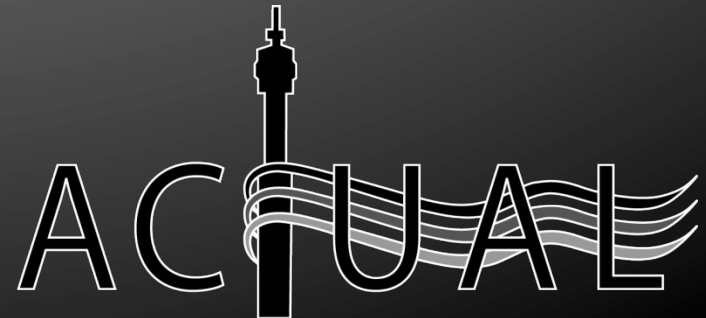


# “Sustainable Adaptation of Buildings to a Warmer London Climate” The ACTUAL Project

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



# The Urban Heat Island (UHI)

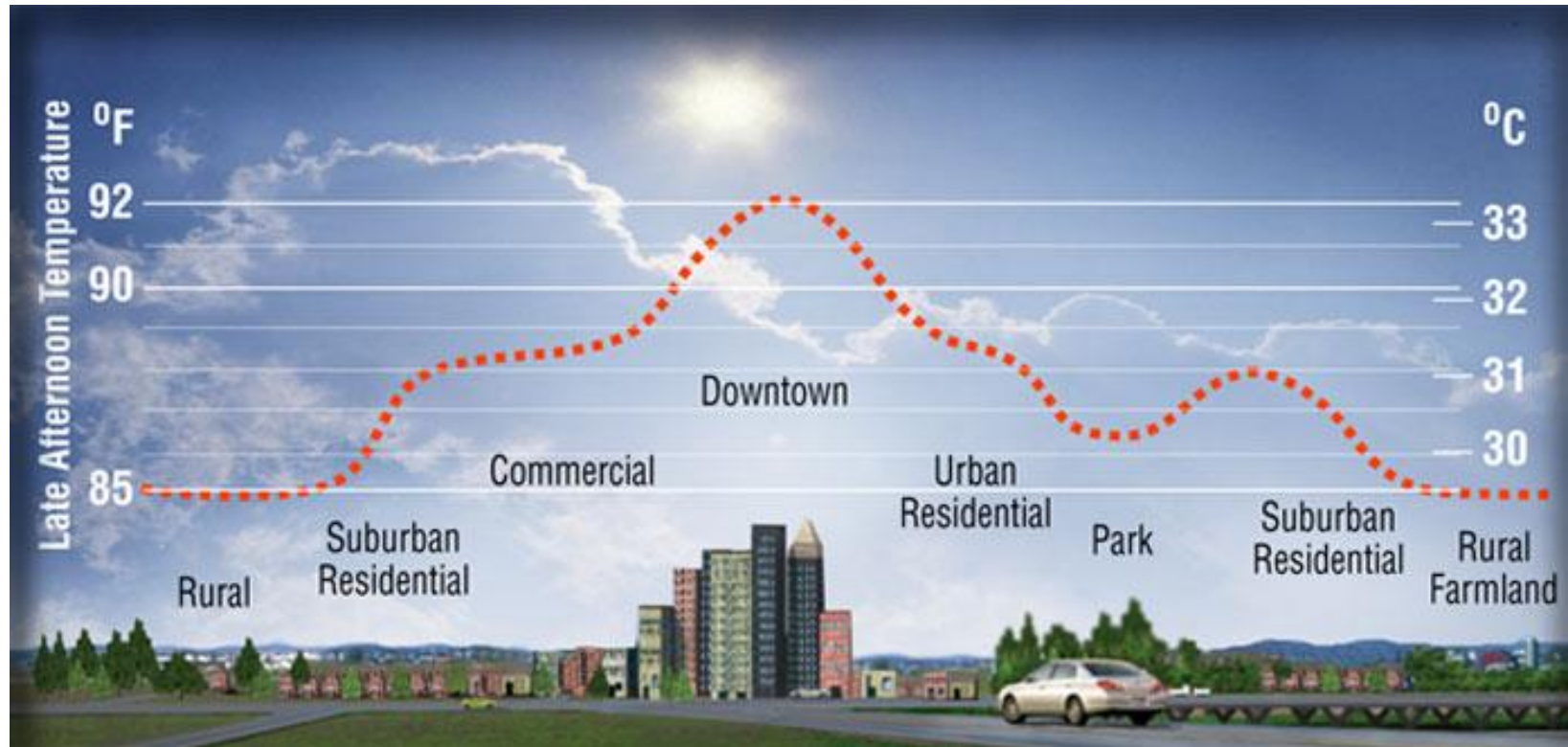
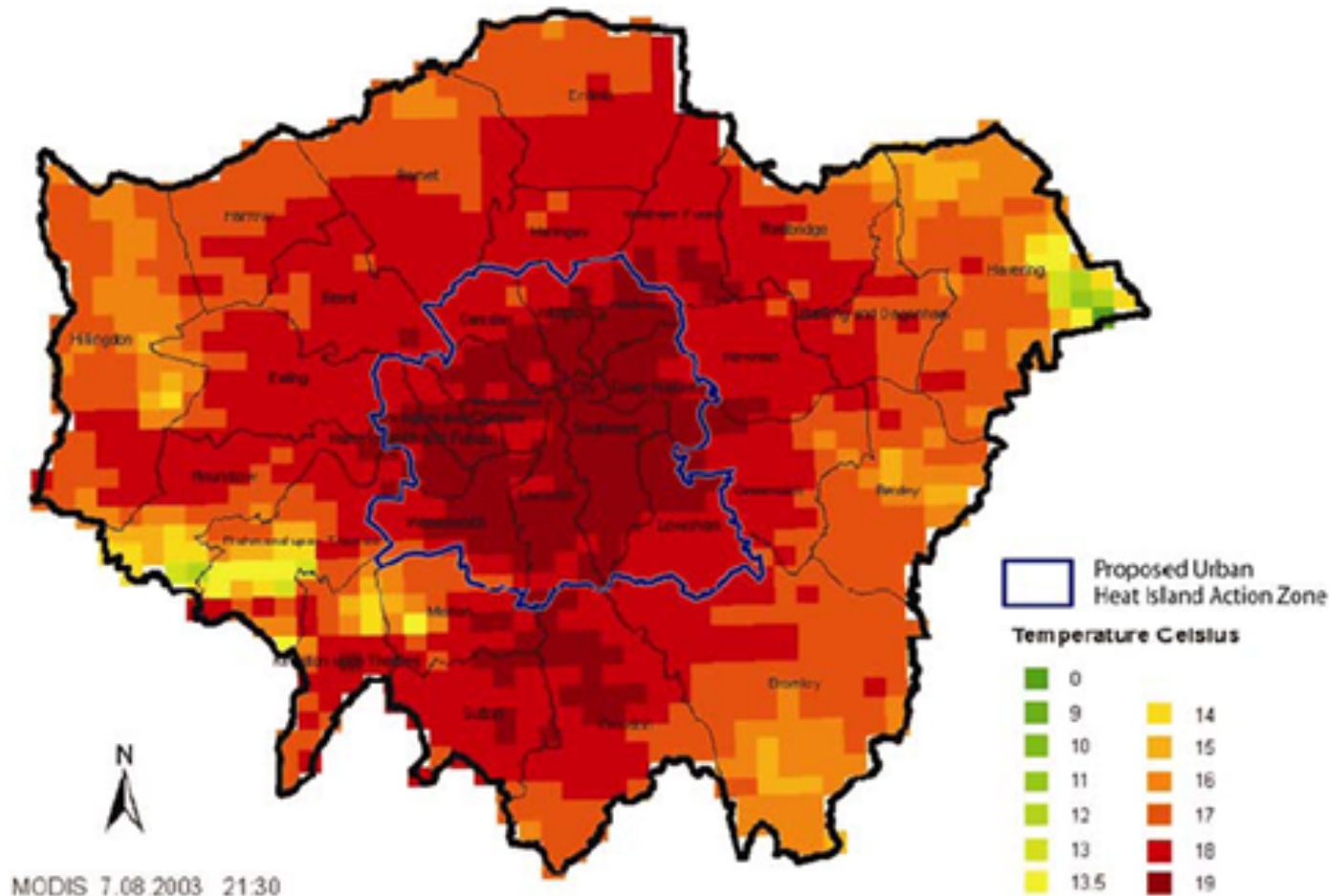
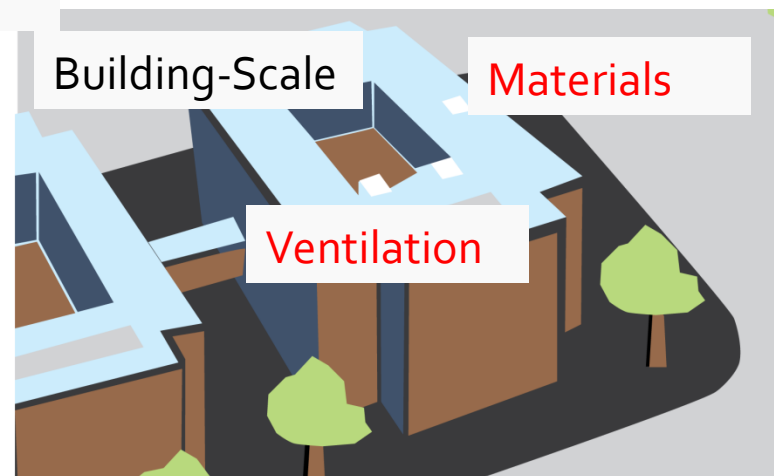
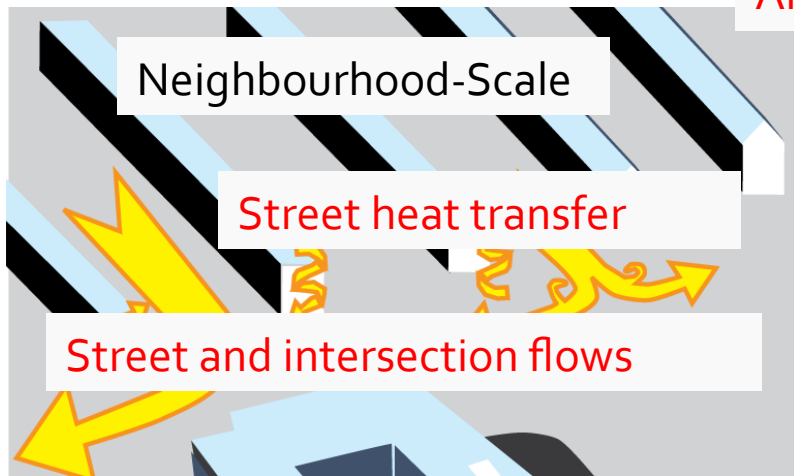
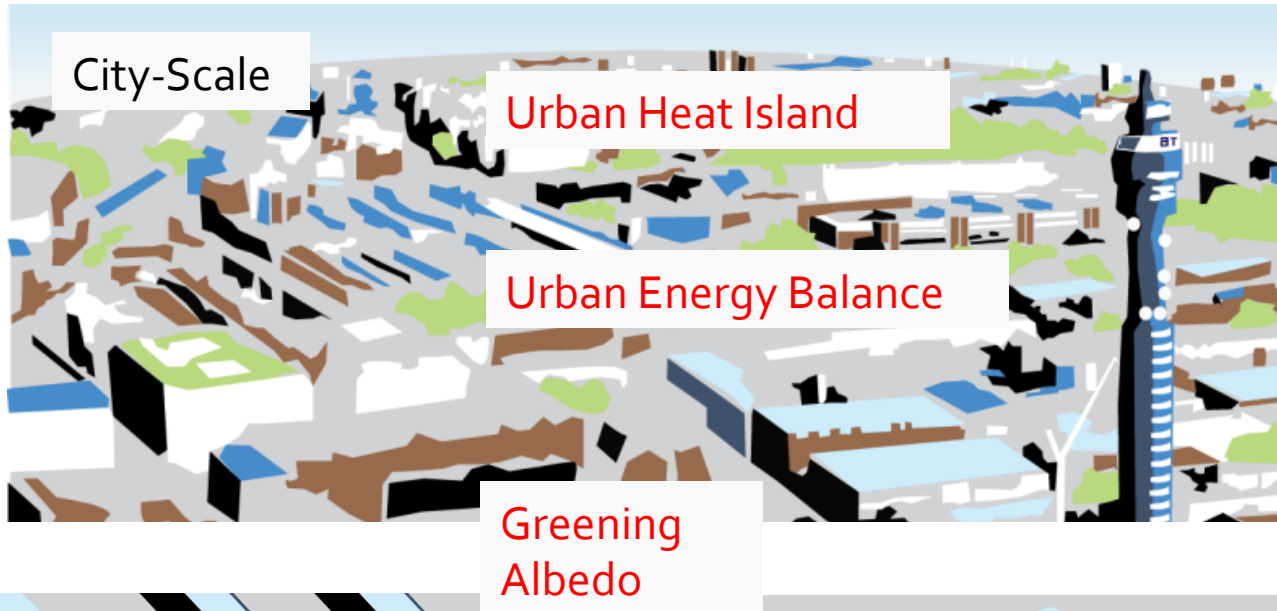


Image: Lawrence Berkeley National laboratory  
<http://heatisland.lbl.gov/>



# Cities as urban climate systems





# ACTUAL – Working across scales



WCC building

ACTUAL  
London Laboratory

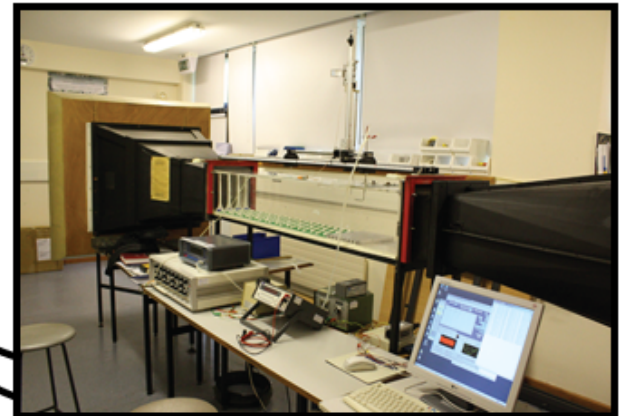


BT Tower

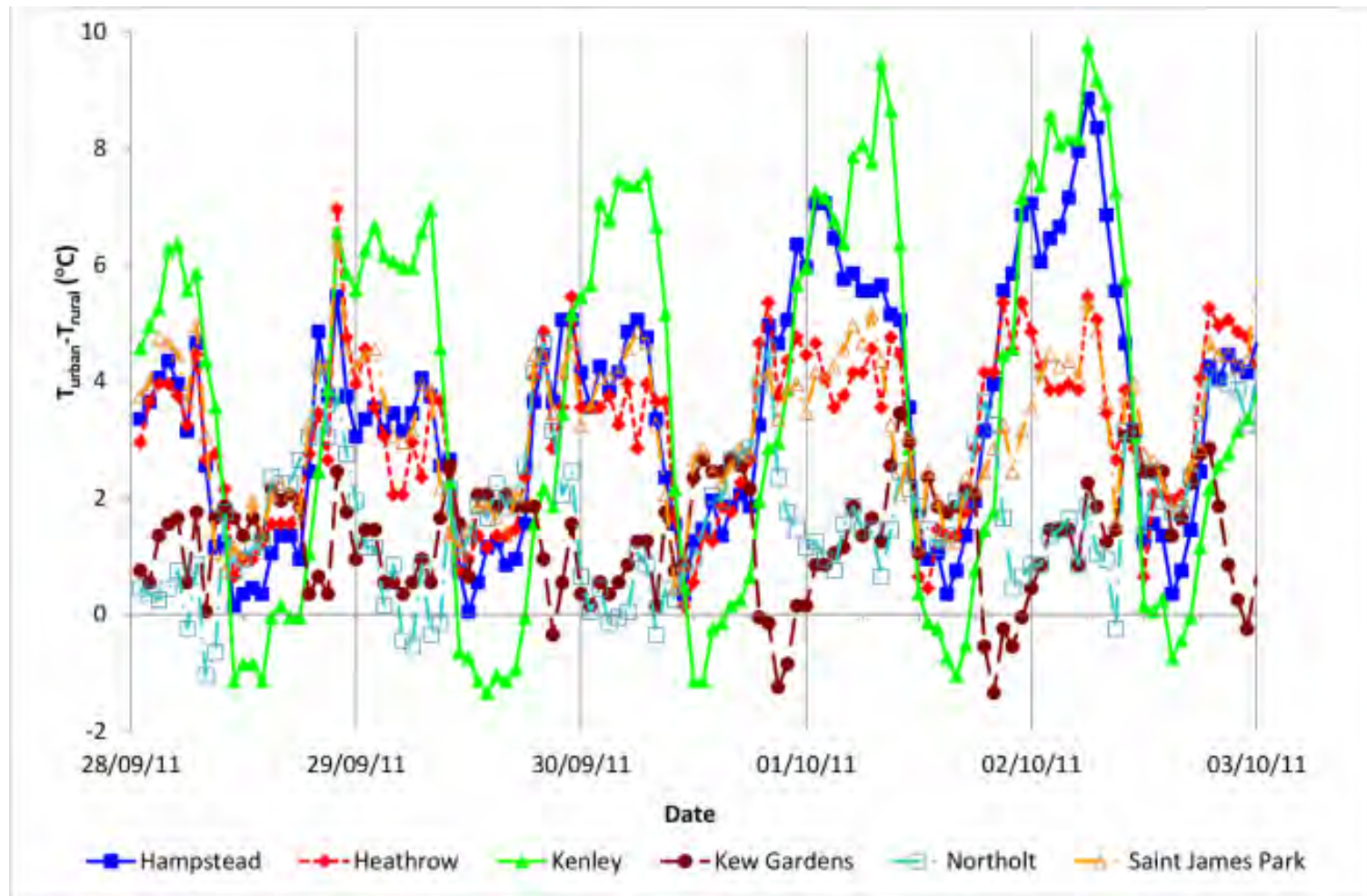
Model Simulation



Wind Tunnel Simulation



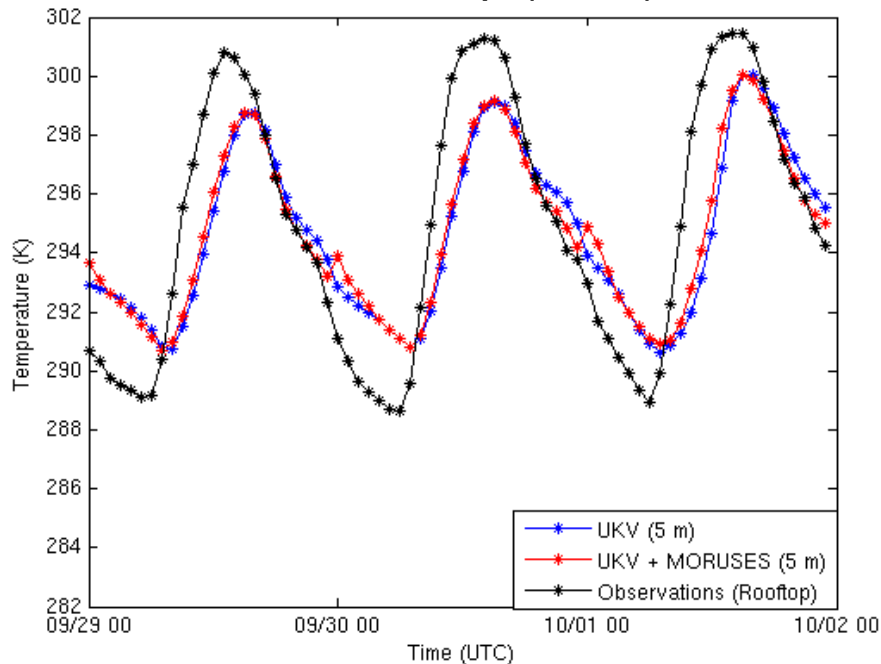
# Observing the UHI



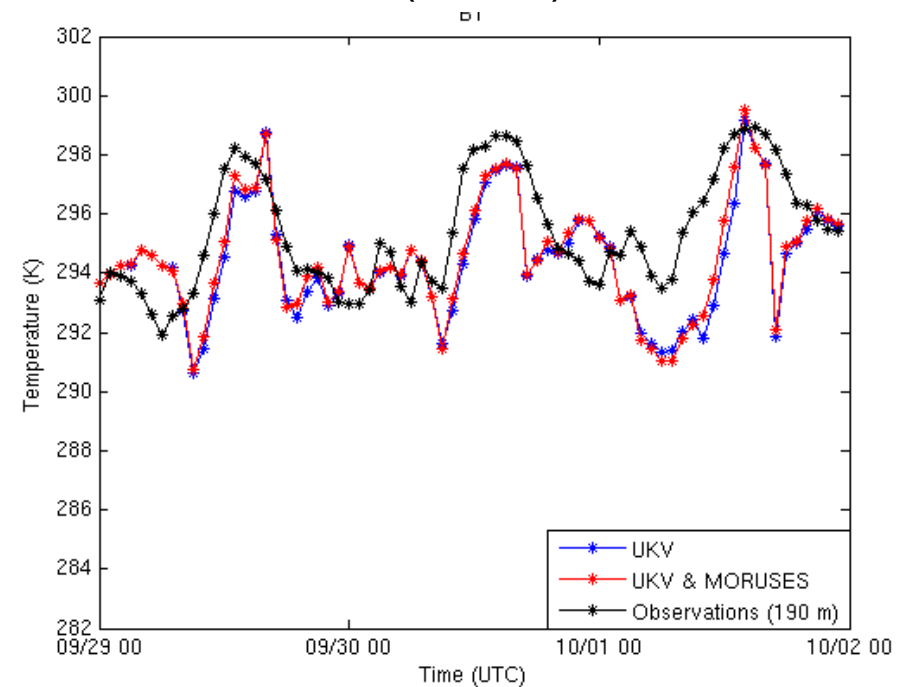
# Observing the UHI



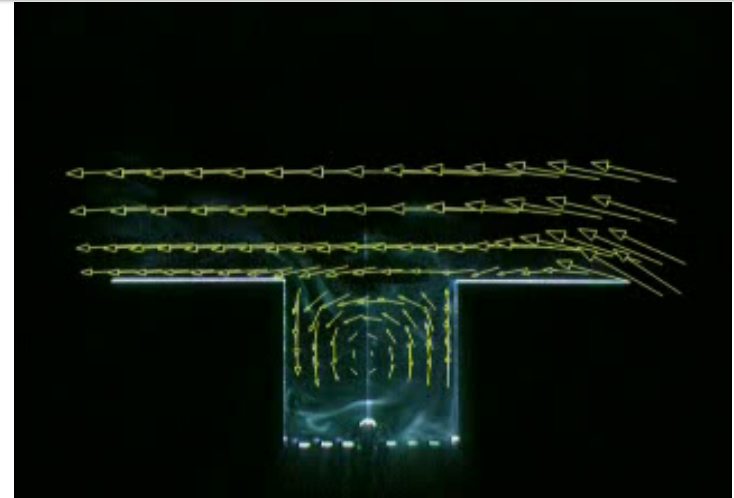
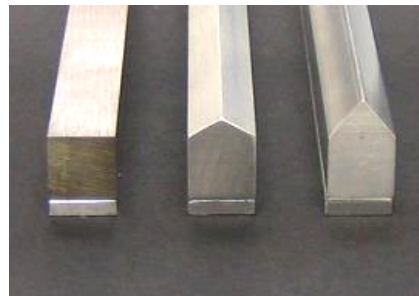
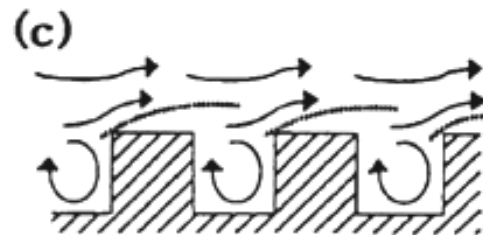
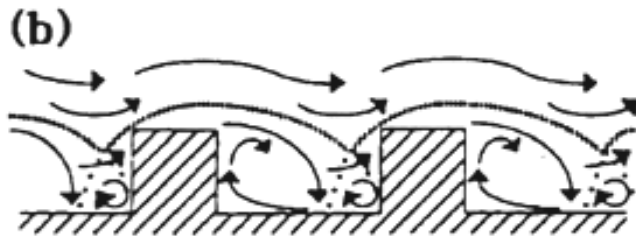
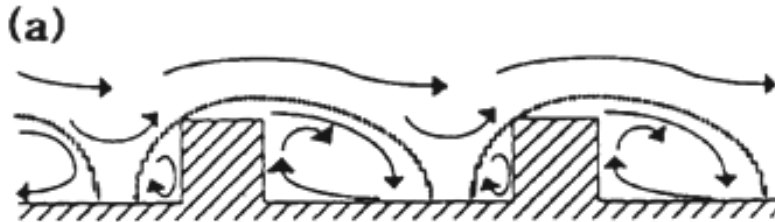
## Rooftop (21 m)



## BT Tower (190 m) - scaled



# Heat transfer at the neighbourhood scale

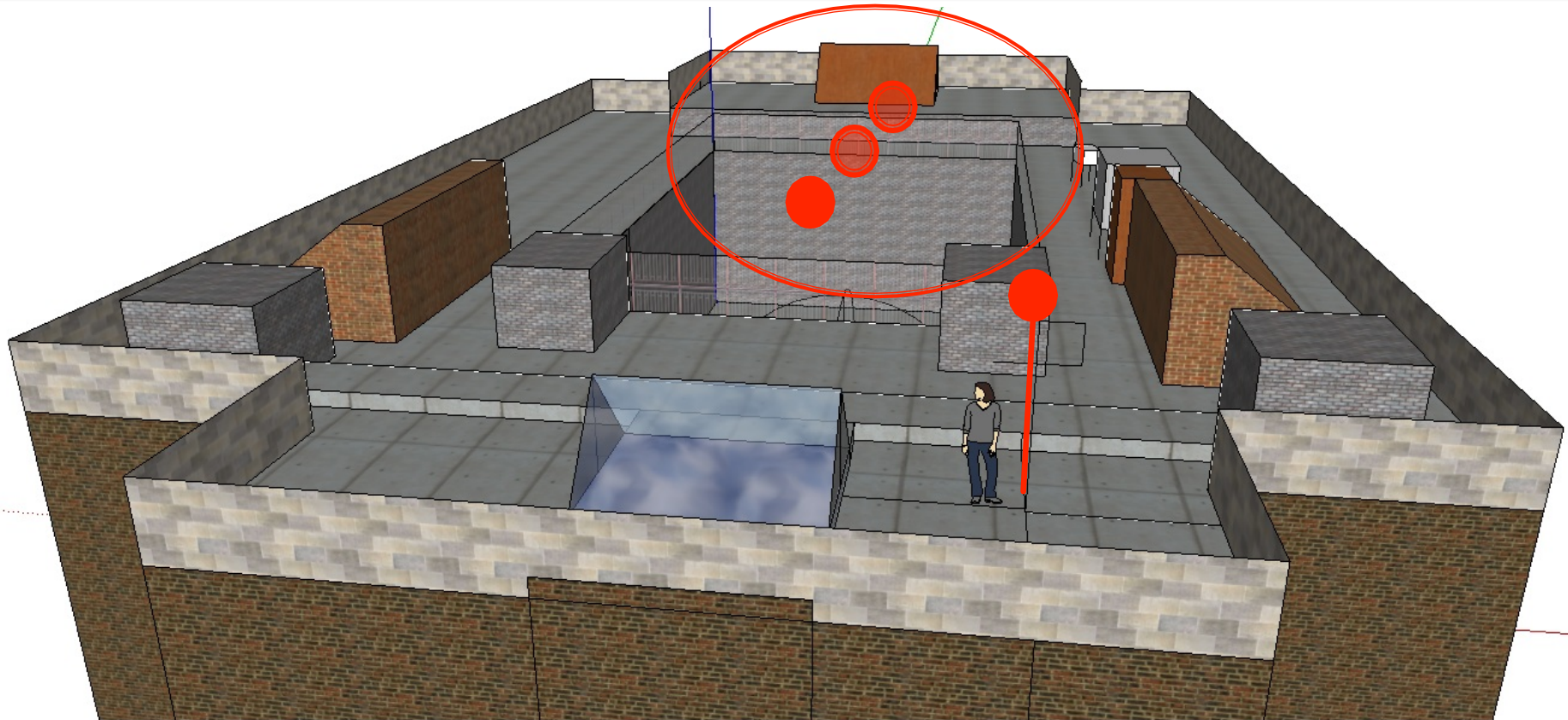


Oke, 1988

Wagner Nogueira Neto, PhD

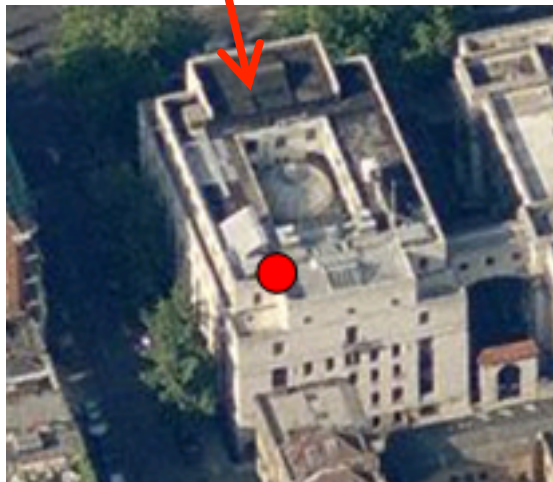
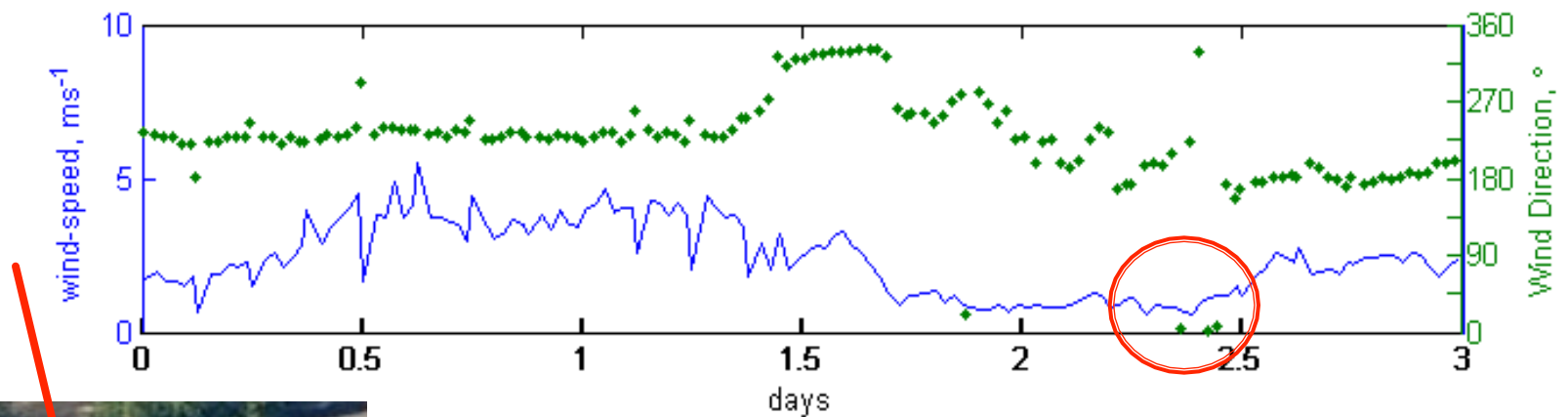
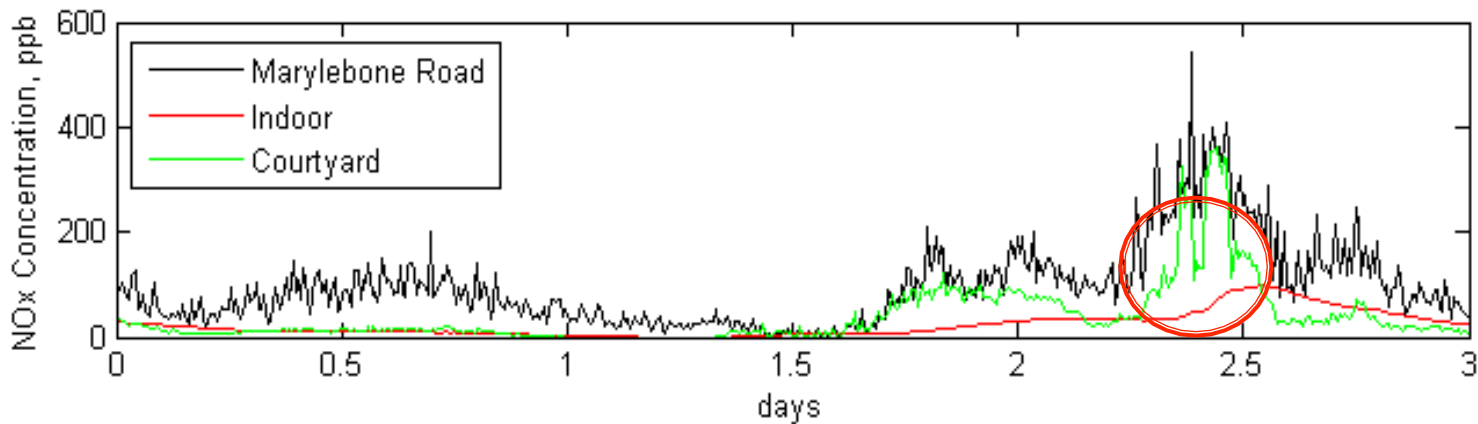


# Urban climate and building infiltration rates



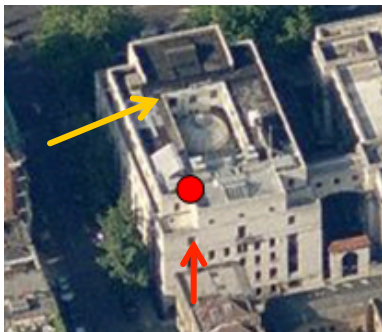
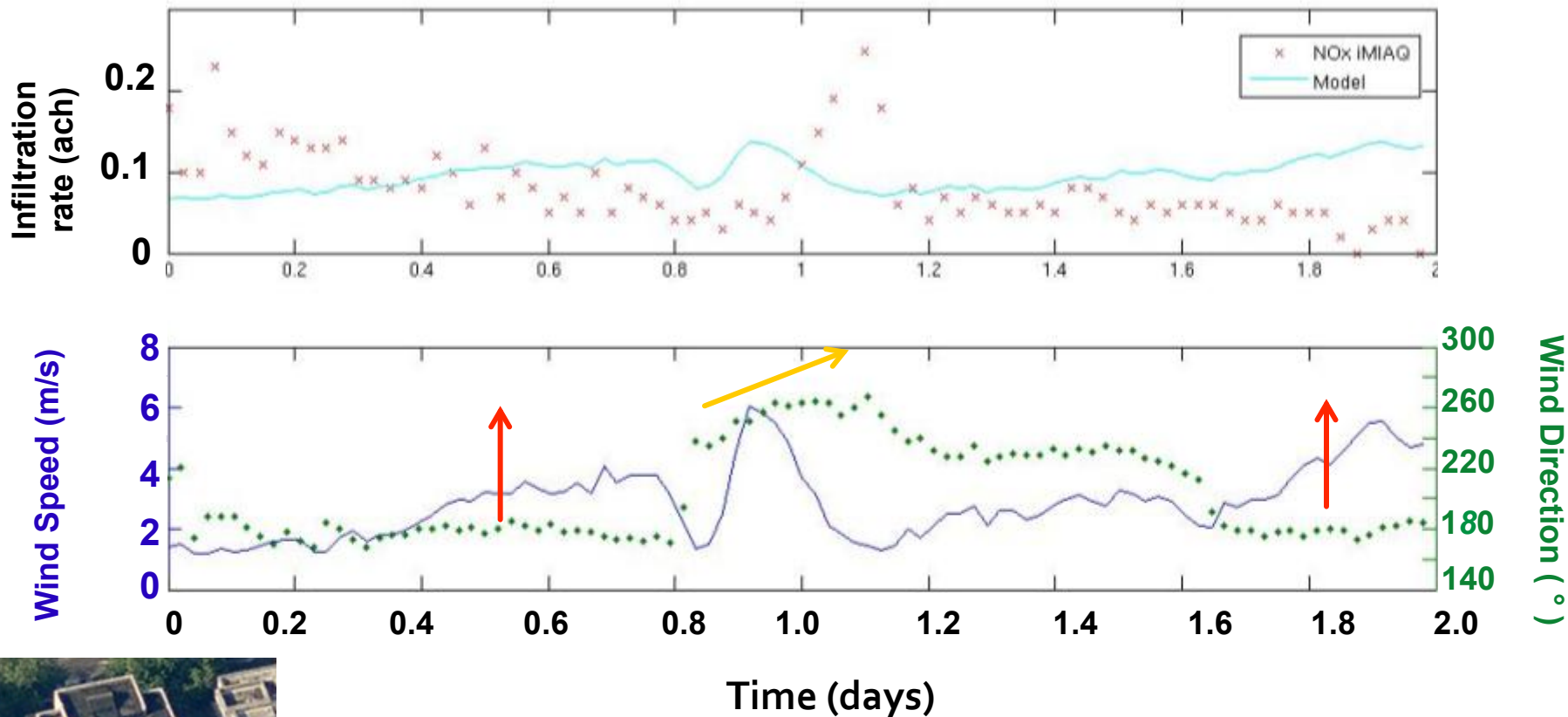
- Room next to busy road ( $\sim 3600 \text{ veh hr}^{-1}$ )
- Use ambient pollution ( $\text{NO}_x$ ) as a tracer to monitor ventilation rate

*Aidan Brocklehurst, PhD*



- Lag of indoor concentrations  $\sim 4$  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 =  $f(U)$

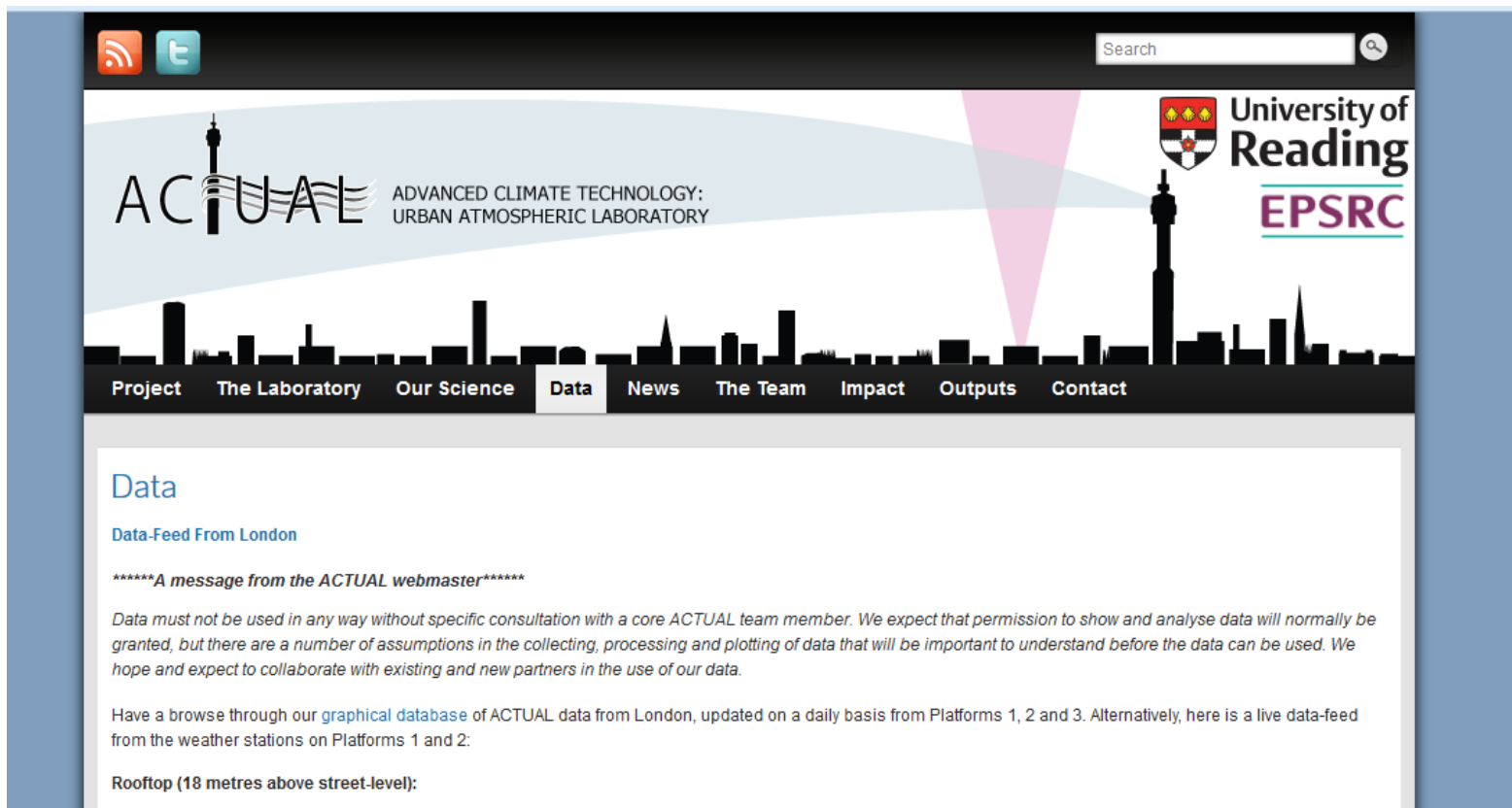
# Conclusions

- 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](http://www.actual.ac.uk)



The screenshot shows the ACTUAL website interface. At the top, there are social media icons for RSS and Twitter, and a search bar. The main header features the ACTUAL logo (Advanced Climate Technology: Urban Atmospheric Laboratory) and the University of Reading EPSRC logo. Below the header is a navigation menu with links: Project, The Laboratory, Our Science, Data (highlighted), News, The Team, Impact, Outputs, and Contact. The main content area is titled "Data" and includes a sub-section "Data-Feed From London". A message from the ACTUAL webmaster states: "Data must not be used in any way without specific consultation with a core ACTUAL team member. We expect that permission to show and analyse data will normally be granted, but there are a number of assumptions in the collecting, processing and plotting of data that will be important to understand before the data can be used. We hope and expect to collaborate with existing and new partners in the use of our data." Below this, it says: "Have a browse through our [graphical database](#) of ACTUAL data from London, updated on a daily basis from Platforms 1, 2 and 3. Alternatively, here is a live data-feed from the weather stations on Platforms 1 and 2:" and "Rooftop (18 metres above street-level):".

Project The Laboratory Our Science **Data** News The Team Impact Outputs Contact

## Data

### Data-Feed From London

\*\*\*\*\*A message from the ACTUAL webmaster\*\*\*\*\*

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Rooftop (18 metres above street-level):

# Acknowledgements



Please come and see our poster!

Thanks for your attention.  
Any questions?

