews and assessments are summarised in Table 2.

Table 2: Previous rounds of Review and Assessment

Report	Date	Outcome and Notes
Stage 1 report [CMBC99]	1999	Reported data
Stage 2 report [CMBC00]	2000	Concluded Stage 3 reviews needed
Stage 3 report [CMBC01]	2001	Reported data and modelling
Updating and Screening Assessment [CMBC02]	2003	Assessed SO_2
Detailed Assessment [CMBC03]	2004	Identified need for further investigation at Ainley Top
Updating and Screening Assessment [CMBC05]	2005	Identified need for detailed assessments. AQMAs declared at Hebden Bridge (No 3) and Sowerby Bridge (No 2)
Detailed Assessment [CMBC06]	2006	Declaration of AQMAs No 4, No 5 and No 6
Progress Report [CMBC07]	2007	Reported monitoring results
Updating and Screening Assessment [CMBC09B]	2009	Identified need for detailed assessments
Air Quality Action Plan [AQAP09]	2009	Reported action plan for AQMAs No 1, No 2 and No 3
Progress Report [CMBC10B]	2010	Reported monitoring results
Progress Report [CMBC11B]	2011	Reported monitoring results and action plan
Detailed Assessment (biomass) [CMBC10]	2010	Assessed plant identified in [CMBC09B]
Detailed Assessment (West End) [CMBC11]	2011	Confirmed exceedences in this area are unlikely
Detailed Assessment (Hipperholme) [CMBC12]	2012	Determined extent of proposed AQMA
Progress Report [CMBC13]	2013	Reported monitoring results
Progress Report [CMBC14]	2014	Reported monitoring results

2 New monitoring data

2.1 Summary of monitoring undertaken

2.1.1 Automatic monitoring sites

The automatic monitoring site details are shown in Table 3.

Table 3: Continuous monitoring locations

Site name	Site type	grid reference	pollutant	AQMA	closest exposure	distance from kerb
Romon 2	Roadside	409488 423428	NO_2	1	10m	2m
Romon 3	Roadside	398990 427209	NO_2	2	10m	2m
Romon 4	Roadside	406073 423615	NO_2	3	10m	2m

2.1.2 Non-automatic monitoring sites

These monitoring sites are listed in Table 4. Figures 10, 12, 13, 15 and 14 show the diffusion tubes in Sowerby Bridge, Salterhebble, Brighouse, Hipperholme and Hebden Bridge, indicating the annual mean nitrogen dioxide concentrations for 2014.

Table 4: Diffusion tube locations 2014

Tube ID	Site type	Easting	Northing	Pollutant	AQMA	relevant exposure
HH-LR	roadside	412540	425490	NO_2	7	y
HH-LB	roadside	412431	425477	NO_2	7	y
HH-LT	roadside	412450	425435	NO_2	7	y
HB1	roadside	399033	427223	NO_2	2	y
HB6	roadside	399502	427041	NO_2	2	y
HQ1	roadside	398794	427237	NO_2	2	y
HQ9	roadside	399233	427175	NO_2	2	y
LF1	roadside	403810	424977	NO_2	4	y
LF2	roadside	403738	425110	NO_2	4	y
SB1	roadside	406135	423639	NO_2	3	y
SB3	roadside	405961	423571	NO_2	3	y
SB13	roadside	406732	423981	NO_2	3	y
SB15	roadside	406638	423836	NO_2	3	y
SB16	roadside	406613	423799	NO_2	3	y
SB18	roadside	406936	423799	NO_2	3	y
SB20	roadside	405825	423415	NO_2	3	y
BS1	colocated	406075	423615	NO_2	3	y
BS2	colocated	406075	423615	NO_2	3	y
BS3	colocated	406075	423615	NO_2	3	y
SC5	roadside	410823	422794	NO_2	5	y
HH1	roadside	412621	425504	NO_2	7	y
WR2	roadside	415090	422817	NO_2	6	y
BH3	roadside	414671	422740	NO_2	6	y
BE4	roadside	414478	422692	NO_2	6	y
ER1	roadside	414235	422901	NO_2	6	y
HXR1	roadside	414218	422957	NO_2	6	y
CRH1	roadside	409765	423007	NO_2	1	y
CL1	roadside	413260	420685	NO_2	-	y
CL2	roadside	413295	420679	NO_2	-	y
CL-FVA	roadside	413309	420693	NO_2	-	n
HTAH	roadside	411494	419595	NO_2	-	y
AT-BR	roadside	411515	419550	NO_2	-	y
AT-SR	roadside	411360	419520	NO_2	-	y
KR1	roadside	407950	427420	NO_2	-	y
AQ20	roadside	409482	423336	NO_2	1	y
HB-XN	roadside	399174	427177	NO_2	2	n
HB-XS	roadside	399159	427155	NO_2	2	n

2.2 Comparison of monitoring results with AQ objectives

Table 5: Continuous monitoring results

Site name	Location	AQMA	Data capture 2014 (%)	Number of hours > 200	annual mean 2012	2013	2014
Romon 2	Salterhebble	1	99	10	53	48	51
Romon 3	Hebden Bridge	3	79	0	-	-	42
Romon 4	Sowerby Bridge	2	87	0	43	42	43

2.2.1 Nitrogen dioxide annual mean concentration

This is the only pollutant presently measured by the Council in Calderdale. The continuous monitoring results are set out in Table 5. Figures 1, 2 and 3 summarise the data for 2014. The trends in concentrations at Salterhebble (Romon 2) and Wharf Street Sowerby Bridge (Romon 4) over a number of years up to and including 2014 are shown in Figures 5 and 4. The trend at Market Street Hebden Bridge is not plotted due to significant data loss due to flooding in 2012. The annual means remain above the objective of 40 microgrammes per cubic metre at all three sites.

The diffusion tube results (Table 6) indicate that the annual mean objective is not yet being met in the AQMAs. Investigations at Keighley Road (KR1) and Ainley Top (AT-BR etc) do not show breaches outside the AQMAs. Some of these diffusion tubes are to be relocated for other investigations.

2.2.2 Nitrogen dioxide hourly mean concentration

There were 10 hours of concentrations above 200 microgrammes per cubic metre at Romon 2 in 2014. The 99.8th percentile of the 15-minute means at this site was 193 microgammes per cubic metre. This is consistent with the results from previous monitoring of the air quality on Hudderfield Road at Salterhebble. This station has now been upgraded, and the old monitor has been replaced with a new unit.

2.2.3 PM_{10}

The Council has not undertaken any monitoring for PM_{10} in 2014. Monitoring is scheduled to start at Wharf Street, Sowerby Bridge in 2015 in connection with transport emissions monitoring, funded by West Yorkshire Combined Authority.

2.2.4 $PM_{2.5}$

The Council proposes to measure $PM_{2.5}$ at the monitoring site on Huddersfield Road, Salterhebble, Halifax. The monitor to be used is a MetOne beta attenuation monitor (BAM). Data will be reported in the 2016 Progress Report.

Table 6: Diffusion tube results 2014

Tube	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	mean	f=0.75
HH-LR	52	48	47	56	55	42	46	46	55	52	42	25	47	35
HH-LB	54	52	62	58	60	67	52	52	70	53	57	47	57	**43**
HH-LT	66	65	62	65	52	43	48	61	62	63	104	70	63	**47**
HB1	65	67	60	63	61	52	46	37	55	60	67	57	58	**44**
HB6	32	49	51	54	55	45	43	43	51	49	49	42	47	35
HQ1	74	78	66	63	67	61	58	67	66	59	67	74	67	**50**
HQ9	61	52	54	50	55	61	44	43	59	52	53	57	53	**40**
LF1	72	66	63	64	63	42	51	52	62	58	76	55	60	**45**
LF2	49	46	52	48	42	66	40	39	50	46	59	41	48	36
SB1	78	72	64	74	71	63	55	57	71	73	77	60	68	**51**
SB3	75	58	55	71	67	46	47	44	70	61	84	46	60	**45**
SB13	55	47	47	51	59	39	47	44	55	54	56	52	51	38
SB15	64	61	62	52	52	44	34	45	55	59	65	55	54	**41**
SB16	56	57	60	61	57	50	42	42	58	59	67	48	55	**41**
SB18	64	53	44	47	37	35	36	34	41	46	58	53	46	35
SB20									61	67	83	54	66	**50**
BS1	78	55	62	56	65	49	56	52	70	64	63	54	60	**45**
BS2	60	55	67	45	67	62	55	49	72	64	83	50	61	**45**
BS3	73	62	70	71	55	49	53	50	65	67	87	45	62	**46**
SC5	58	48	53	56	55	59	52	46	62	57	58	45	54	**41**
HH1	58	missing	53	60	60	49	49	52	58	62	51	53	55	**41**
WR2	64	57	50	51	57	43	45	50	44	56	58	44	52	39
BH3	26	51	61	62	60	50	50	59	63	66	72	70	58	**44**
BE4	67	77	64	64	68	59	60	63	66	69	73	70	67	**50**
ER1	44	45	47	56	49	39	41	40	56	49	56	41	47	35
HXR1	54	69	56	68	94	57	77	61	68	74	66	57	67	**50**
CRH1	77	66	75	68	77	73	67	71	76	73	95	77	75	**56**
CL1	44	54	49	49	43	40	44	40	59	55	63	47	49	37
CL2	53	38	57	37	43	31	41	42	51	50	60	49	46	35
CL-FVA	51	50	48	37	34	22	26	26	37	36	29	44	37	28
CL-FVB	55	47	46	41	21	28							40	30
HTAH	38	42	48	55	36	23	35	45	53	44	26	53	42	33
AT-BR	41	44	51	49	36	36	34	39	47	42	23	54	41	31
AT-SR	37	44	44	39	32	34	35	33	46	38	50	42	40	30
KR1	46	37	39	39	36	21	31	30	46	34	57	32	37	28
AQ20	37	32	36	33	28	26	31	32	43	38	53	40	36	27
HB-XN								14	31	34	40	38	31	23
HB-XS								16	27	29	38	35	29	22

2.2.5 Sulphur dioxide

The Council has not undertaken any monitoring for sulphur dioxide in 2014.

2.2.6 Benzene

The Council has not undertaken any monitoring for benzene in 2014.

2.2.7 Other pollutants monitored

The Council has not undertaken any monitoring for other pollutants in 2014. The AURN $PM_{2.5}$ data from sites at Leeds, Manchester and Wigan has been examined in order to better understand the possible local contributions. The planned local monitoring may help identify episodes due to local pollution sources by comparison with regional monitoring.

3 Road traffic sources

3.1 Narrow congested streets with residential properties close to the kerb

The Council has not identified any further streets of this type since the previous USA.

3.2 Busy streets where people may spend one hour or more close to traffic

There are no locations of this type that have not been considered in previous rounds.

3.3 Roads with a high flow of buses and or HGVs

There are no locations of this type that have not been considered in previous rounds.

3.4 Junctions

There are no locations of this type that have not been considered in previous rounds.

3.5 Newly constructed or proposed roads

There are no newly constructed roads in the Borough.

3.6 Roads with significantly changed traffic flows

No roads with significantly changed traffic flows have been identified in the Borough.

3.7 Bus and coach stations

There have been no significant changes to the bus stations in Halifax, Brighouse and Todmorden.

4 Other transport sources

4.1 Airports

There are no airports within the Borough of Calderdale.

4.2 Railways

There have been no notified significant changes to the nature and volume of rail traffic since the last round.

4.2.1 Stationary trains

There are no locations at which this criterion applies.

4.2.2 Moving trains

There are no locations at which this criterion applies.

4.3 Ports

There are no ports within the Borough of Calderdale.

5 Industrial sources

5.1 Industrial installations

No new Part B installations have started up in Calderdale, and no Part A installations have been consulted upon.

5.1.1 New or proposed installations with an AQ assessment

There are no new or proposed installations where an air quality impact assessment has been carried out.

5.1.2 Existing installations with increased emissions or new relevant exposure

Although no installation has been identified as having substantially increased emissions, the Council is continuing to work with the operator of a combustion installation in Todmorden to address emissions of visible smoke. The emissions, from a chimney located in a deep narrow valley, have been found to come to ground in certain weather conditions. This was reported in the last Progress Report [CMBC13] but is summarised here for completeness. The installation, at Frostholme Mill, operates under an environmental permit, but a BAT assessment carried out by the operator in 2014

indicates that work is required to address smoke emissions. As previously reported, it is not clear whether any air quality objectives are likely to be breached, as no monitoring has been carried out. Modelling has been undertaken in an earlier round of review and assessment. The operator has been making efforts to identify and address the problem.

5.1.3 New or significantly changed installations without an AQ assessment

No such installations have been identified by the Council.

5.2 Major fuel depots

There are no major fuel depots in the Borough.

5.3 Petrol stations

No petrol stations satisfying the criteria are in operation in the Borough.

5.4 Poultry farms

No large poultry farms operate in the Borough.

6 Commercial and domestic sources

6.1 Biomass combustion, individual installations

No new biomass installations have been notified to or identified by the Council.

6.2 Biomass combustion, combined impacts

No new combined impacts from biomass installations have been identified by the Council.

6.3 Domestic solid fuel burning

The Council continues to investigate complaints about smoke from domestic chimneys, generally offering advice about authorised fuels and exempted fireplaces. In 2014 the Council has not investigated any areas to assess the domestic contribution to PM_{10} concentrations using the procedure of paragraph 5.89 of [TG09]. An assessment of domestic contributions to sulphur dioxide concentrations around Heptonstall was reported in [CMBC99] and [CMBC00].

7 Fugitive or uncontrolled sources

The Council has considered fugitive and uncontrolled sources of particulate matter and has not identified any new sources.

8 Conclusions and proposed actions

8.1 Conclusions from new monitoring data

Annual mean nitrogen dioxide concentrations appear to be steady across the Borough. There is no compelling evidence that the annual mean concentrations are showing a consistent downward trend, particularly at Salterhebble.

Concentrations of $PM_{2.5}$ appear to be dominated by regional effects. Data from the AURN sites indicate that there have been several pollution events during which elevated concentrations of this pollutant have been evident across the north of England. The Council's own monitoring started in February 2015 and will be included in future reports.

8.2 Conclusions from assessment of sources

No new or substantially changed sources of nitrogen dioxide have been identified in the Borough.

8.3 Proposed actions

The Council is working to improve air quality across the Borough, concentrating on road transport sources. Details will be presented in the Air Quality Action Plan, but the following actions are proposed.

1 A revised Air Quality Action Plan is in preparation.

2 As one of the five West Yorkshire Authorities the Council is contributing to the development of air quality measures by the West Yorkshire Low Emission Strategy. The Strategy was essentially finalised in 2014 and is due to be published in 2015.

9 Appendices

9.1 Choice of bias correction factor

The local bias correction factor is based on data from diffusion tubes colocated with the analyser at Sowerby Bridge (Romon 4). The relationship between the diffusion tube raw data and the continuous analyser data is shown in Figure 9. In 2014 the analyser suffered a failure due to a faulty air conditioning unit, and the local factor was found not to be reliable. The factor from the latest available version (03/15) of the bias correction spreadsheet has been used in this report (f=0.75).

9.2 Data QA/QC

The diffusion tubes are supplied and analysed by West Yorkshire Analytical Services. The tubes are prepared with 50% TEA in acetone.

The automatic analysers are covered by a maintenance and callout contract, which has just been renewed. Council staff visit the sites every two weeks to check for faults and to check the instrument span and zeros.

The data from all three automatic analysers is collected on a non-networked PC. It is checked for obvious errors and outliers and backed up to the Council's secure network every week. For analysis the data is first conditioned using Excel. This involves scaling the raw data using the span and zero values obtained on site every two weeks, checking for obvious items such as values well below zero or long periods of missing data, and marking these abnormal values.

Periods including long periods of missing data must be removed from the data as they are likely to be due to instrument faults (and this is normally picked up during routine checks). This would mean that any values obtained are likely to be inaccurate. Periods known to be affected by instrument faults are also removed. The data are then put into a suitable format for importing into openair([CR12], [CR14]). The data are not altered at this stage, but zeros introduced in the conditioning process are replaced by a special marker (NA). Once the data have been prepared in this way they are imported into R [R14] for analysis with the openair package. The marked NA values are replaced by interpolated values using the 'zoo' (zero-ordered observations) package. This allows us to obtain a sensible approximation to the value that might have been obtained at that time, but only if the number of missing values around that time is small (one or two sequential values). The summary plot includes the mean calculated using the interpolated values. This has a similar effect to discounting the zeros in the Excel analysis, but the process using R and the interpolated data is more robust. Using openair allows the application of powerful visualisation and statistical techniques. We can use these to identify trends and correlations, which in turn allows us to identify likely sources of pollution(for example, at Romon 2 the morning peak hour traffic consistently contributes more to the annual mean than the afternoon peak, as shown in Figure 6). A useful tool is the calendarPlot function, which displays a calendar coloured according to the daily mean concentration, shown in Figures 7 and 8.

9.3 Short term to annual corrections

For diffusion tubes exposed for less than 12 months of the year it is recommended that a correction is made to the raw results. The correction accounts for the possibility that the mean concentrations over the exposure period were not representative of the annual mean. For almost all the diffusion tubes a full set of measurements was obtained and no period correction is required. Tube CL-FVB was coexposed with CL-FVA and discontinued as it was not felt to be providing useful information, and it was not necessary to period correct the data.

9.4 Note on the preparation of this report

The report was generated using openair [CR12], [CR14] in R [R14] and typeset using the TeXworks environment (version 0.4.5 r.1280) for MikTex 2.9. Advice from DEFRA has been incorporated into this final report.

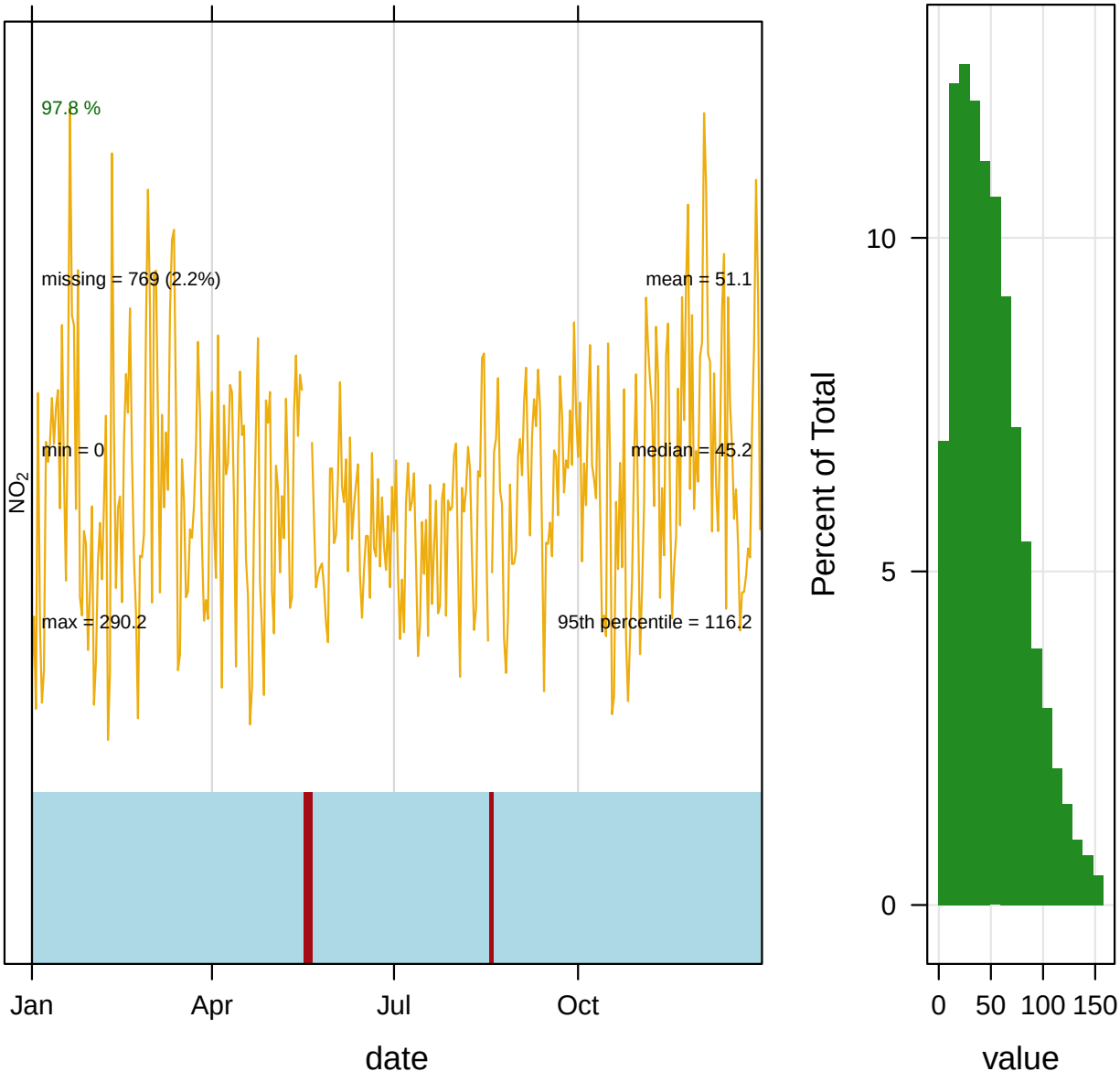

Figure 1: Salterhebble Romon 2 data for 2014

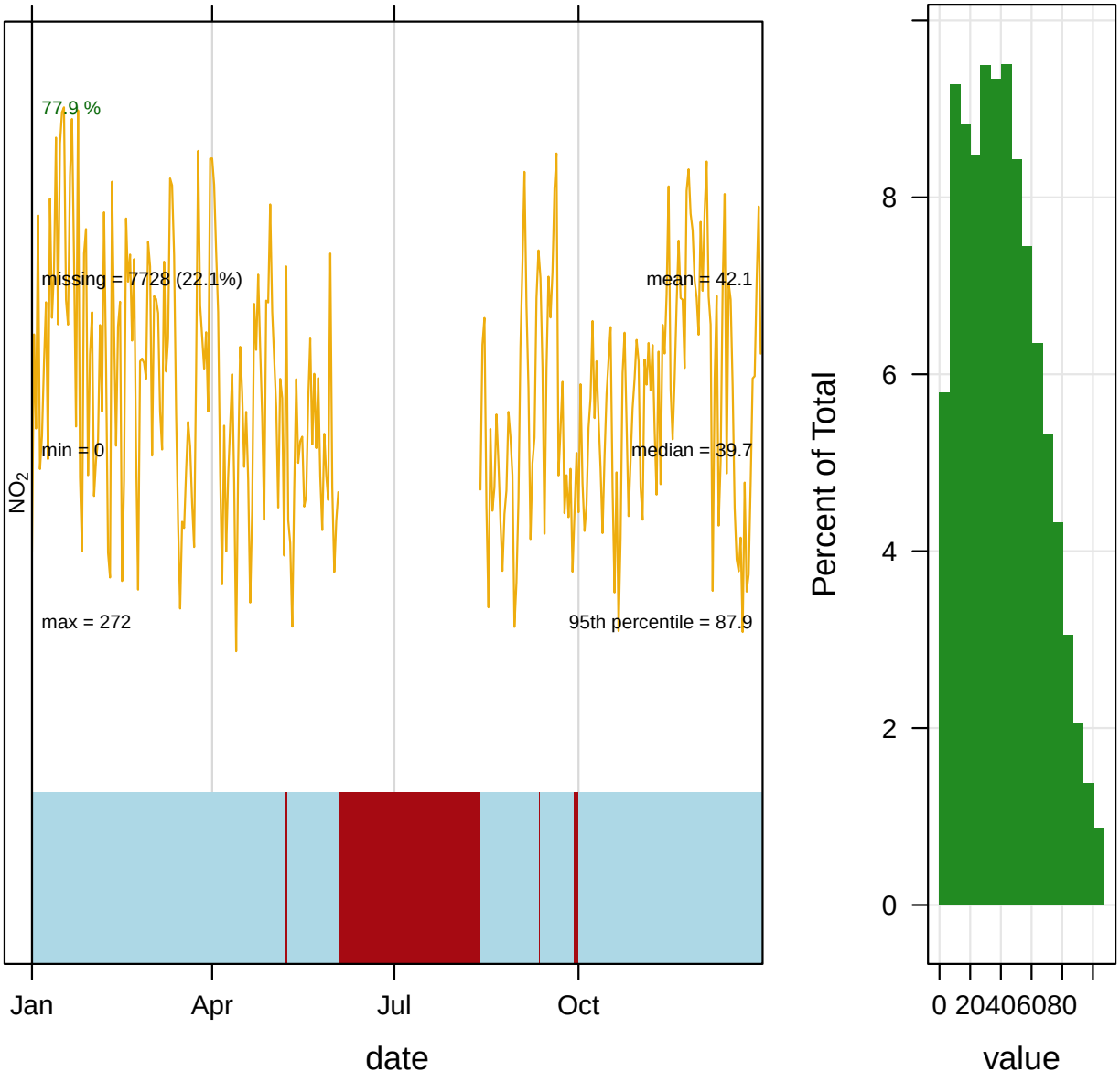

Figure 2: Hebden Bridge Romon 3 data for 2014

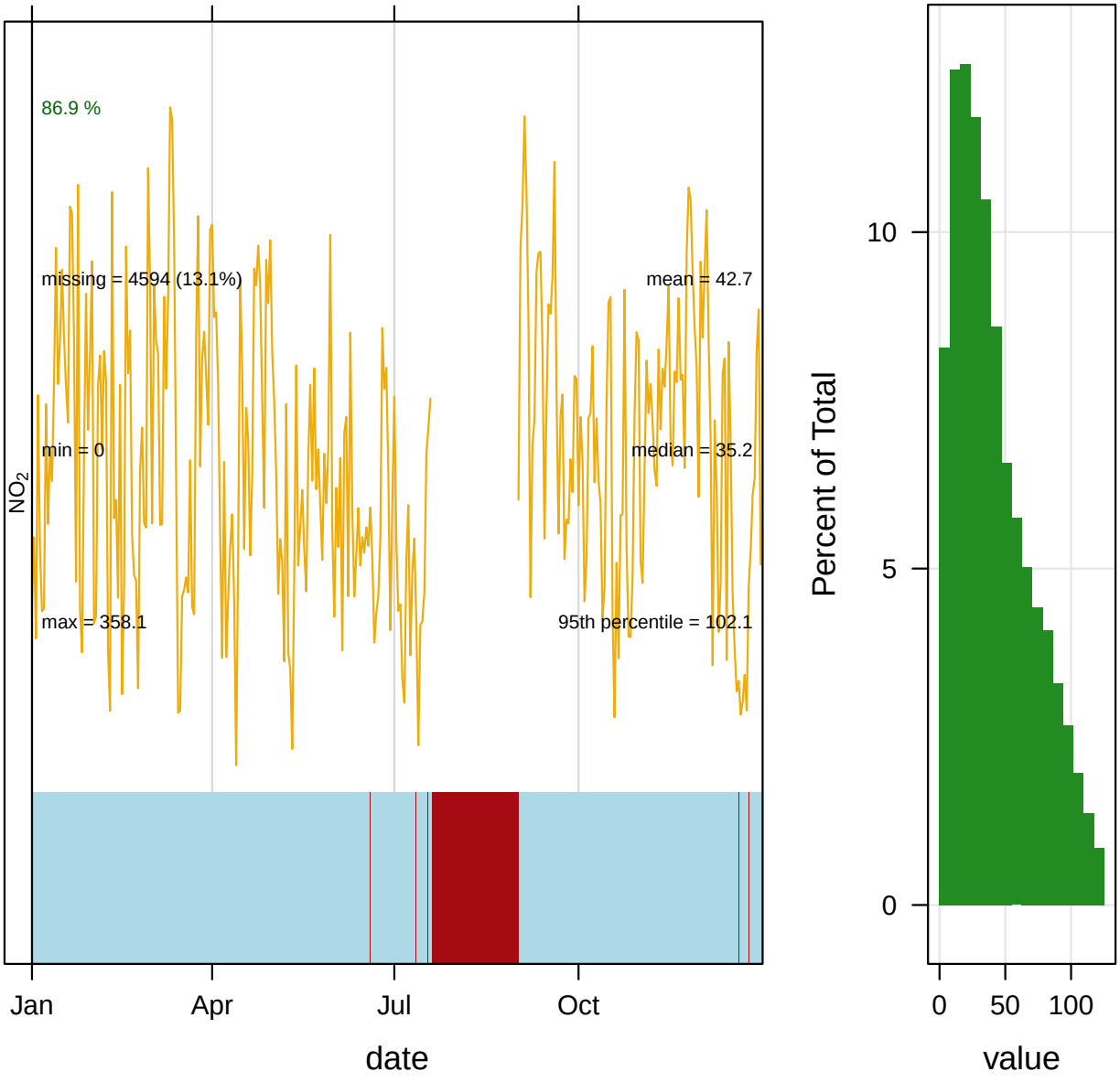

Figure 3: Sowerby Bridge Romon 4 data for 2014

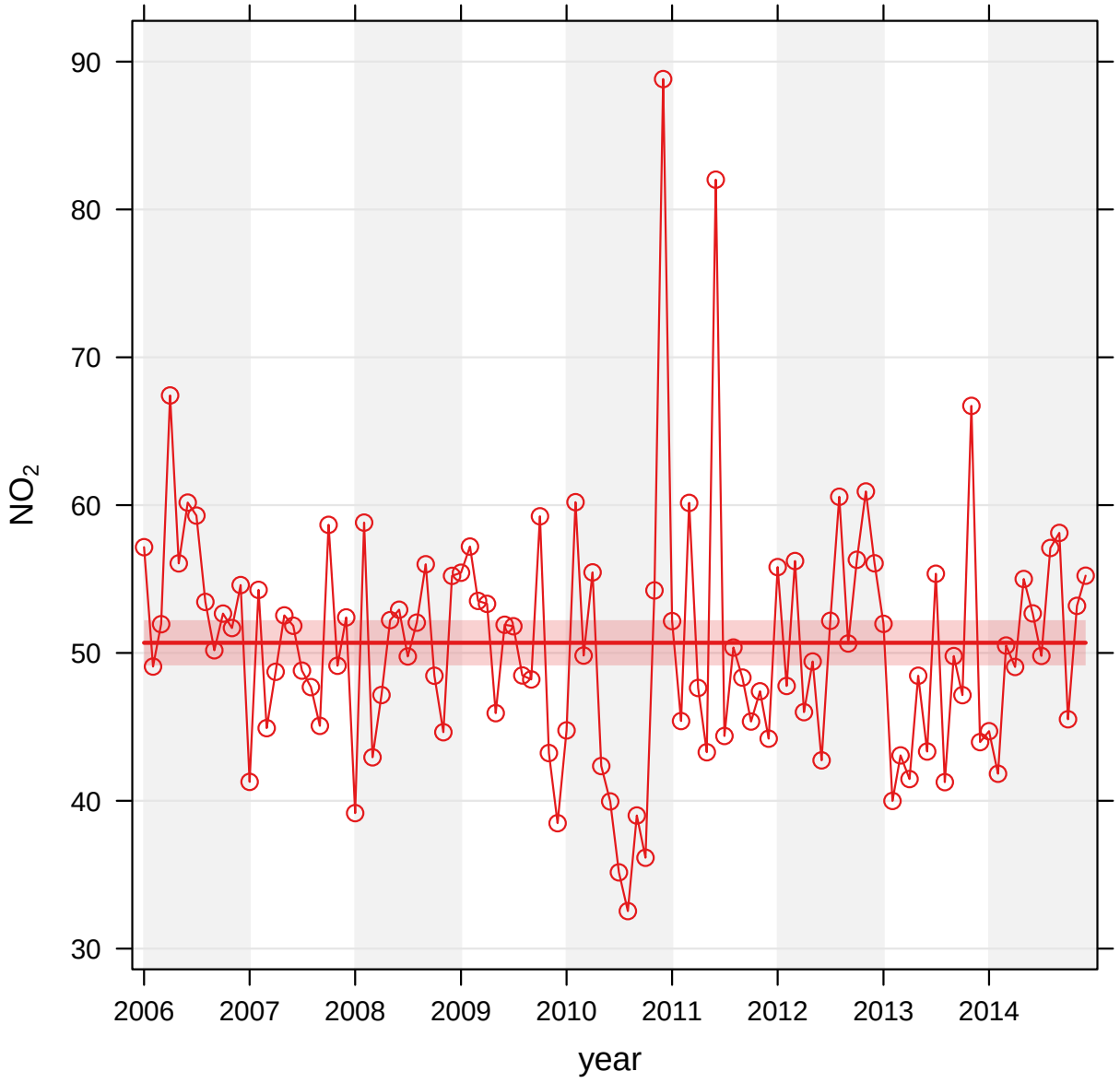

Figure 4: Trend at Romon 2, Salterhebble

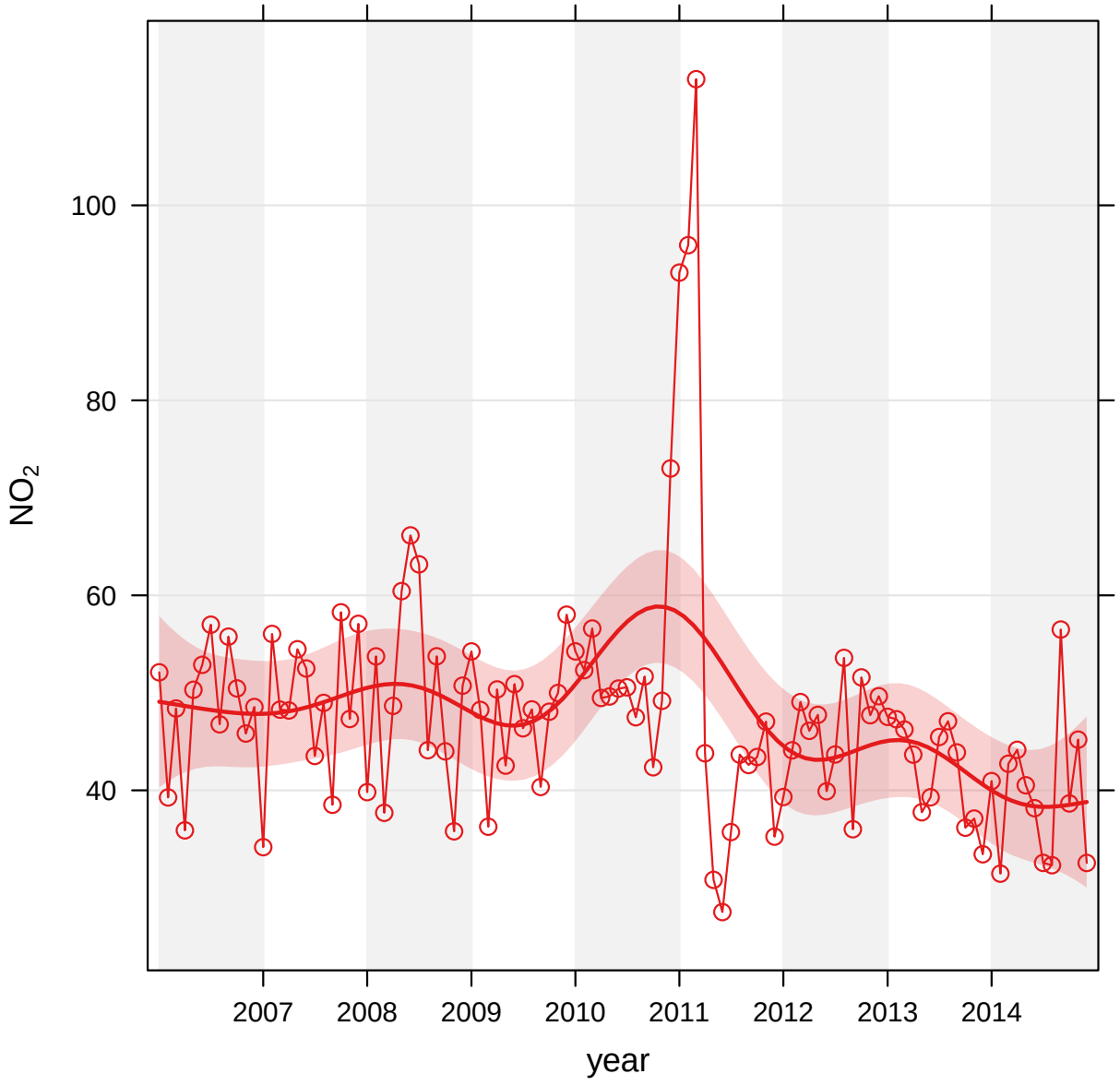

Figure 5: Trend at Romon 4, Sowerby Bridge

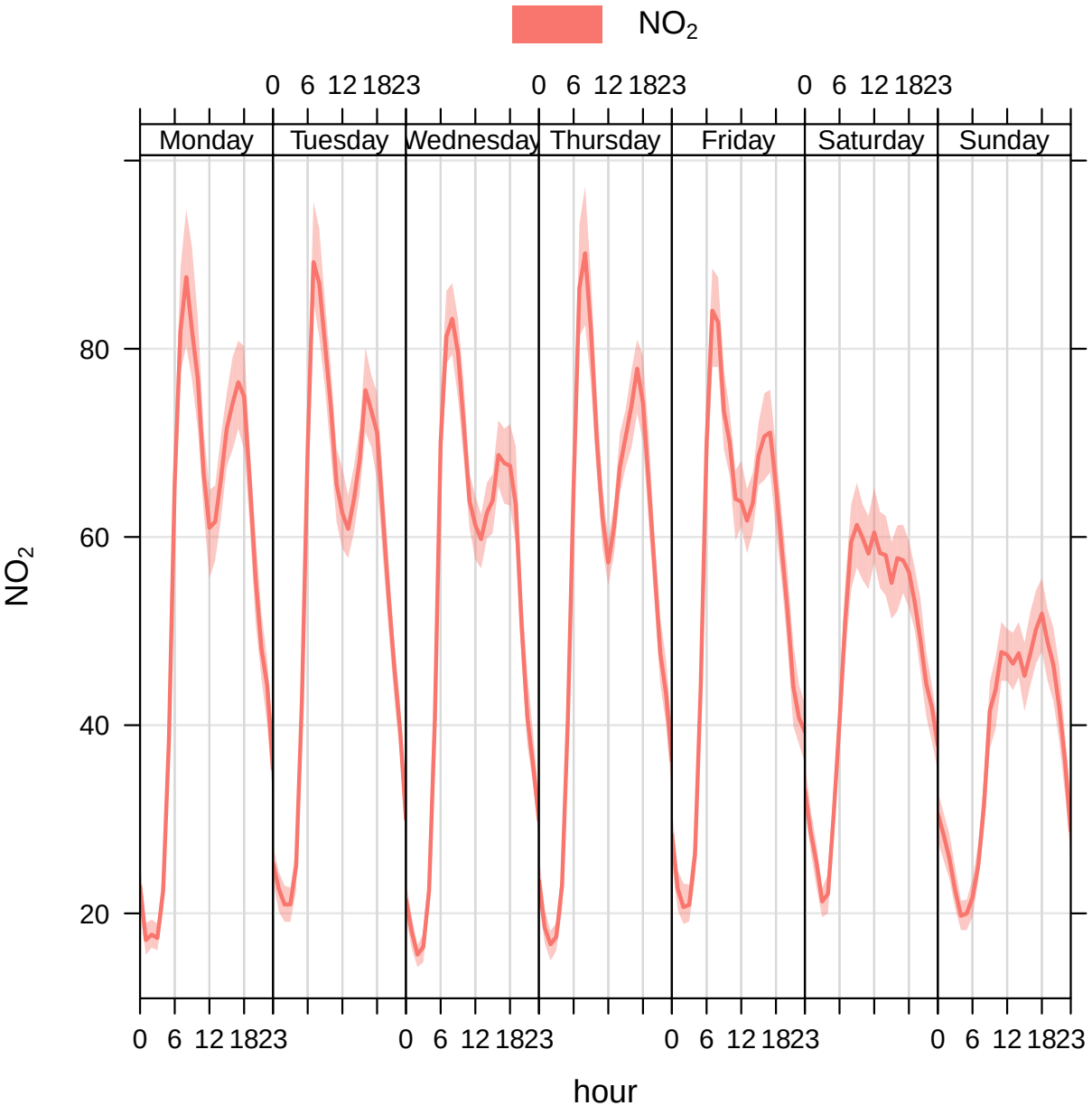

Figure 6: Typical daily profile of road-traffic related emissions

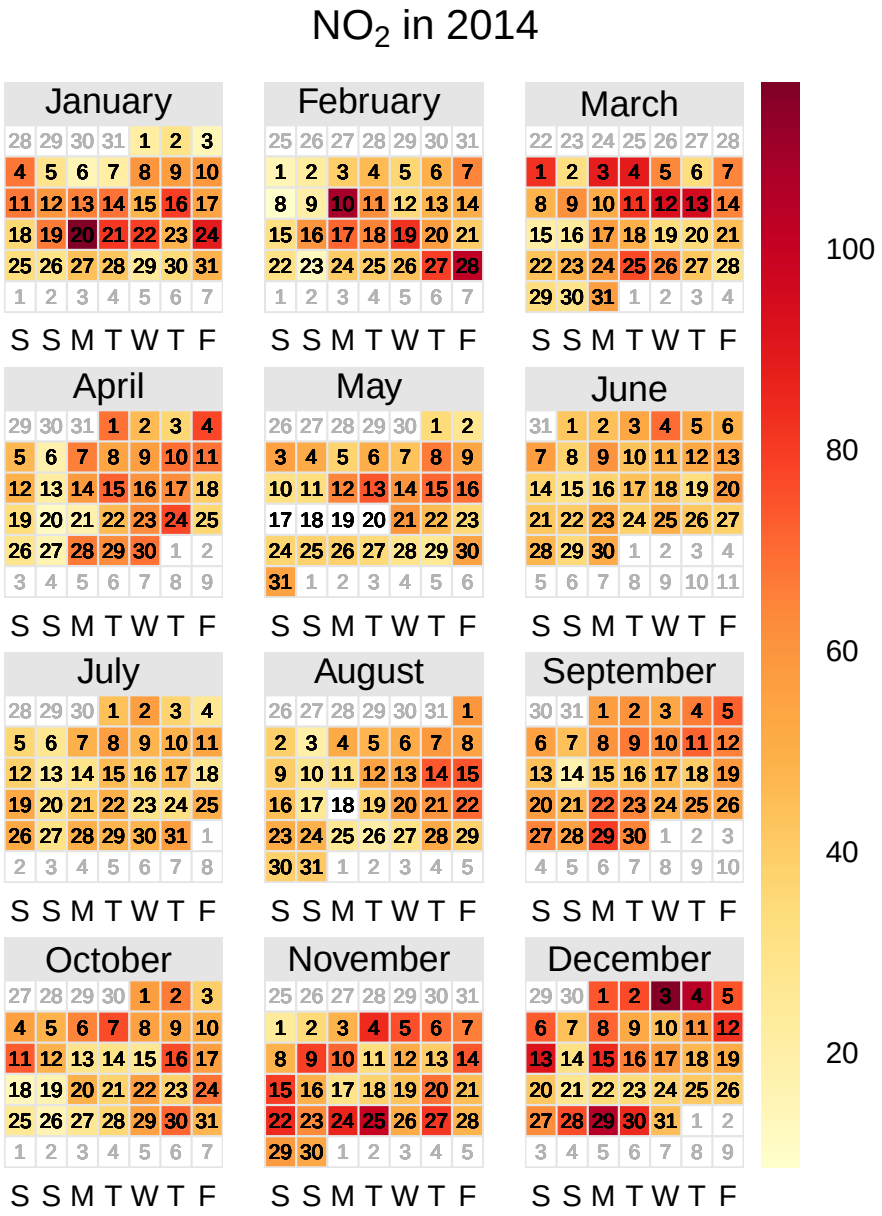

Figure 7: Calendar plot of Salterhebble Romon 2 data

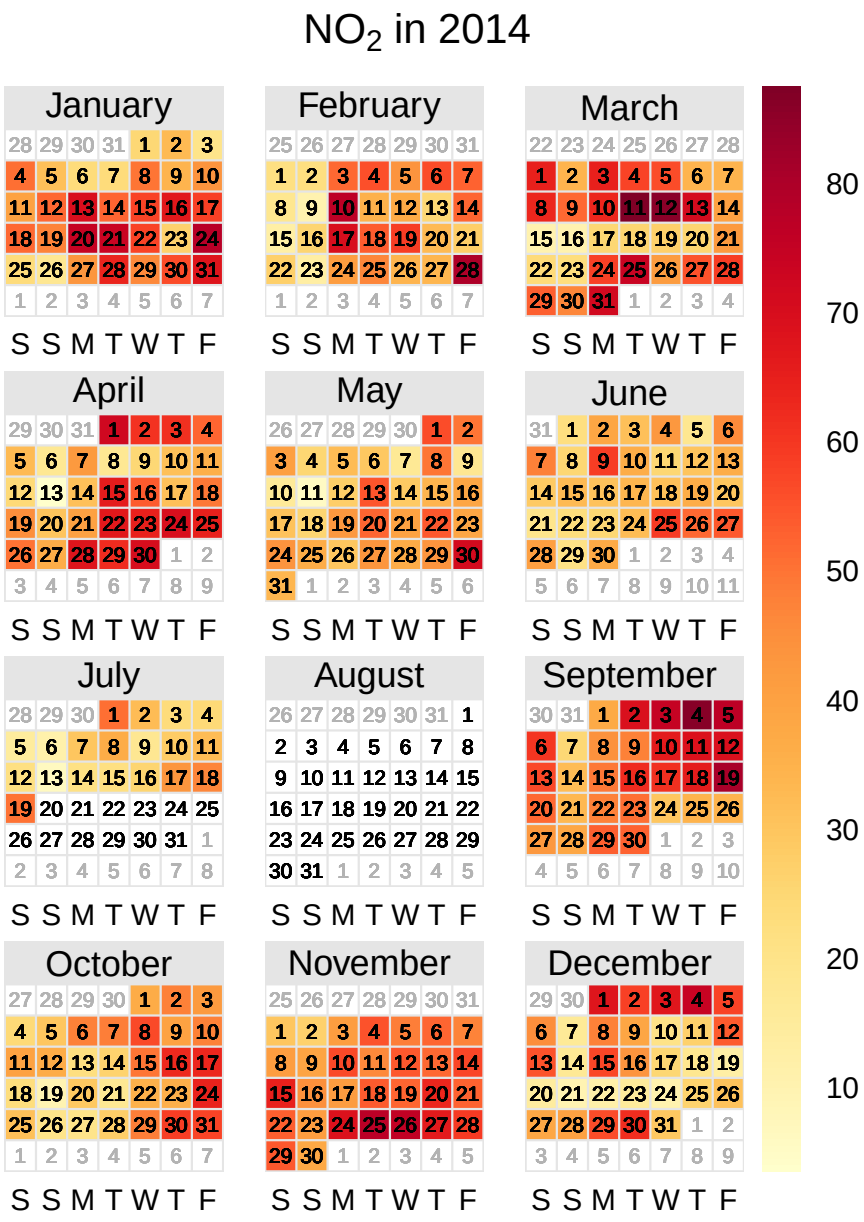

Figure 8: Calendar plot of Sowerby Bridge Romon 4 data

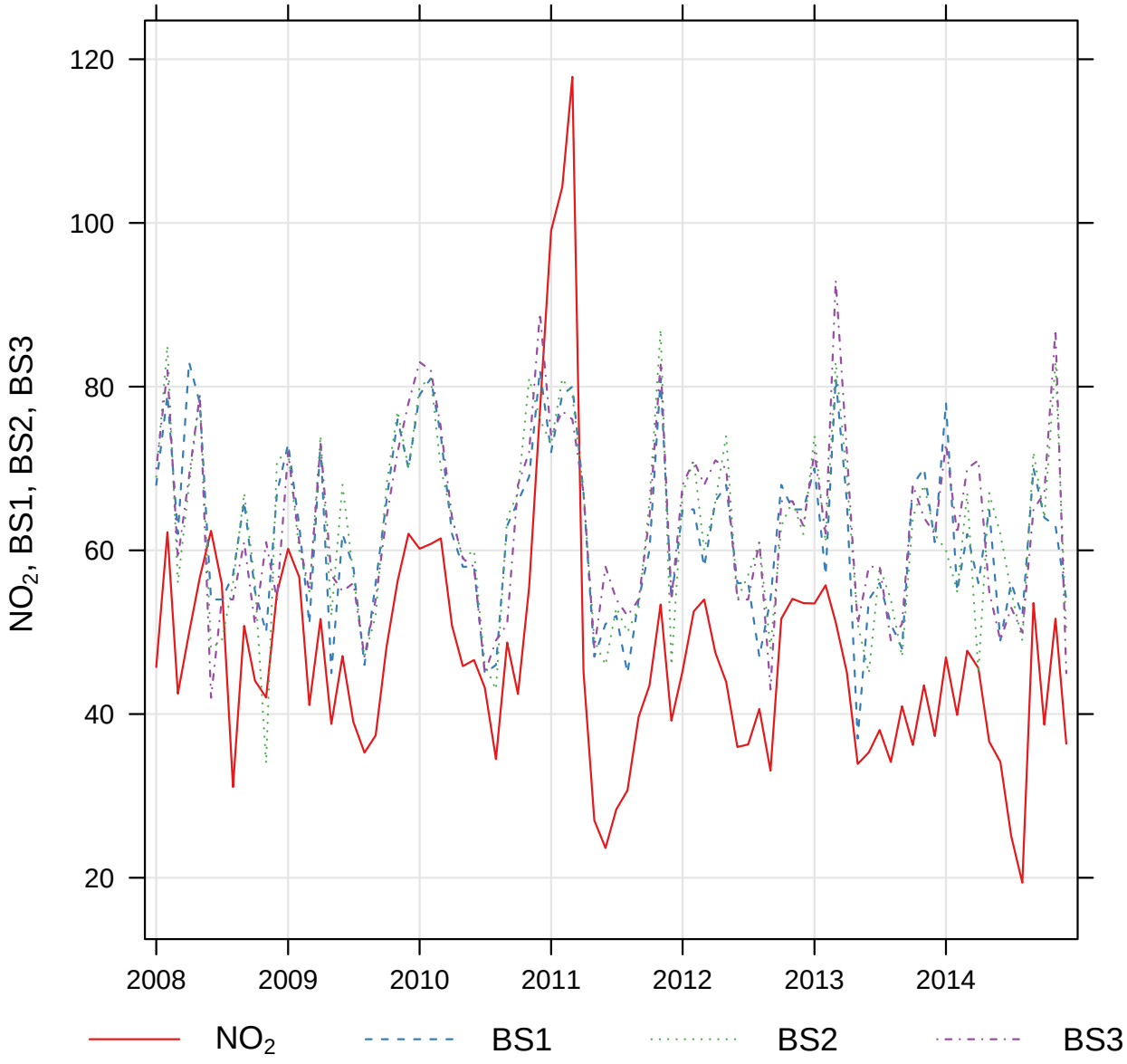

Figure 9: Comparison of diffusion tube and automatic data

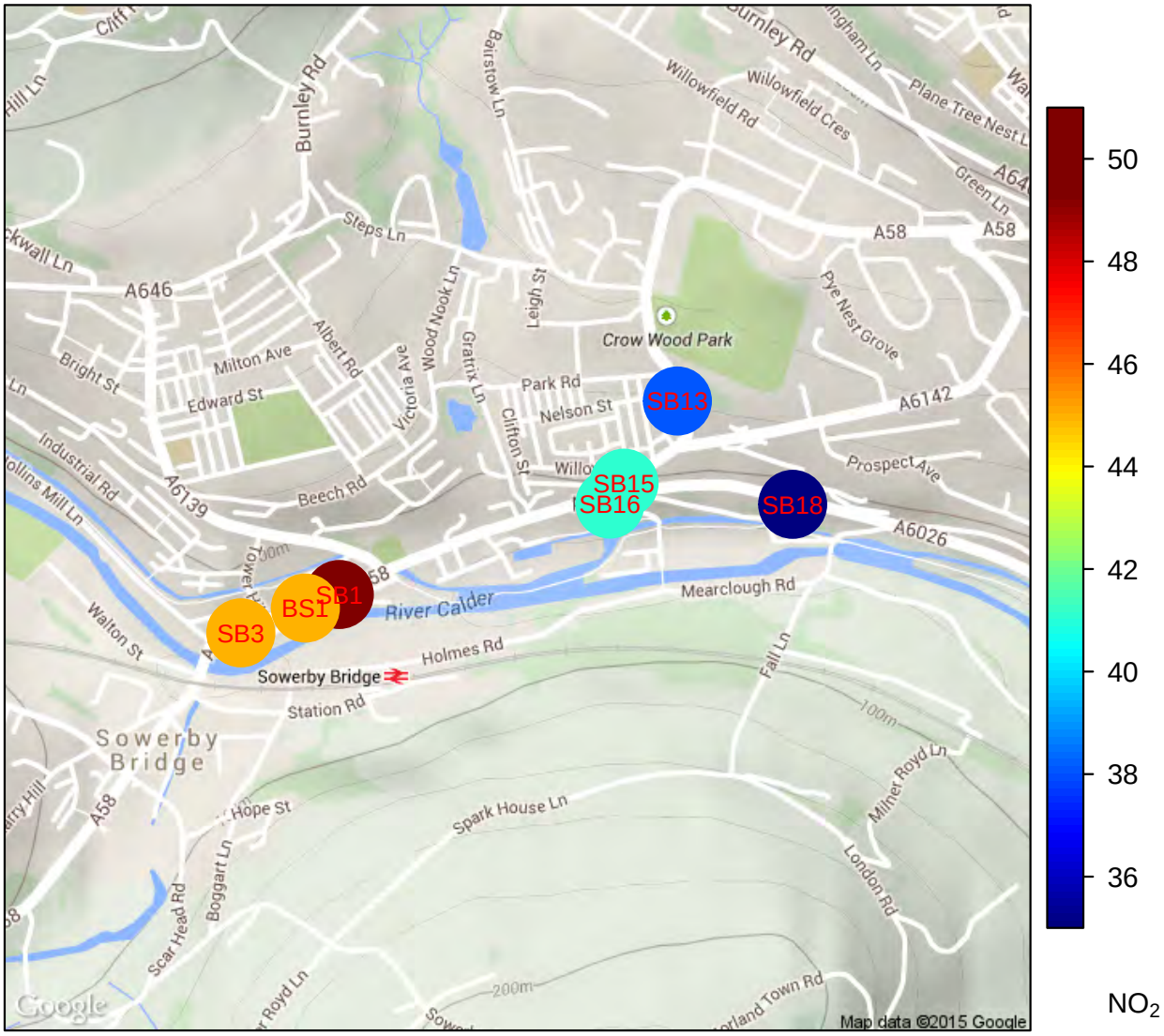

Figure 10: Diffusion tubes in Sowerby Bridge

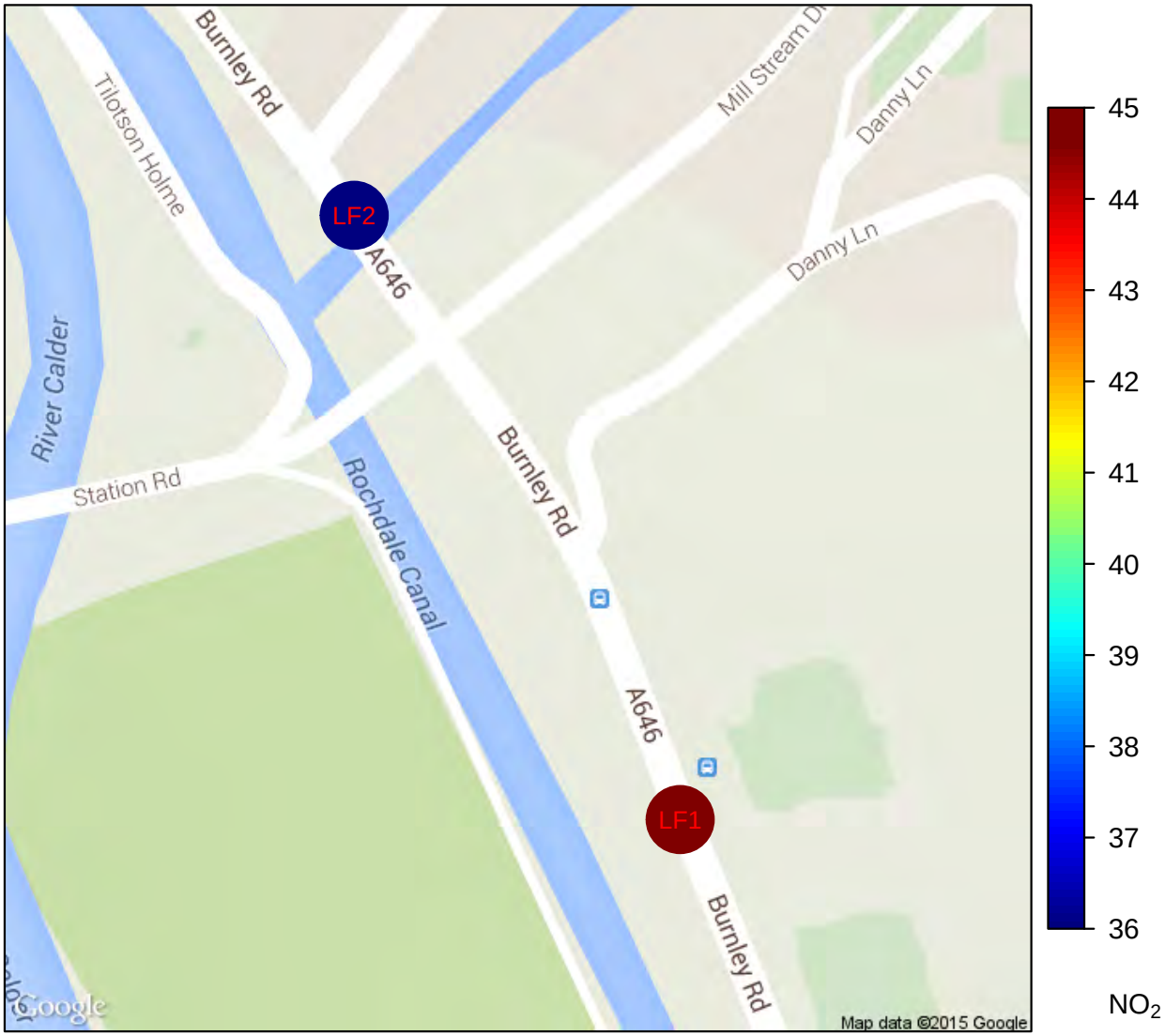

Figure 11: Diffusion tubes in Luddendenfoot

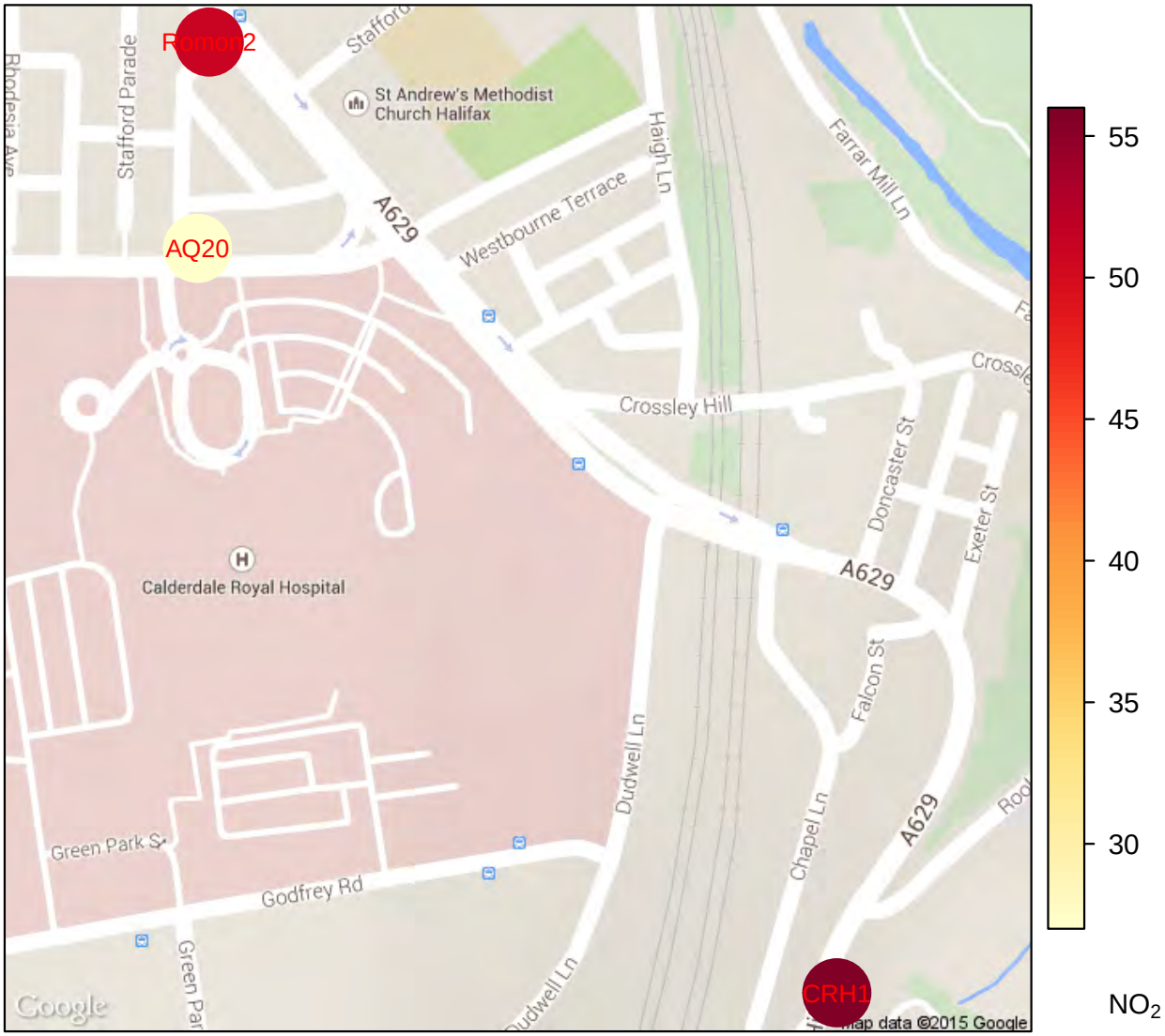

Figure 12: Diffusion tubes and Romon 2 in Salterhebble

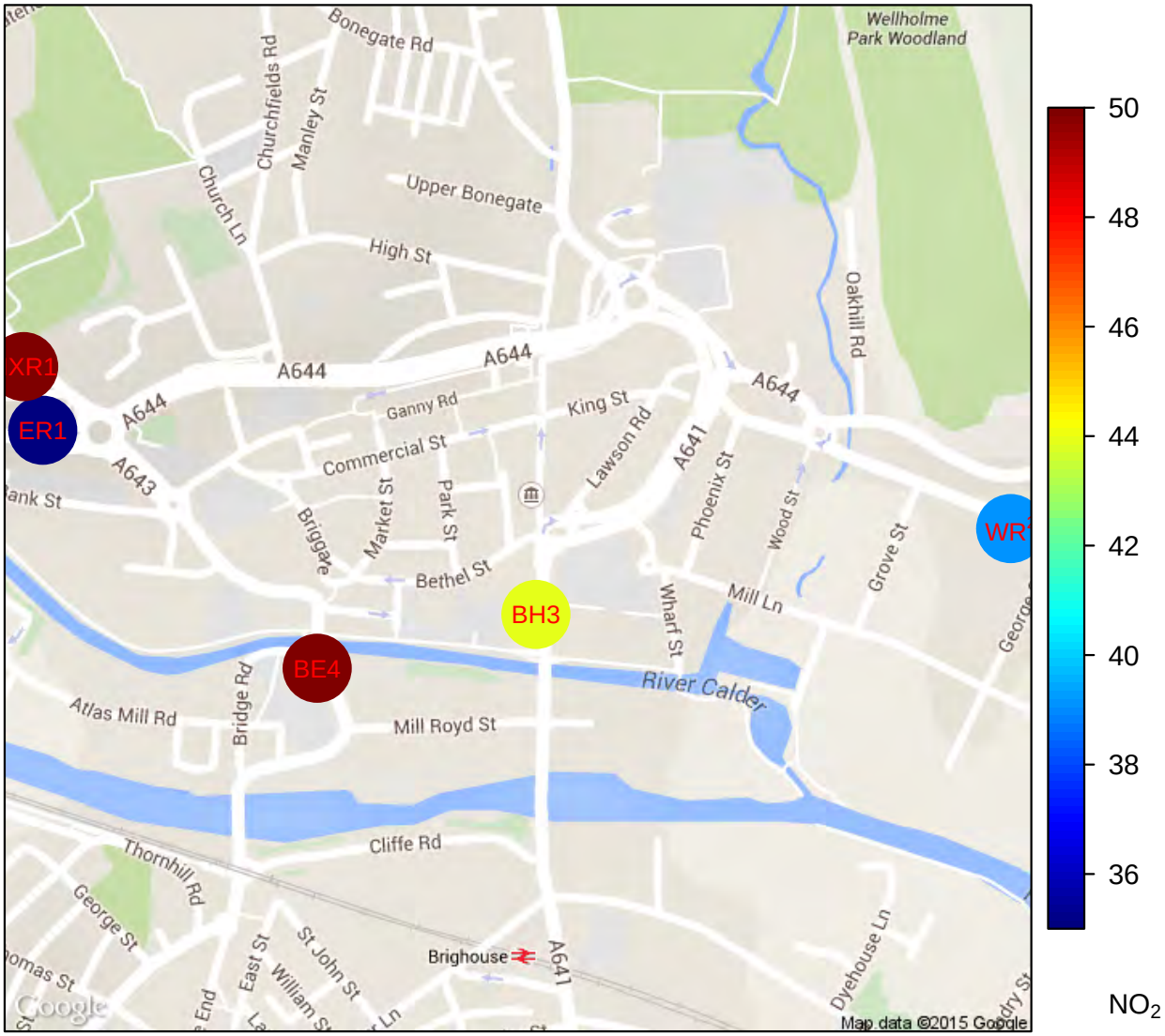

Figure 13: Diffusion tubes in Brighouse

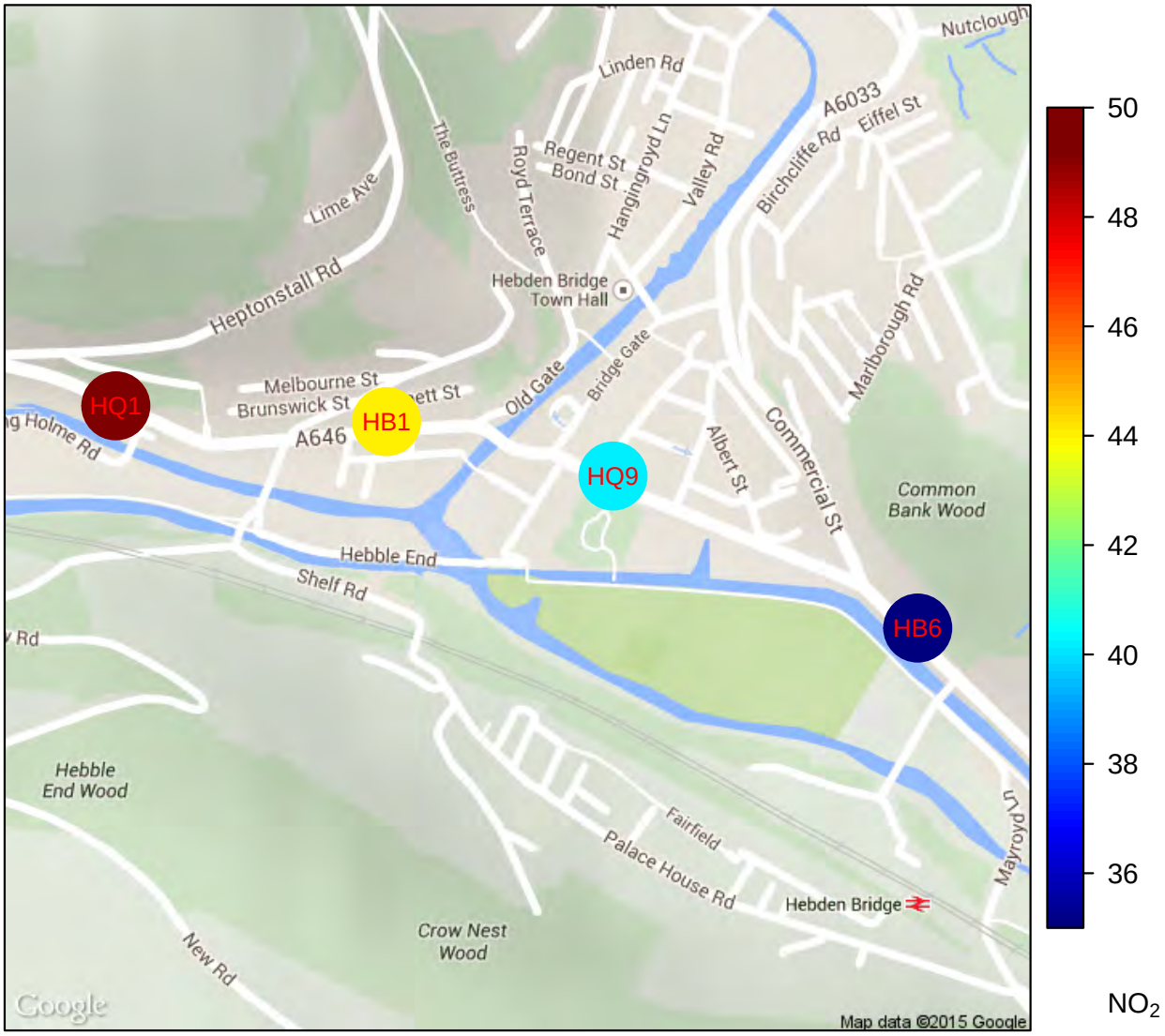

Figure 14: Diffusion tubes in Hebden Bridge

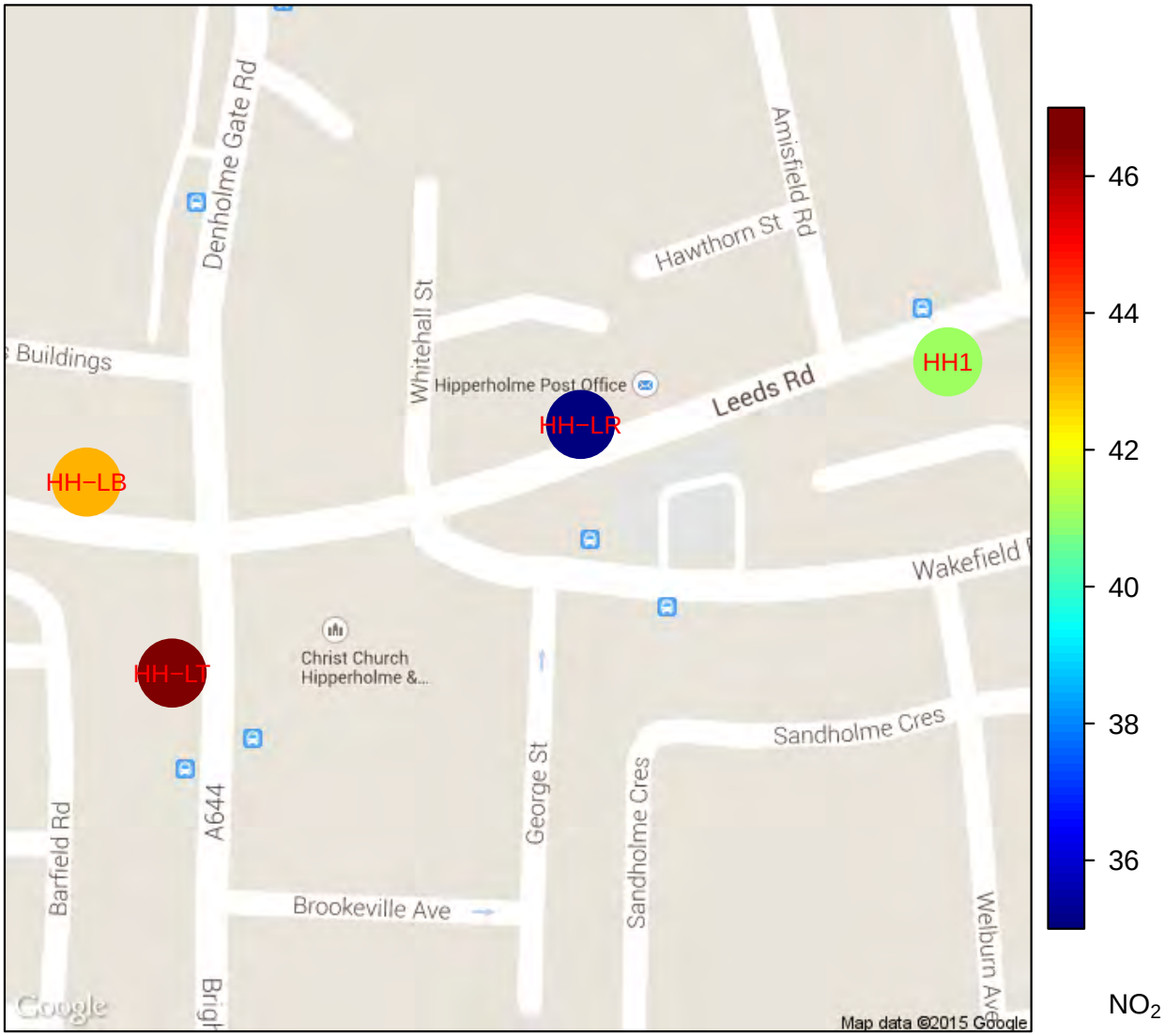

Figure 15: Diffusion tubes in Hipperholme

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