EPSRC
Engineering and Physical Sciences Research Council

University of Reading

"Sustainable Adaptation of Buildings to a Warmer London Climate"
The ACTUAL Project

Alex Boon, Janet Barlow, Dan Drew, Christos Halios, Siân Lane, Aidan Brocklehurst and Wagner Nogueira Neto.

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ARUP

Met Office

ACTUAL

The Urban Heat Island (UHI)

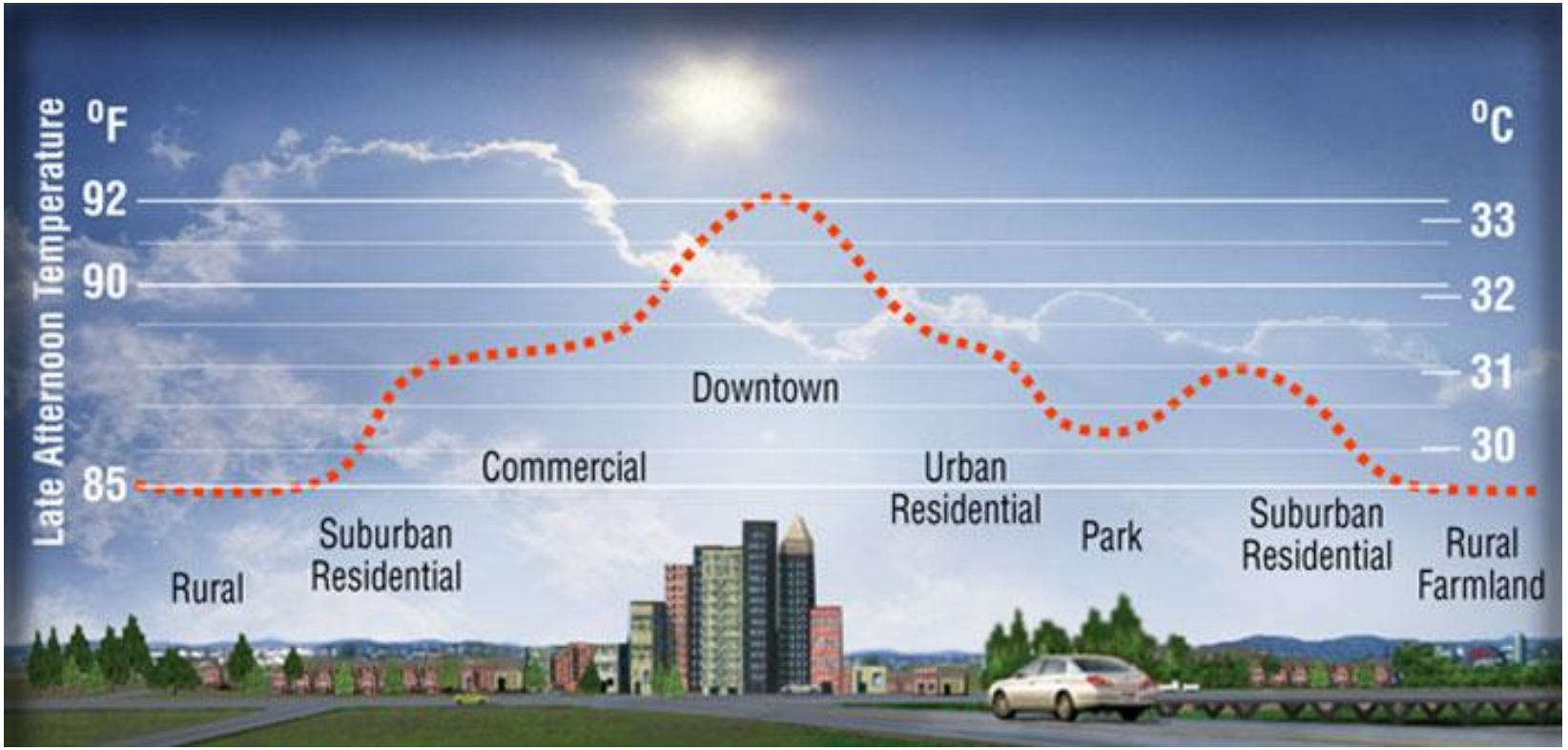
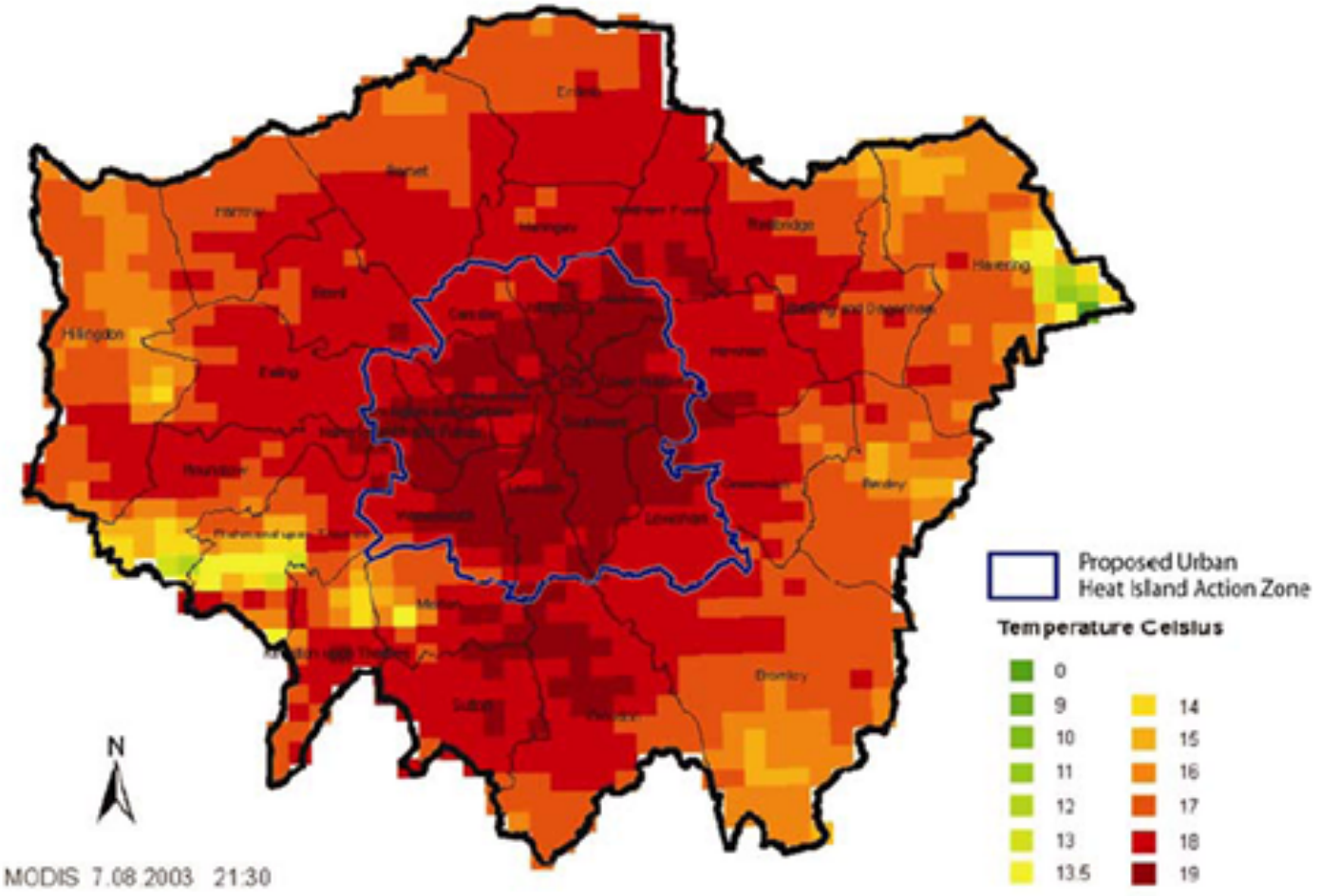
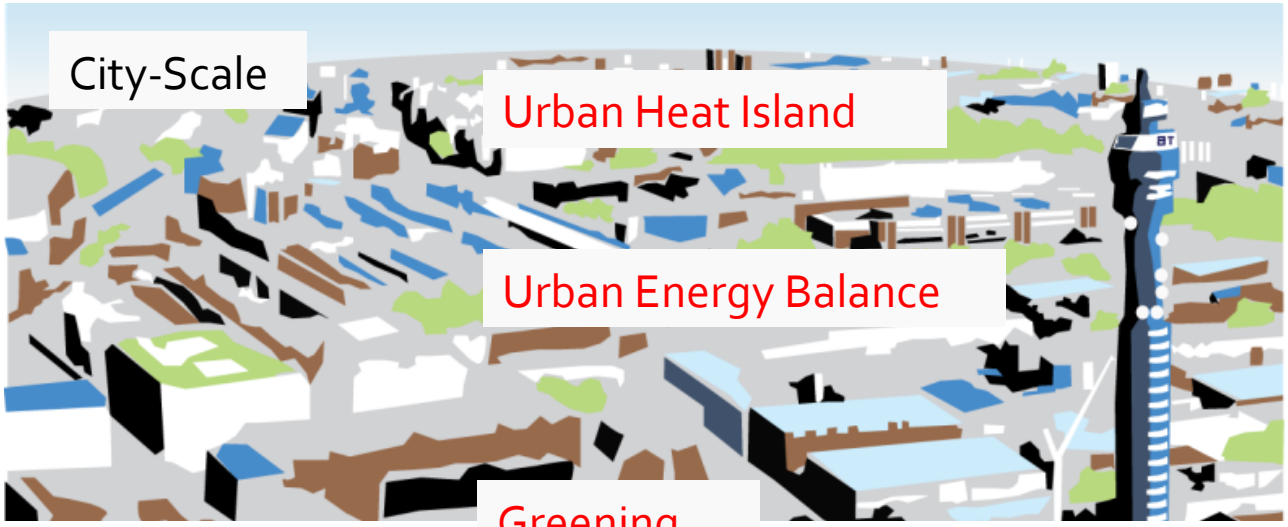


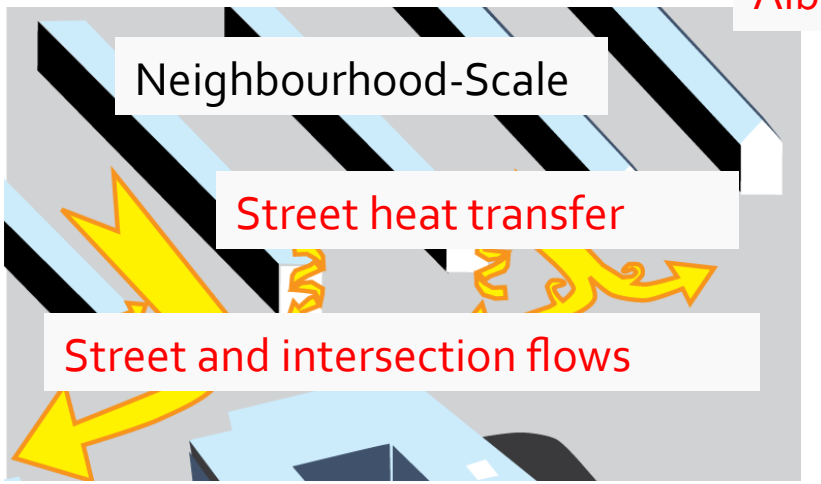
Image: Lawrence Berkeley National laboratory
http://heatisland.lbl.gov/

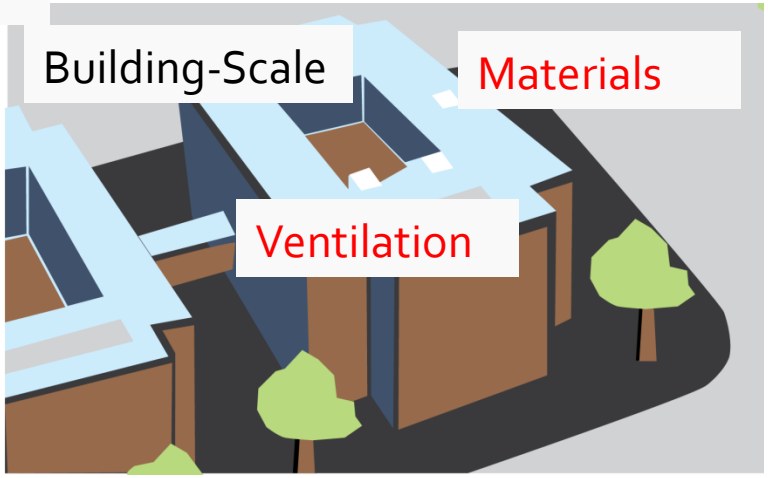
Problem of urban heat



Cities as urban climate systems



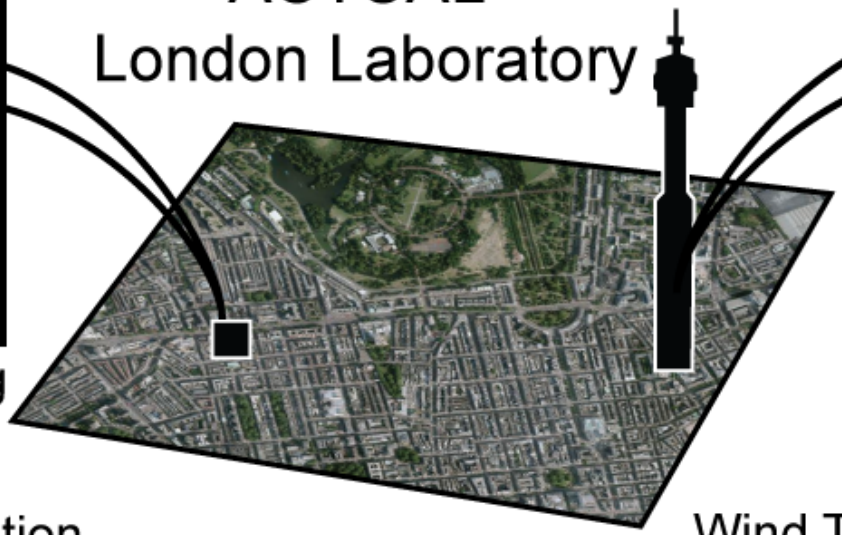




ACTUAL – Working across scales

WCC building

ACTUAL
London Laboratory



BT Tower

Model Simulation

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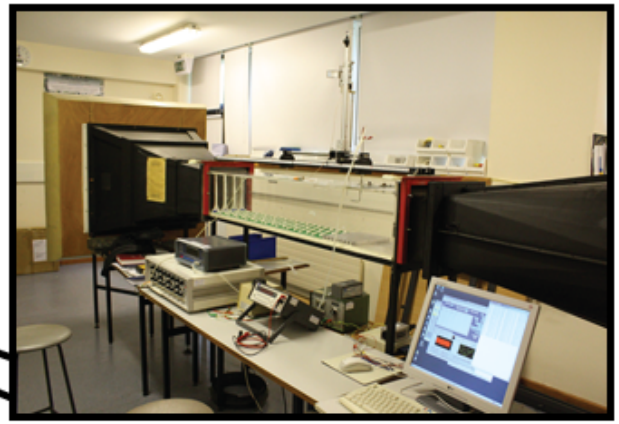
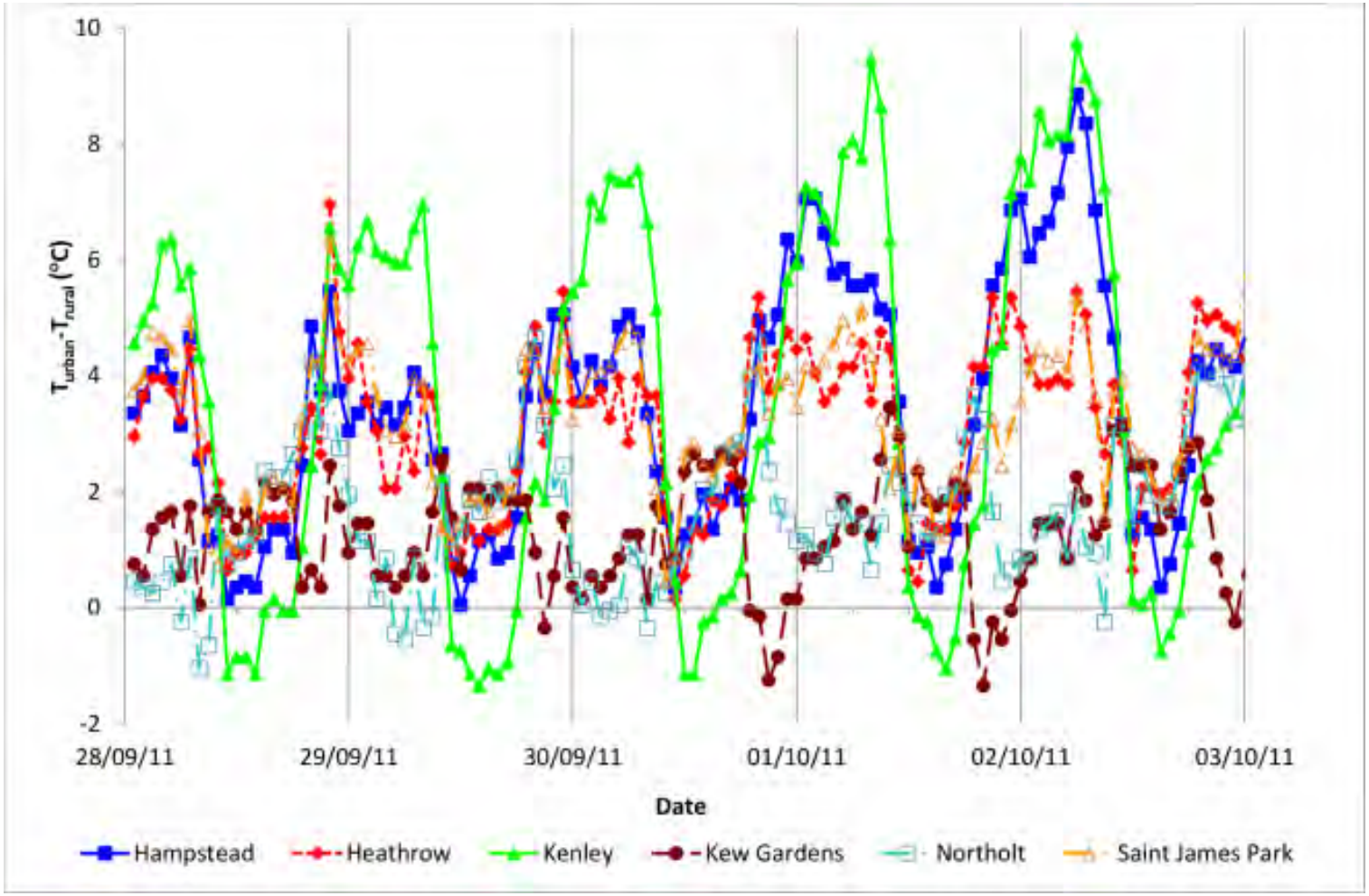
Wind Tunnel Simulation



Observing the UHI



Barlow et al. 2014. BAMS

Observing the UHI

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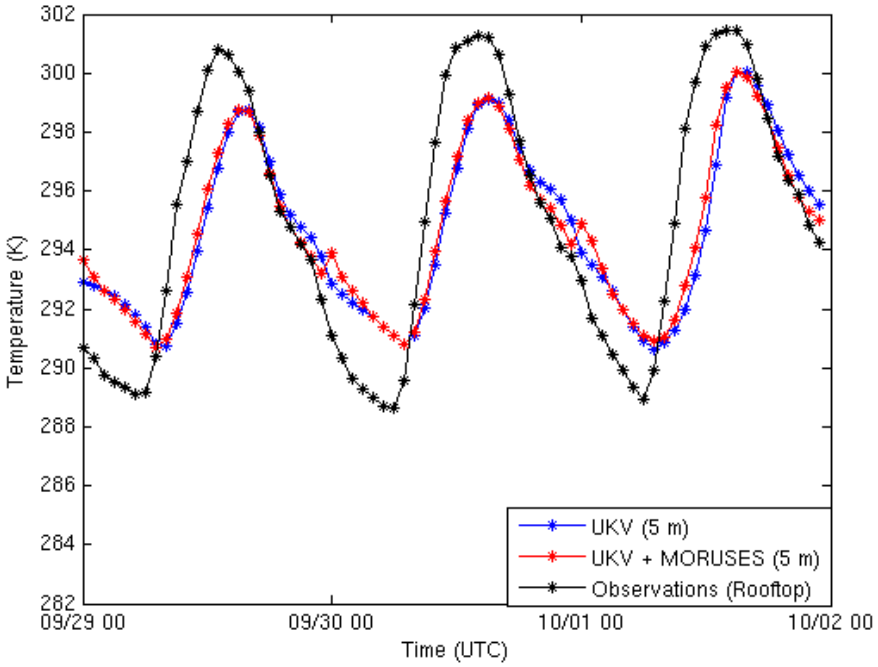
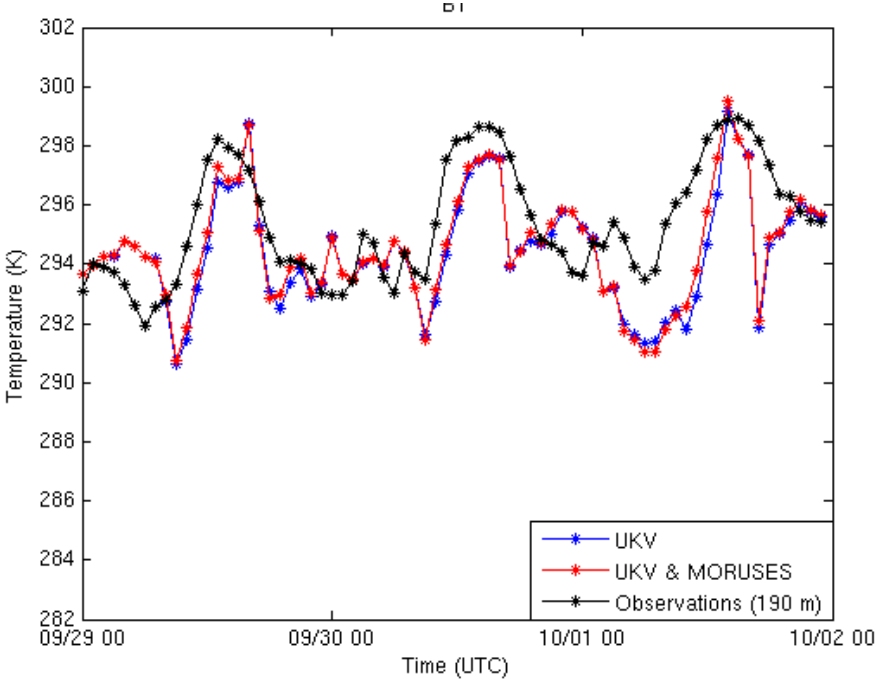
Rooftop (21 m)



BT Tower (190 m) - scaled



Siân Lane, PhD

Heat transfer at the neighbourhood scale

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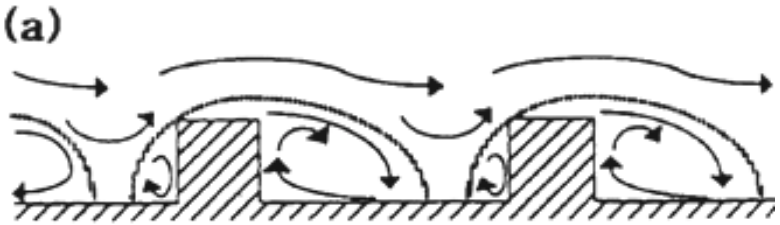
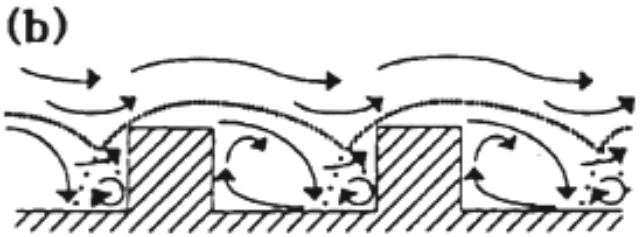
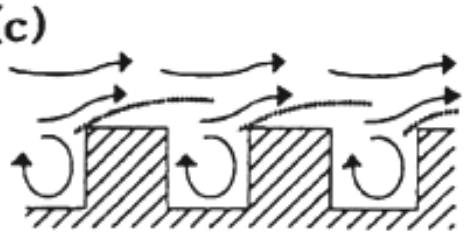
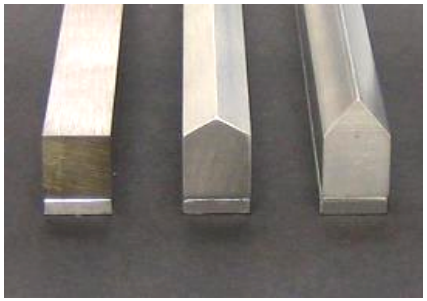
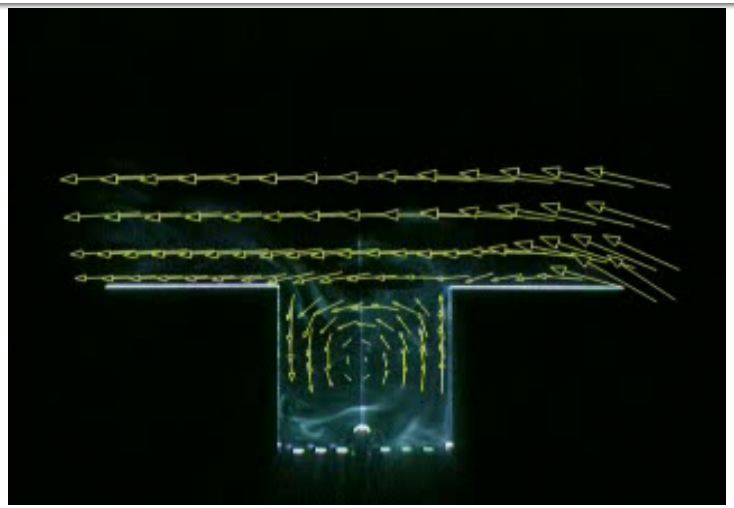


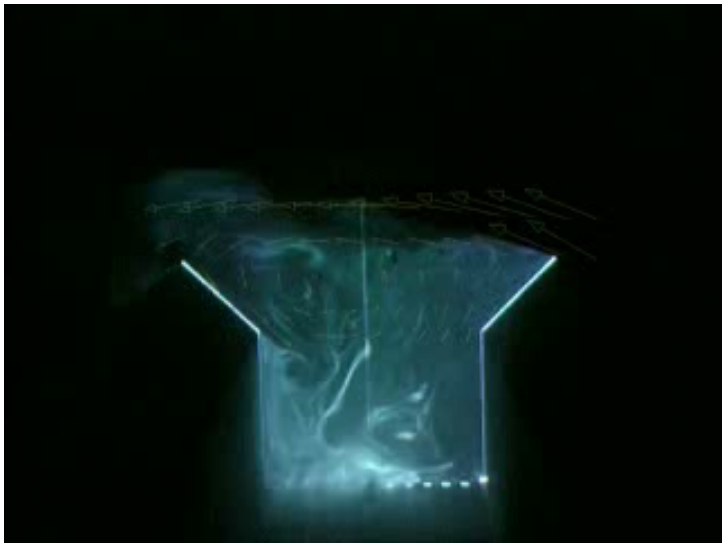




Oke, 1988







Wagner Nogueira Neto, PhD

Urban climate and building infiltration rates

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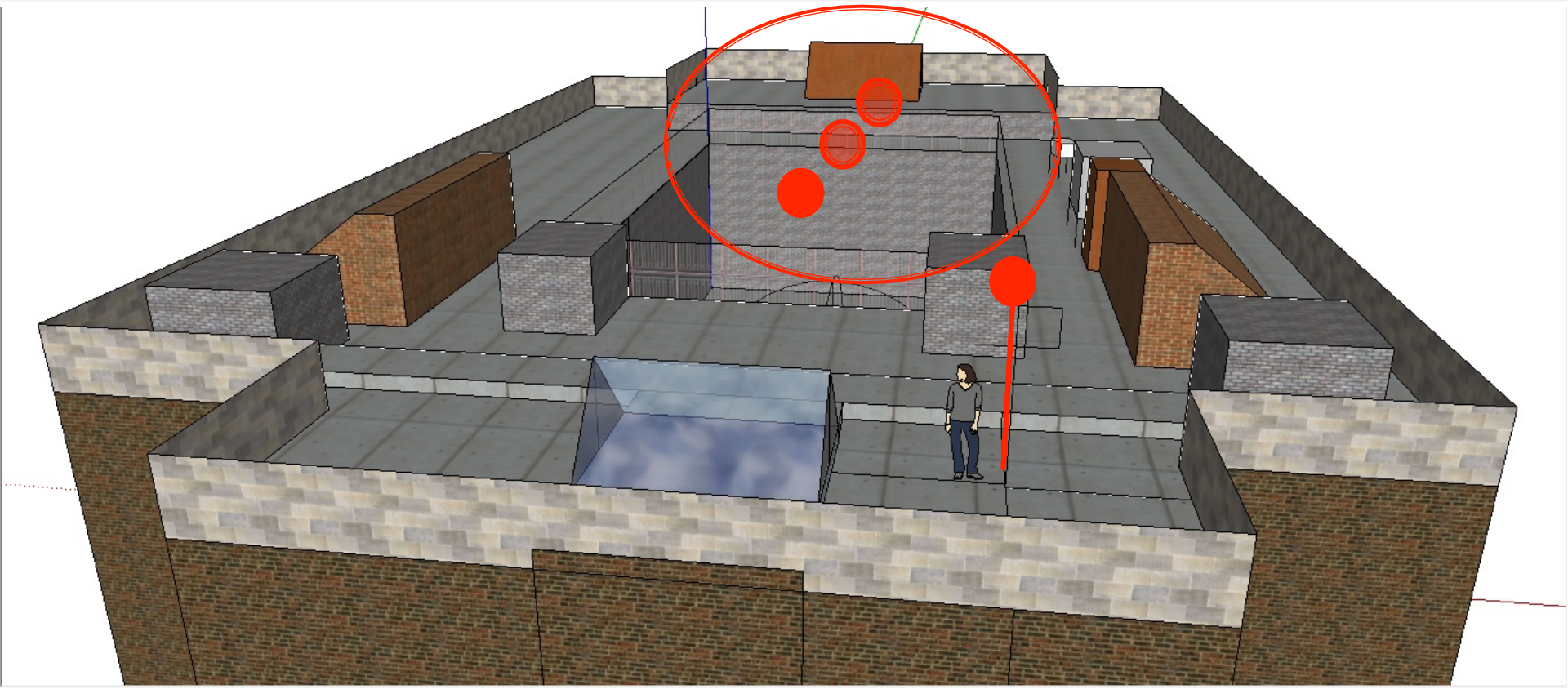
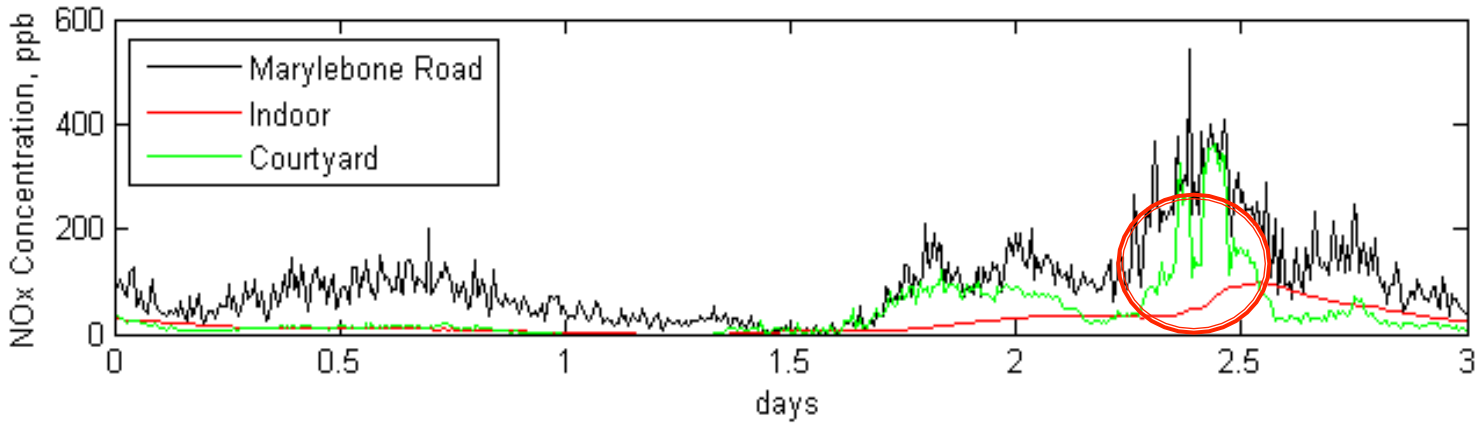
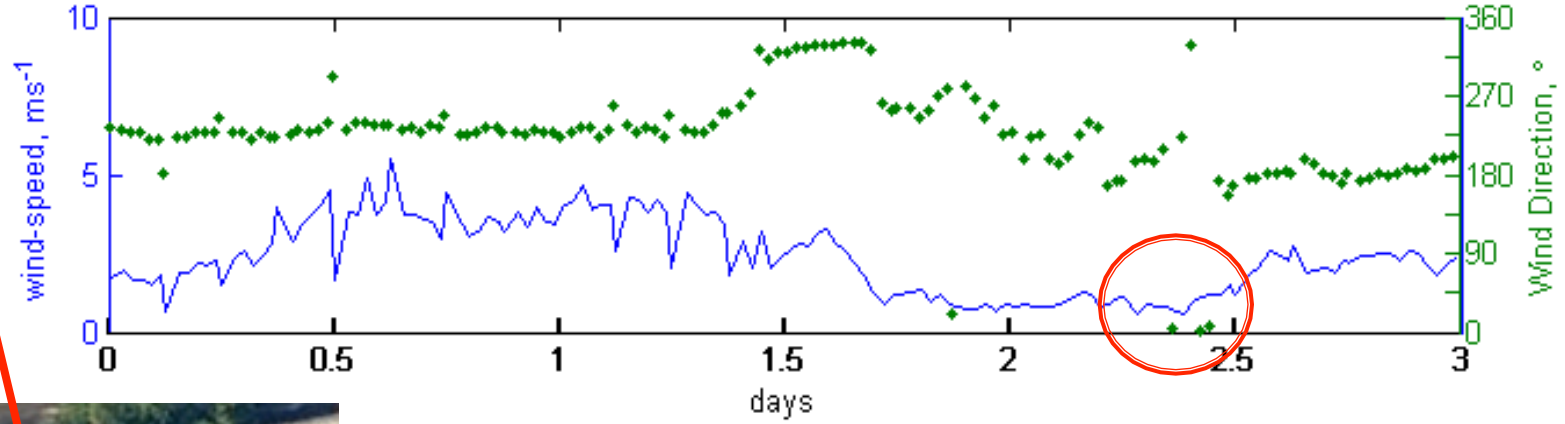
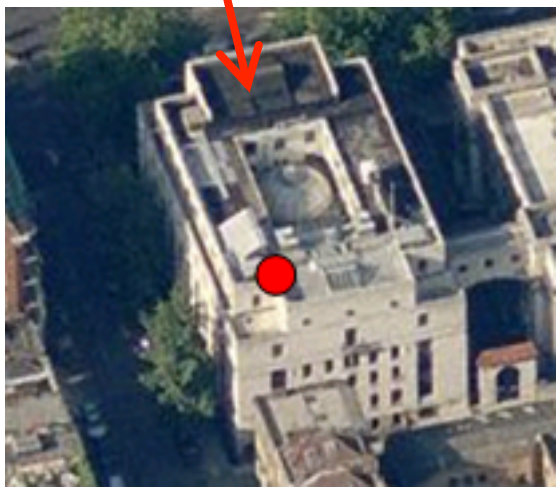


- Room next to busy road (~3600 veh hr^{-1})
- Use ambient pollution (NOx) as a tracer to monitor ventilation rate

Aidan Brocklehurst, PhD

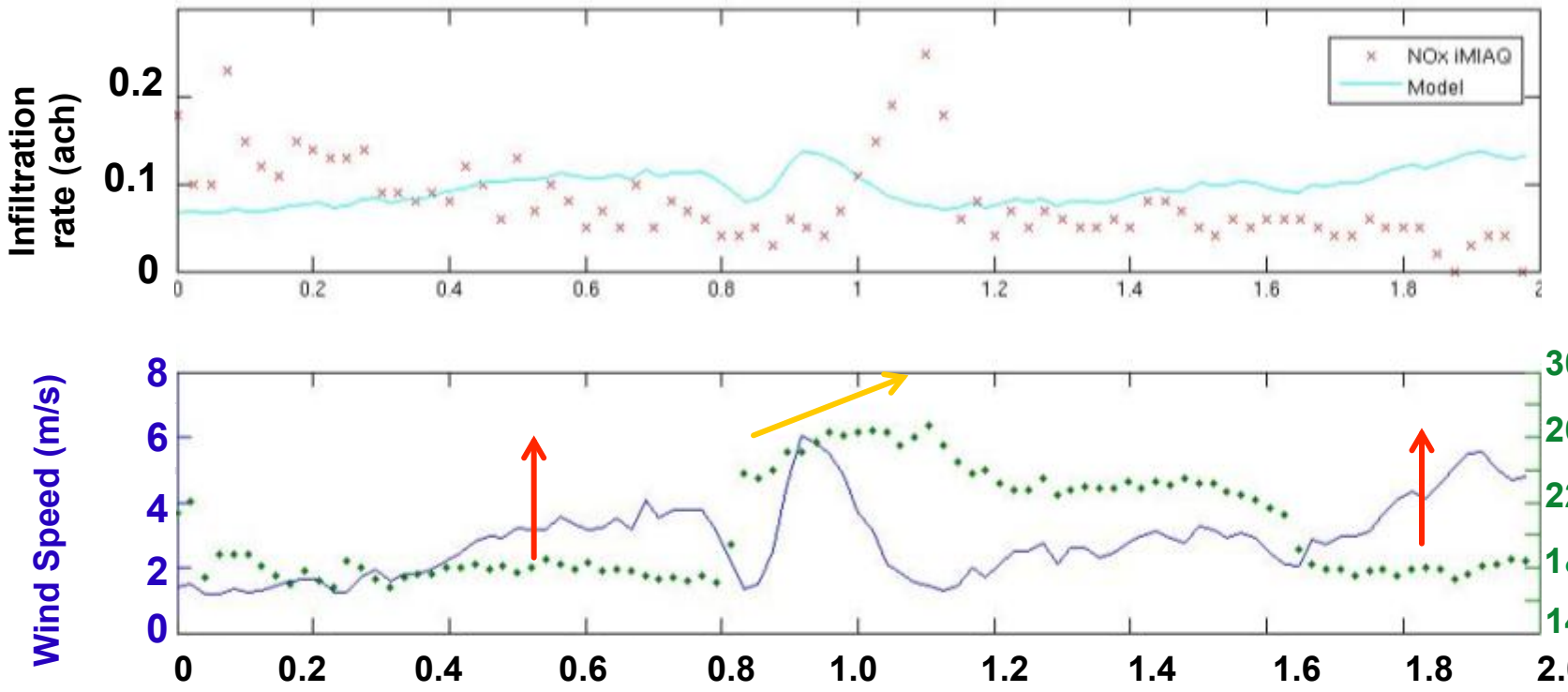


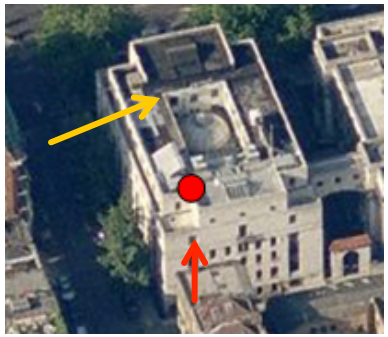




- Lag of indoor concentrations ~ 4 hours
- Infiltration rate driven strongly by wind direction

Daily Infiltration Rates





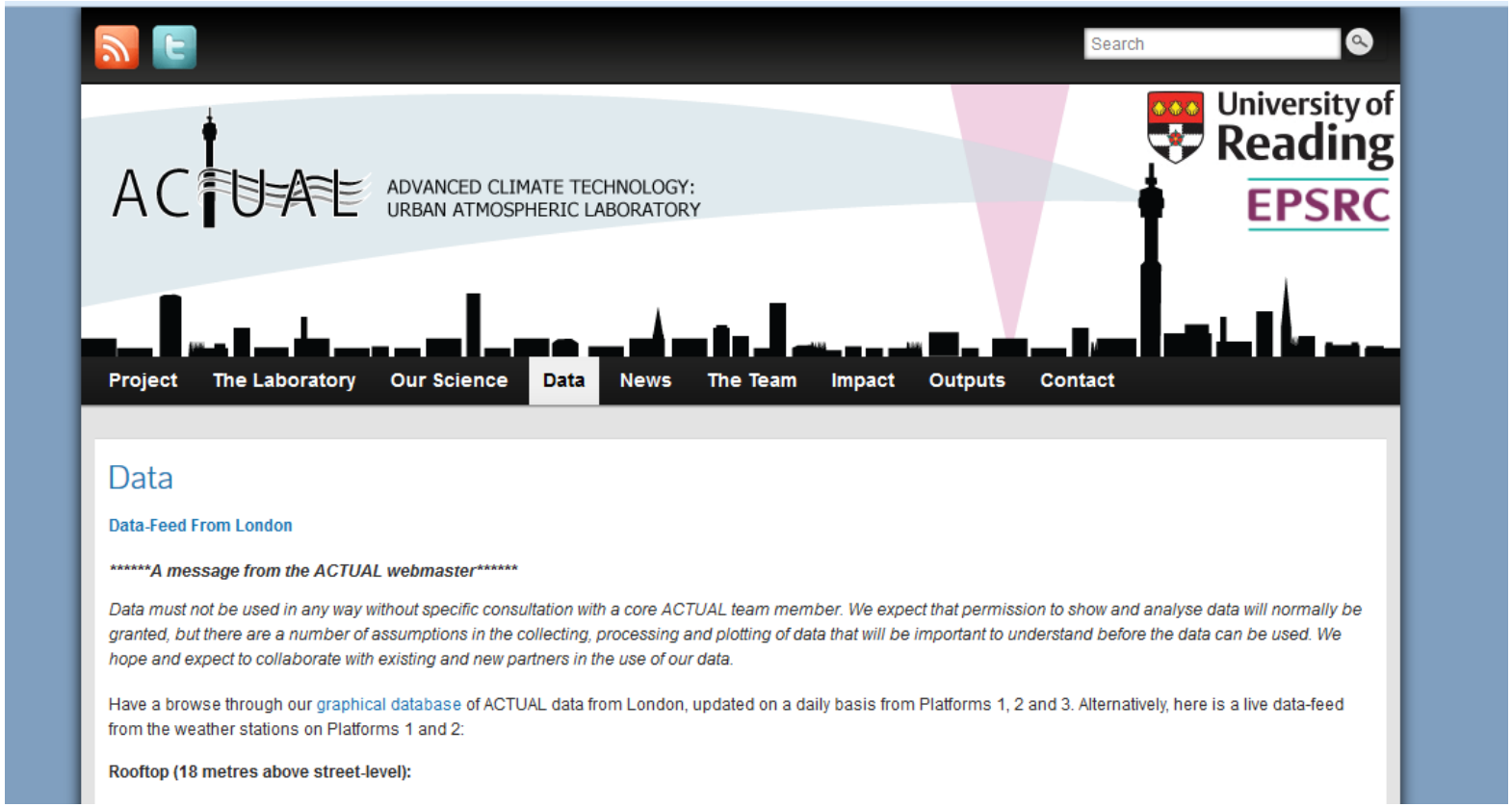
- MIAQ: Multizone Indoor Air Quality method. Transform concentration measurements into a infiltration calculation.
- EnergyPlus infiltration model = f(U)

Conclusions

- Weather forecast models capture the broad features of the UHI
- Building shape influences temperatures by changing heat transport by flow
- Infiltration depends on the wind patterns in the surrounding neighbourhood
- Research continues as a part of the REFRESH project

Data is available online

www.actual.ac.uk



Acknowledgements

Please come and see our poster!

Thanks for your attention.
Any questions?