

Heat islands on a City Scale extreme and “air condition” values

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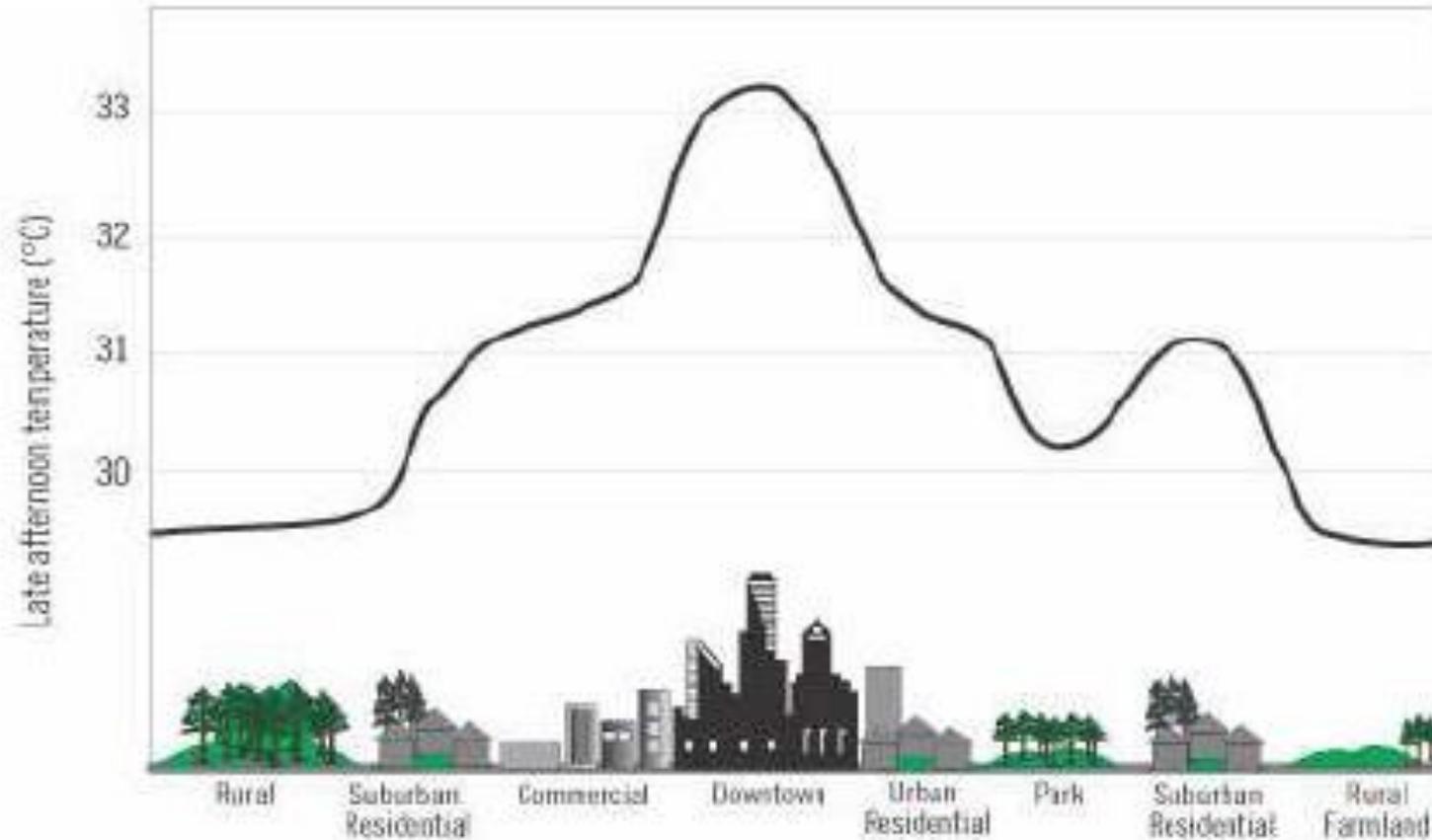
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The University of Manchester

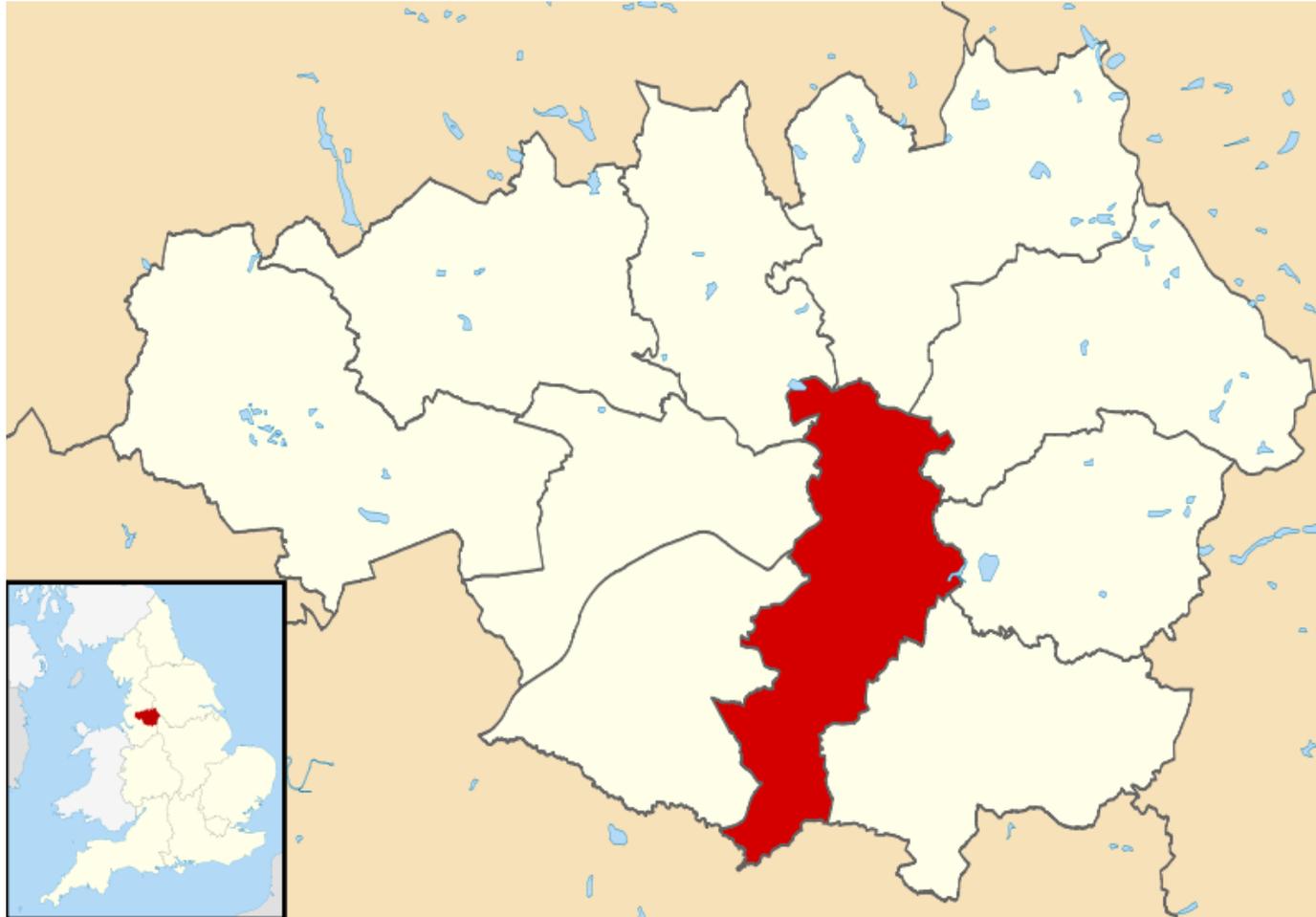
The urban heat island

Clear sunny days and cloud-free nights with low wind speed



A typical urban heat island (from Oke)

Greater Manchester, England



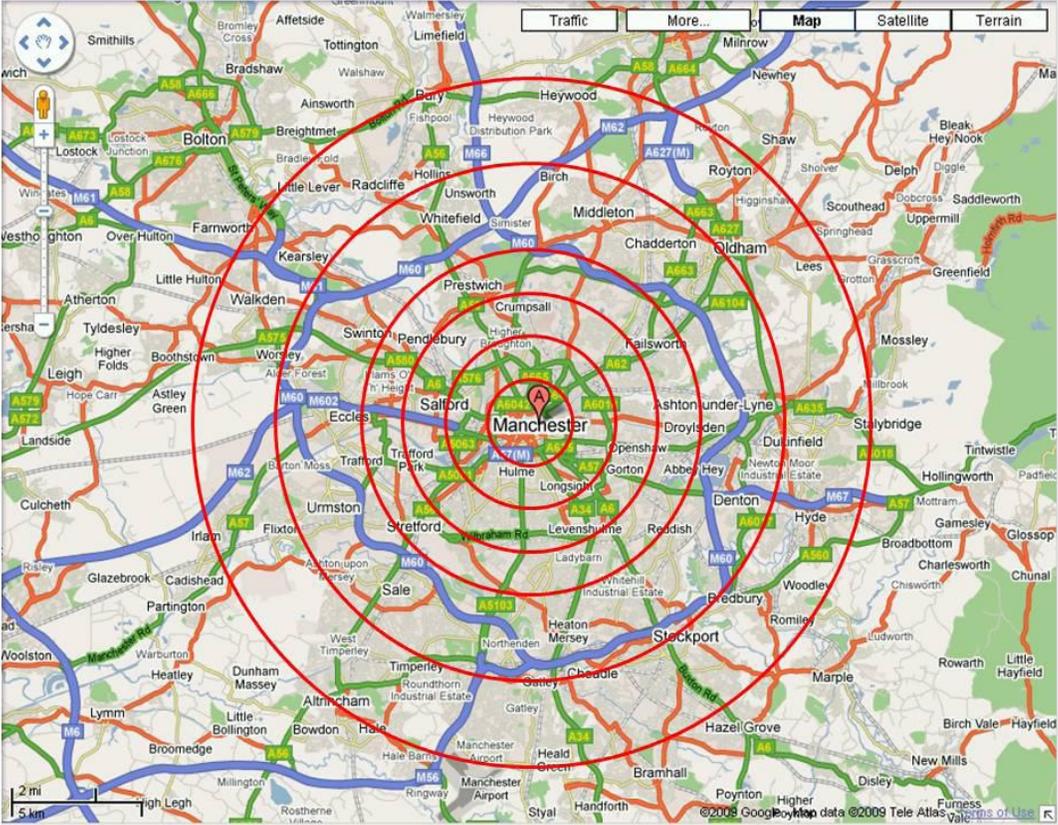
Radiation shield and temperature sensor/logger used in study



iButton Miniature Data Loggers



Stations positioned radially from Manchester city centre



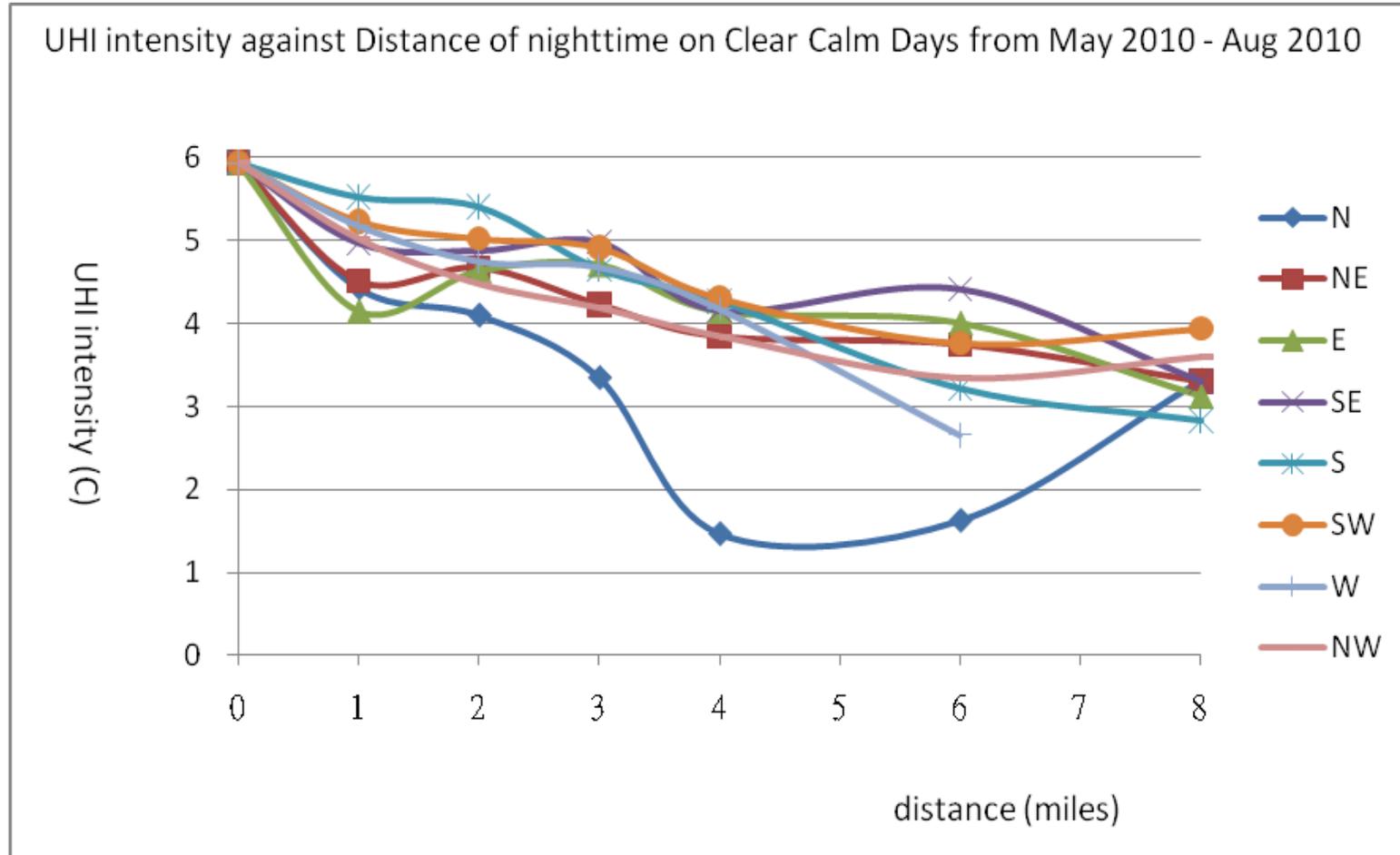
25 miles



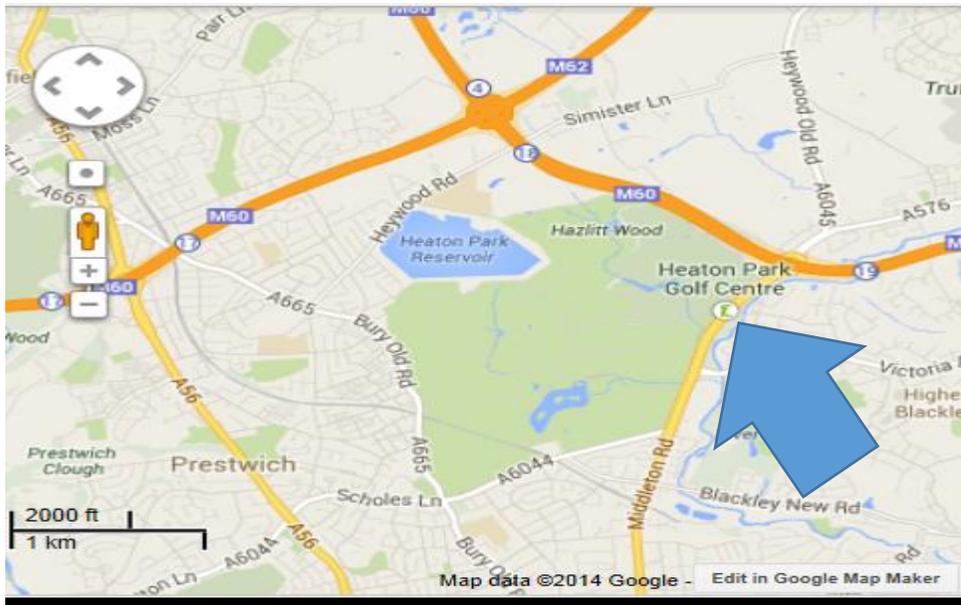
Met Office Rostherne weather station for Manchester since 2013



The urban heat island effect in greater Manchester reduces with distance from the city centre



The reason for the reduced UHI on the northern transect: Heaton Park

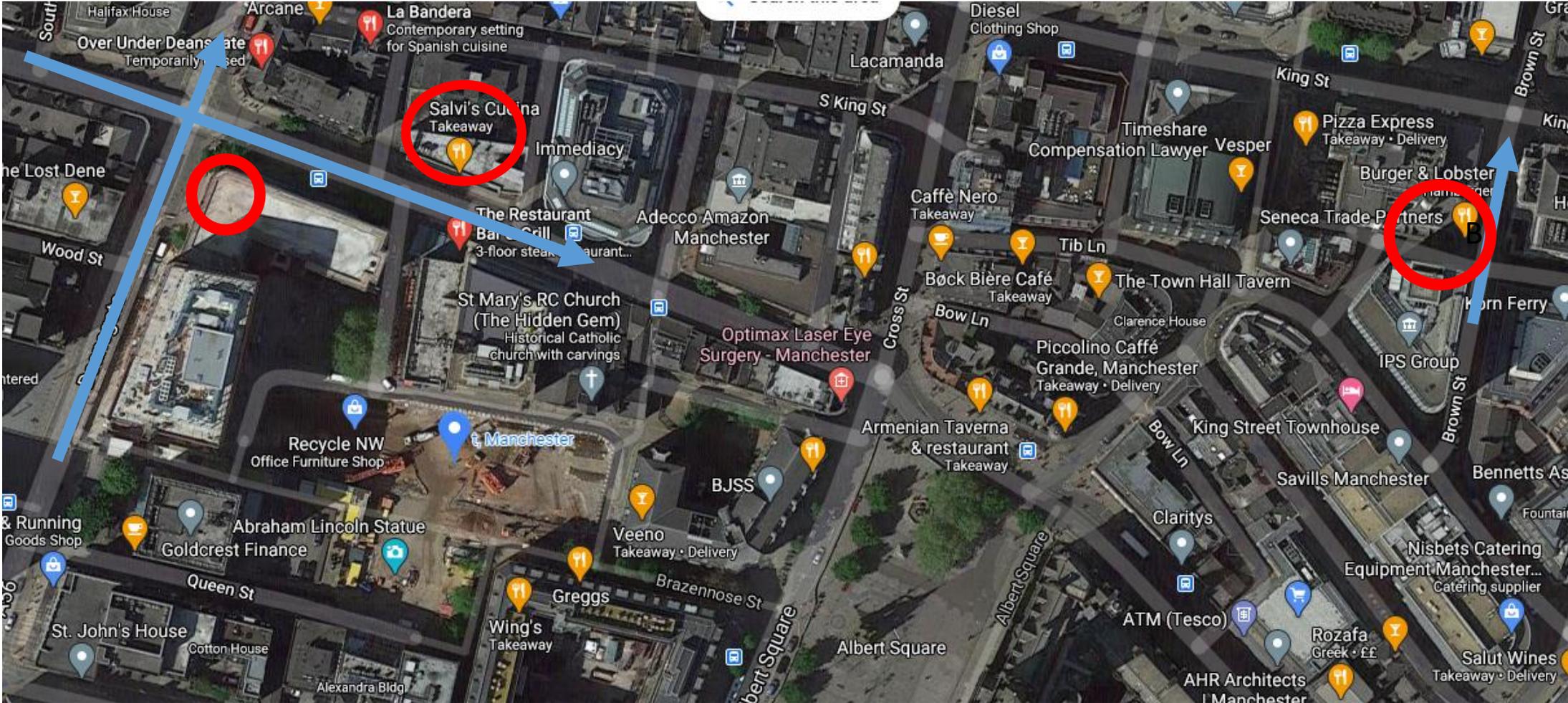


Manchester City Centre from the air



Deansgate John Dalton St

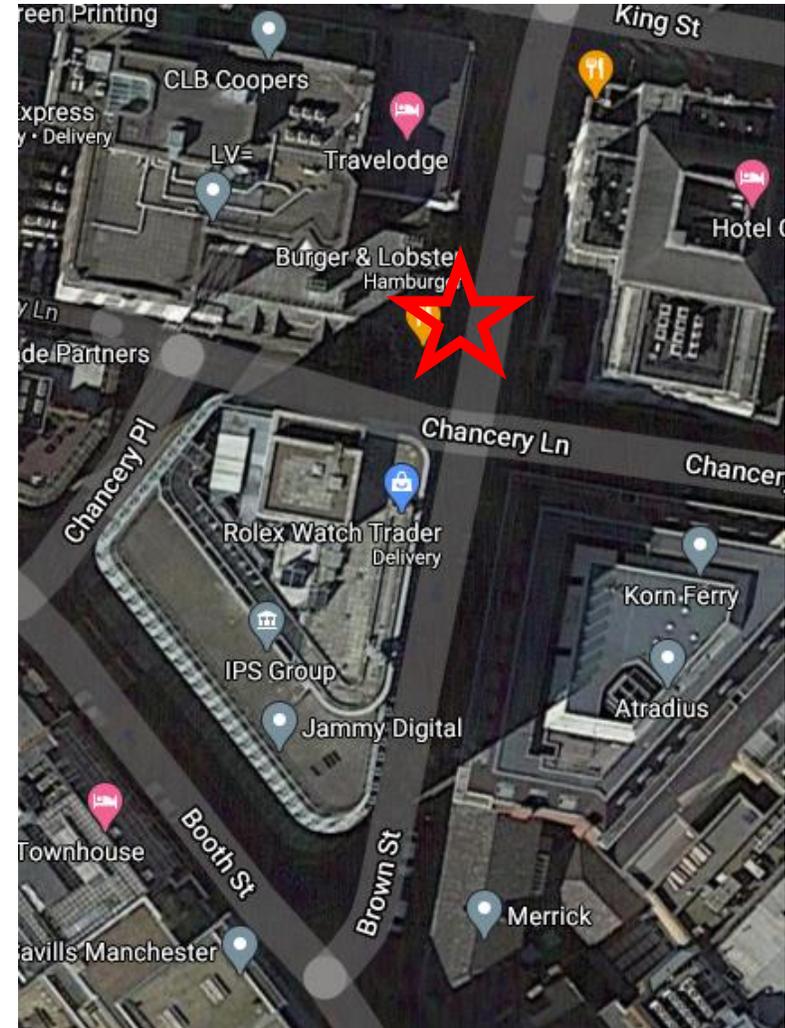
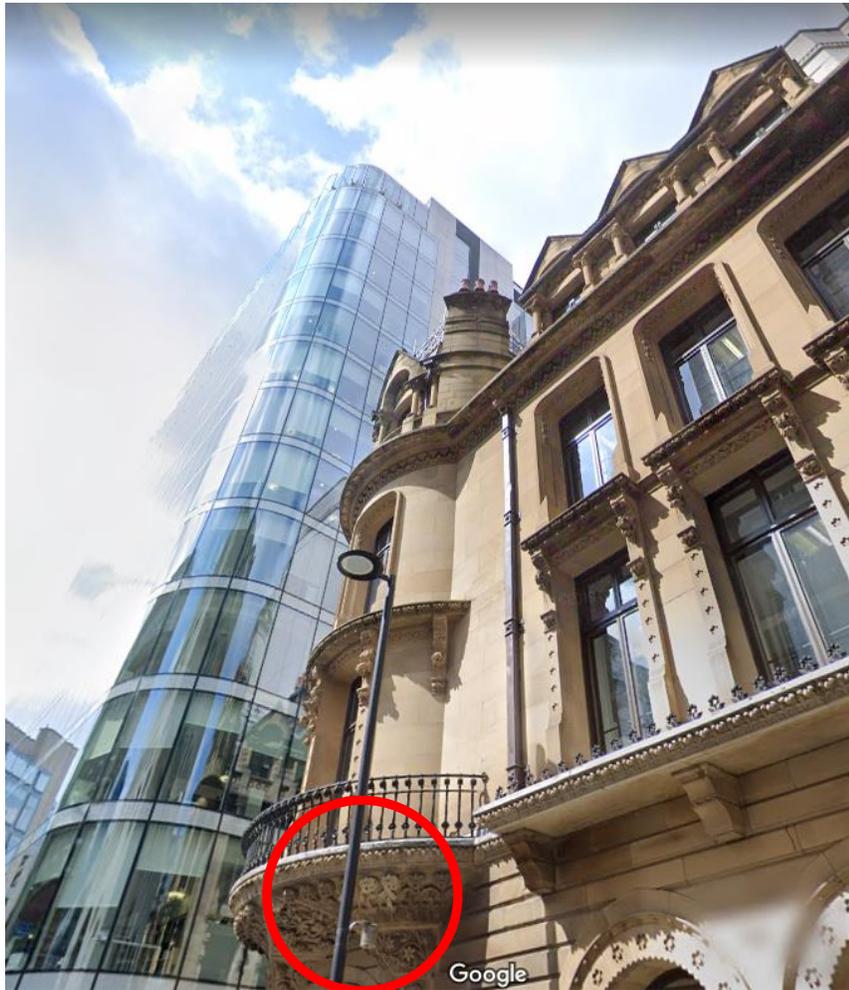
Brown St



Brown Street, Manchester. [SVF = 0.271]



Brown Street, Manchester, further views



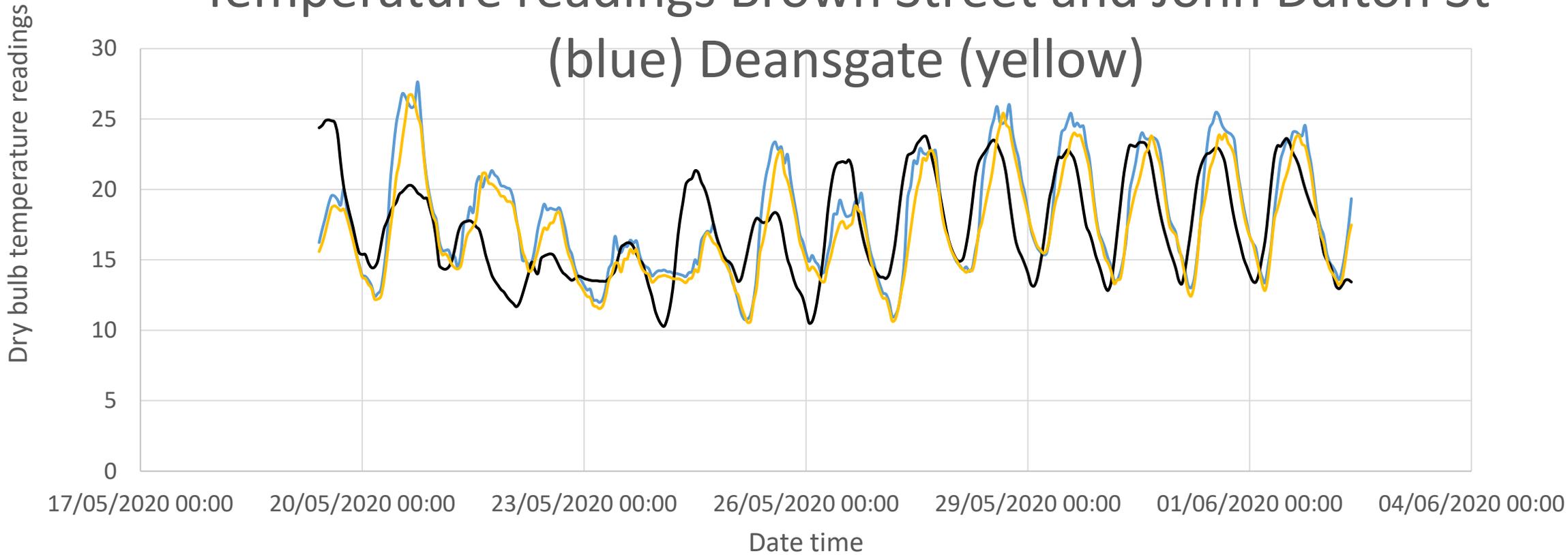
Deansgate



John Dalton Street

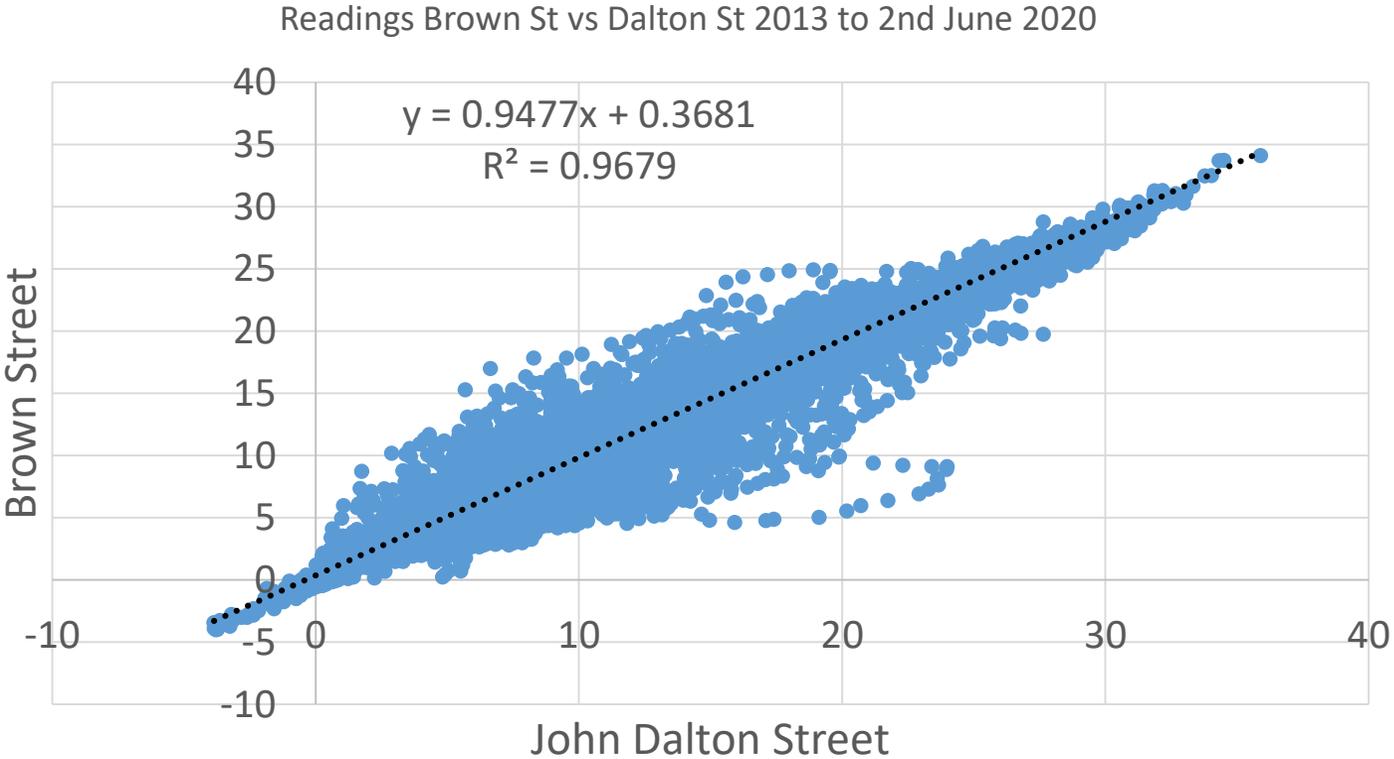


Temperature readings Brown Street and John Dalton St (blue) Deansgate (yellow)

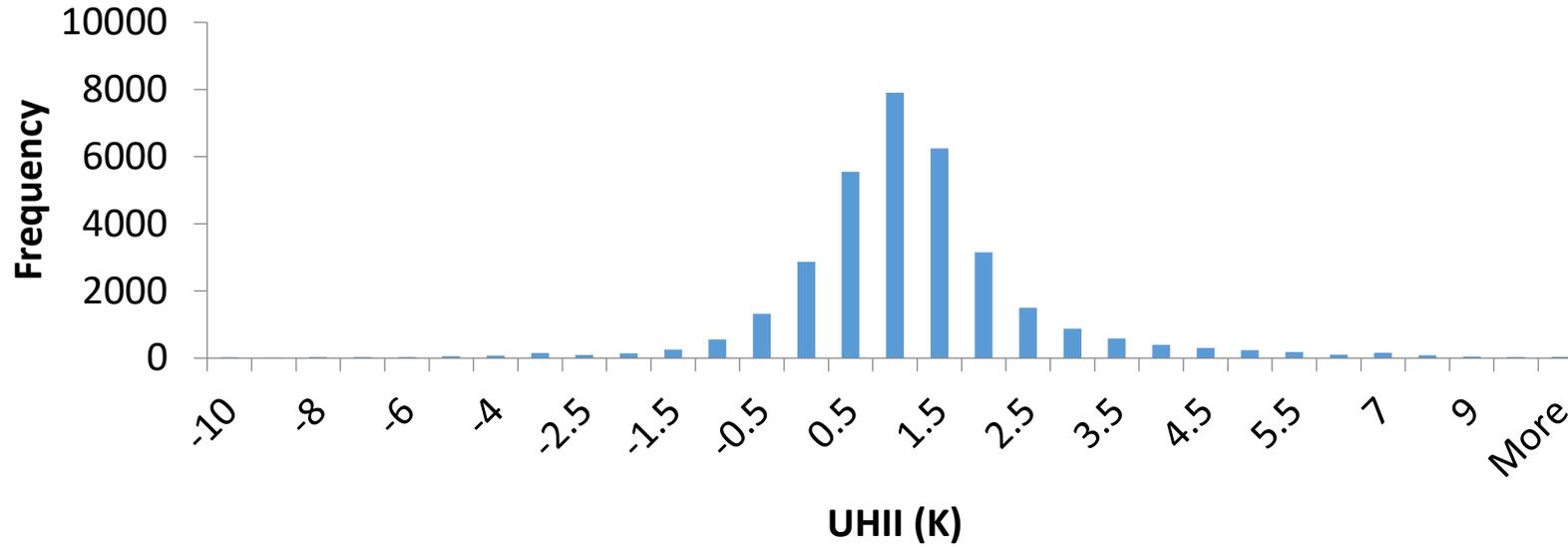


Brown Street vs Dalton Street 2013 to 2nd June 2020

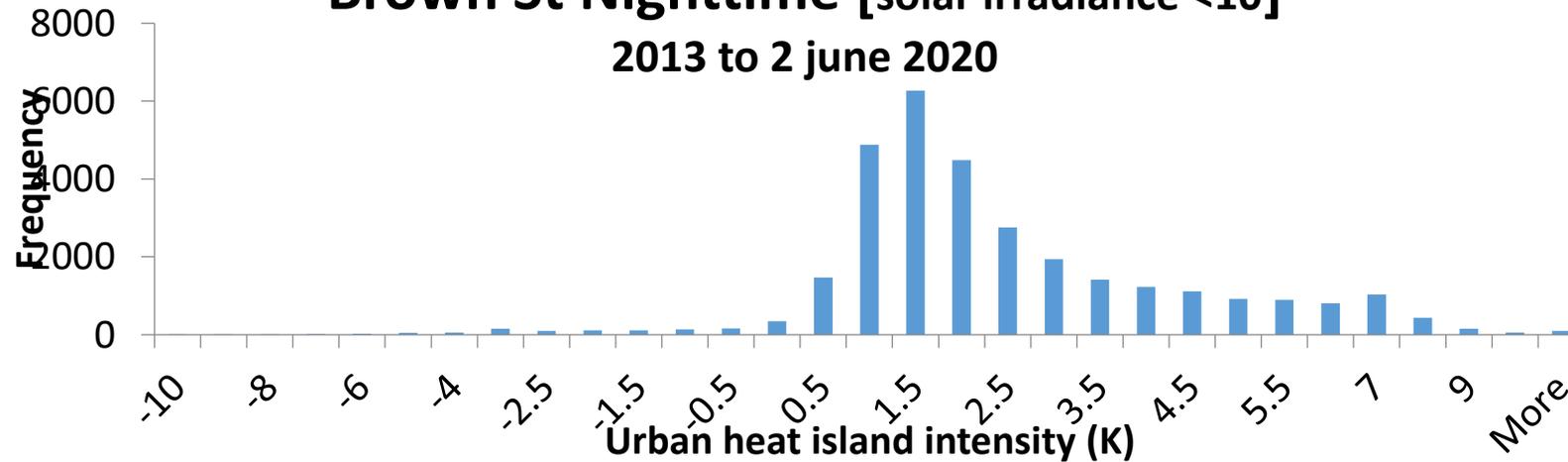
132,000 hourly readings



Brown St UHI Daytime [solar irradiance >= 10], 2013 to 2 June 2020

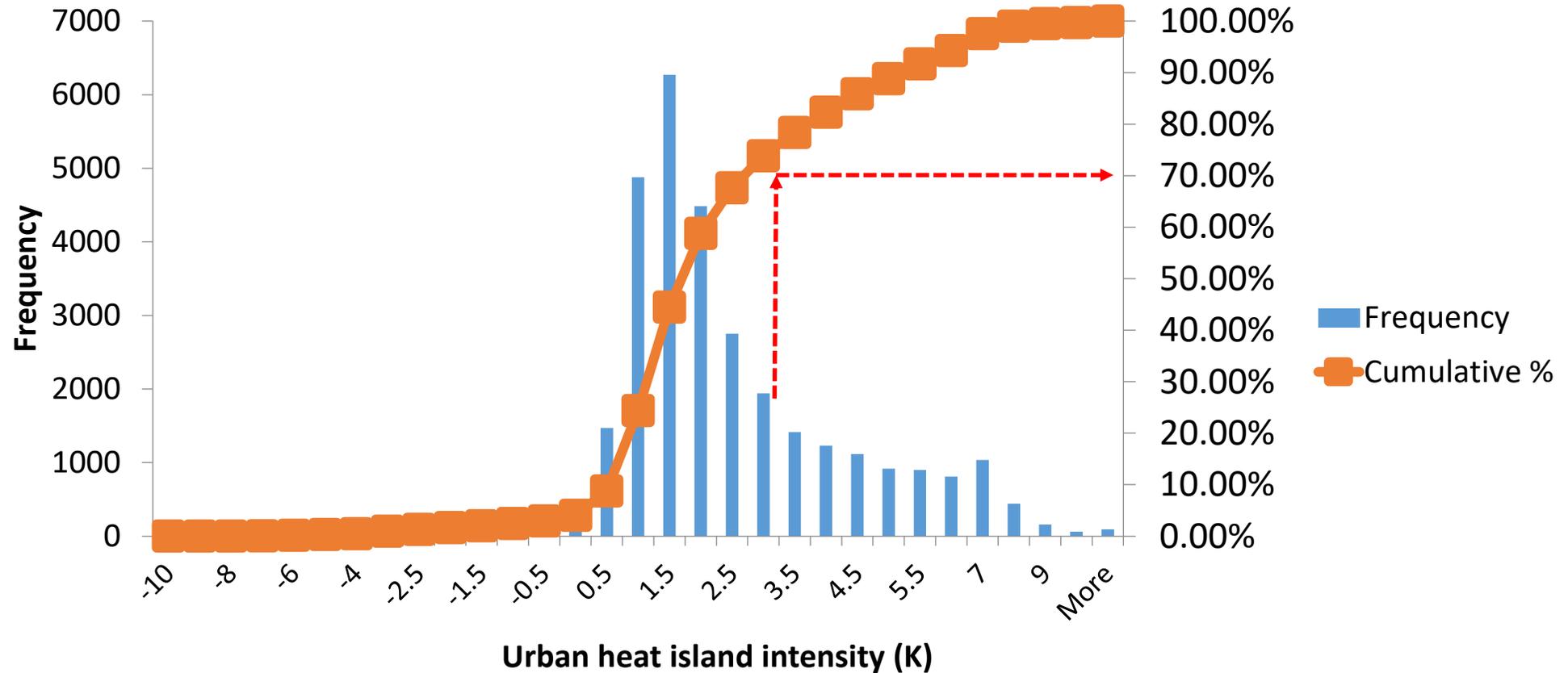


Brown St Nighttime [solar irradiance <10] 2013 to 2 June 2020

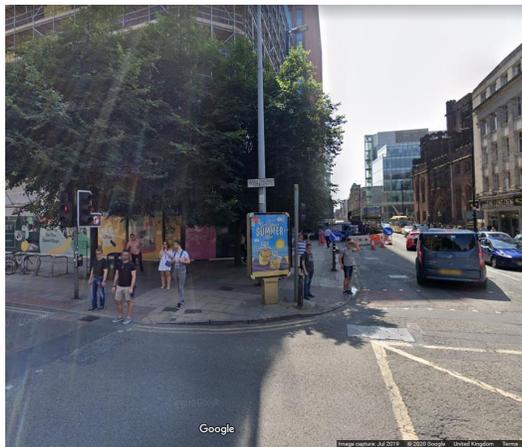
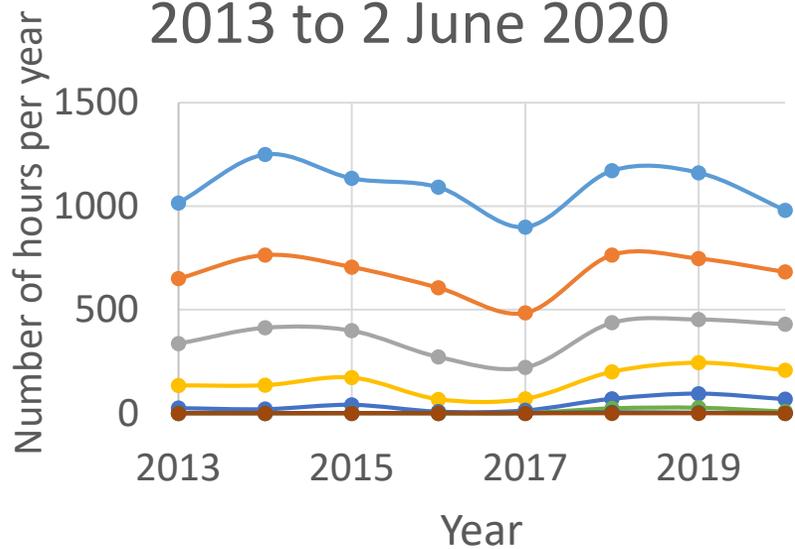


Night UHI and Extreme urban heat island intensities

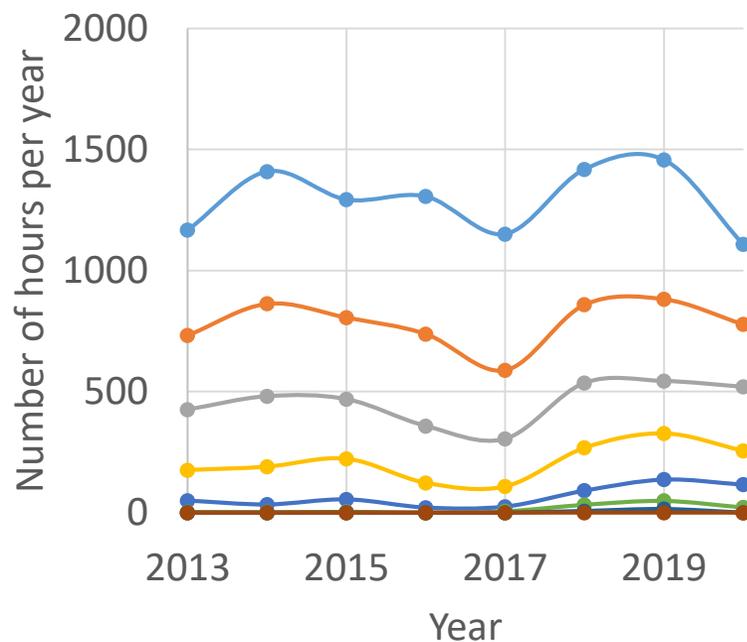
Brown St (solar <10 "night") 2013 to 2 June 2020



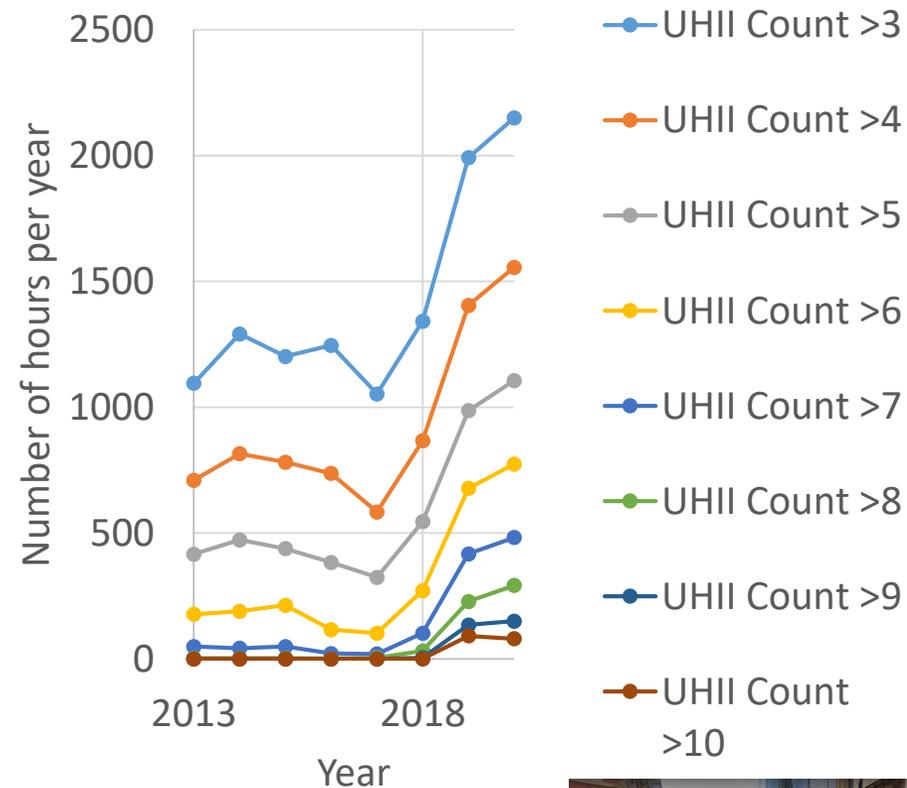
Deansgate extreme UHII 2013 to 2 June 2020



John Dalton St extreme UHII 2013 to 2 June 2020

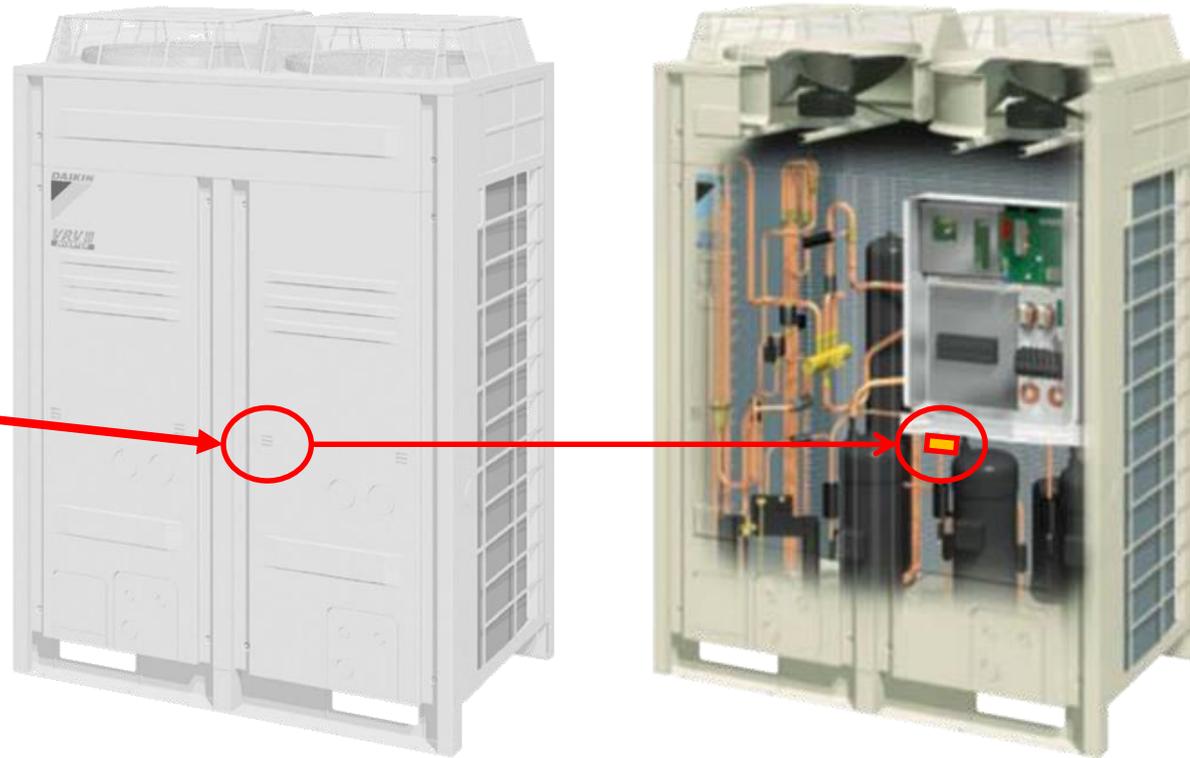


Brown St UHII extreme values 2013 to 2 June 2020

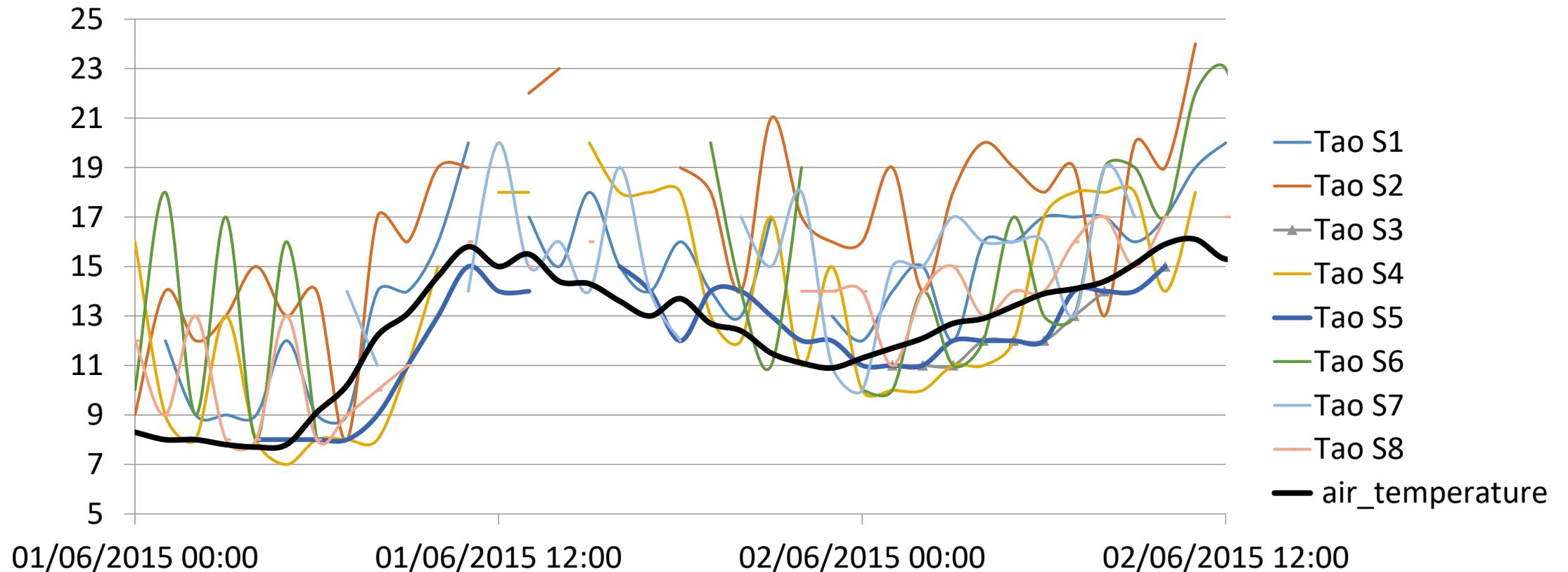


So what is the UHII around an AC system?

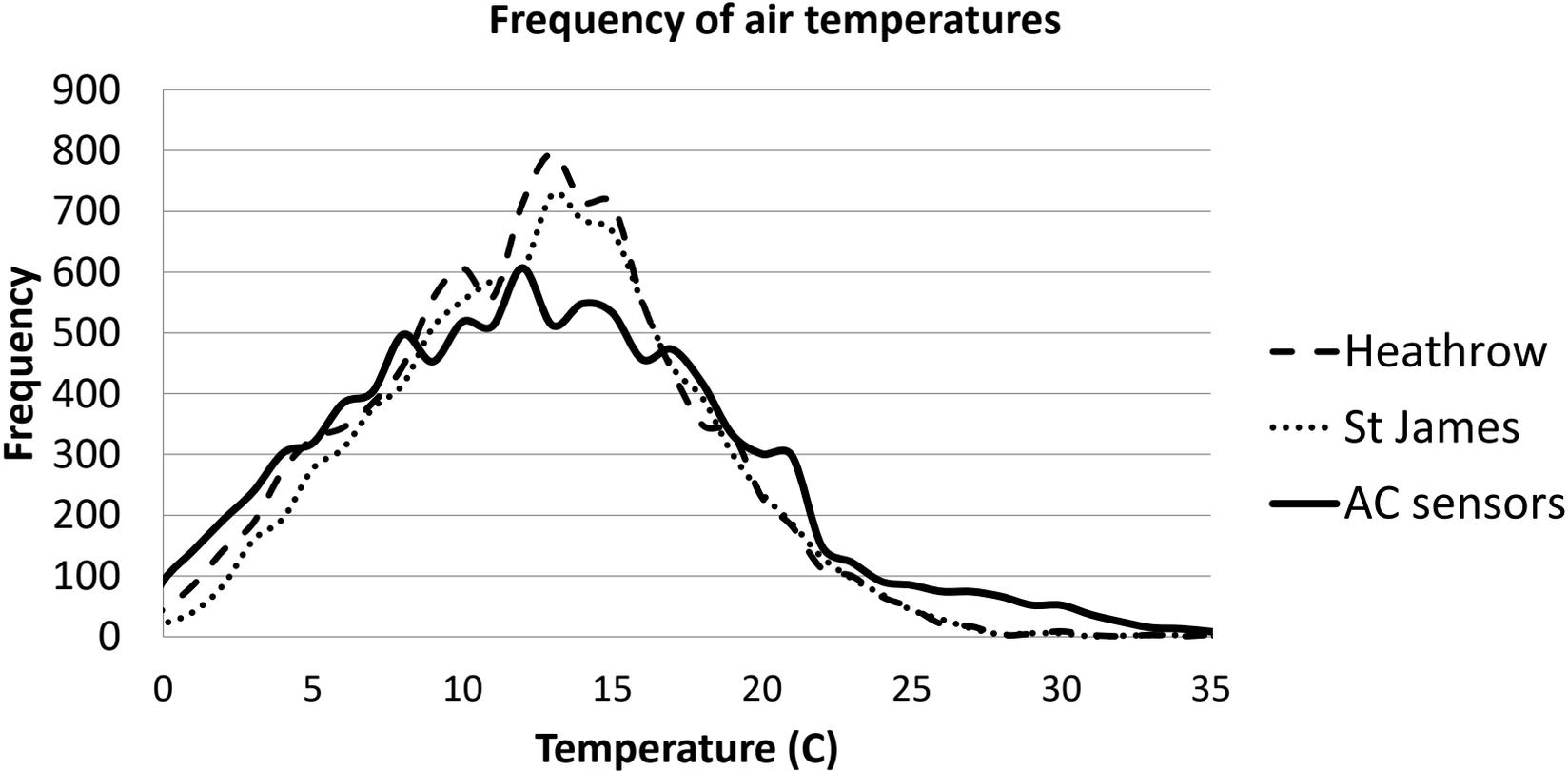
Air temperature sensor



Outside air temperature readings (hourly, Tao) from the sensors in the 8 fan cooled condenser units on the roof of a hotel in West London compared to the air temperature at Heathrow airport (for the 1st and 2nd of June 2015).



The frequency of air temperatures during 2015 for Heathrow Airport, St James Park and the AC sensors



Conclusions

- Extreme values of UHI intensity ($UHII \geq 3K$) occur on clear calm sunny days and clear calm nights
- Extreme values ($UHII \geq 3K$) more in the night than the day
- Extreme values ($UHII \geq 3K$) occur about 1000 hours a year (15%)
- Extreme values ($UHII \geq 3K$) vary markedly between locations, even when close
- Trees can have a significant effect on the extreme UHIIs
- Air conditioning can have its own additional heat island around the condensers
- China's Xi Jinping's speech at UN supporting more climate change measures; Rural Vitalisation means less UHI hopefully in China.

Contacts

- If you wish to use some of this data, contact either Geoff and John
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