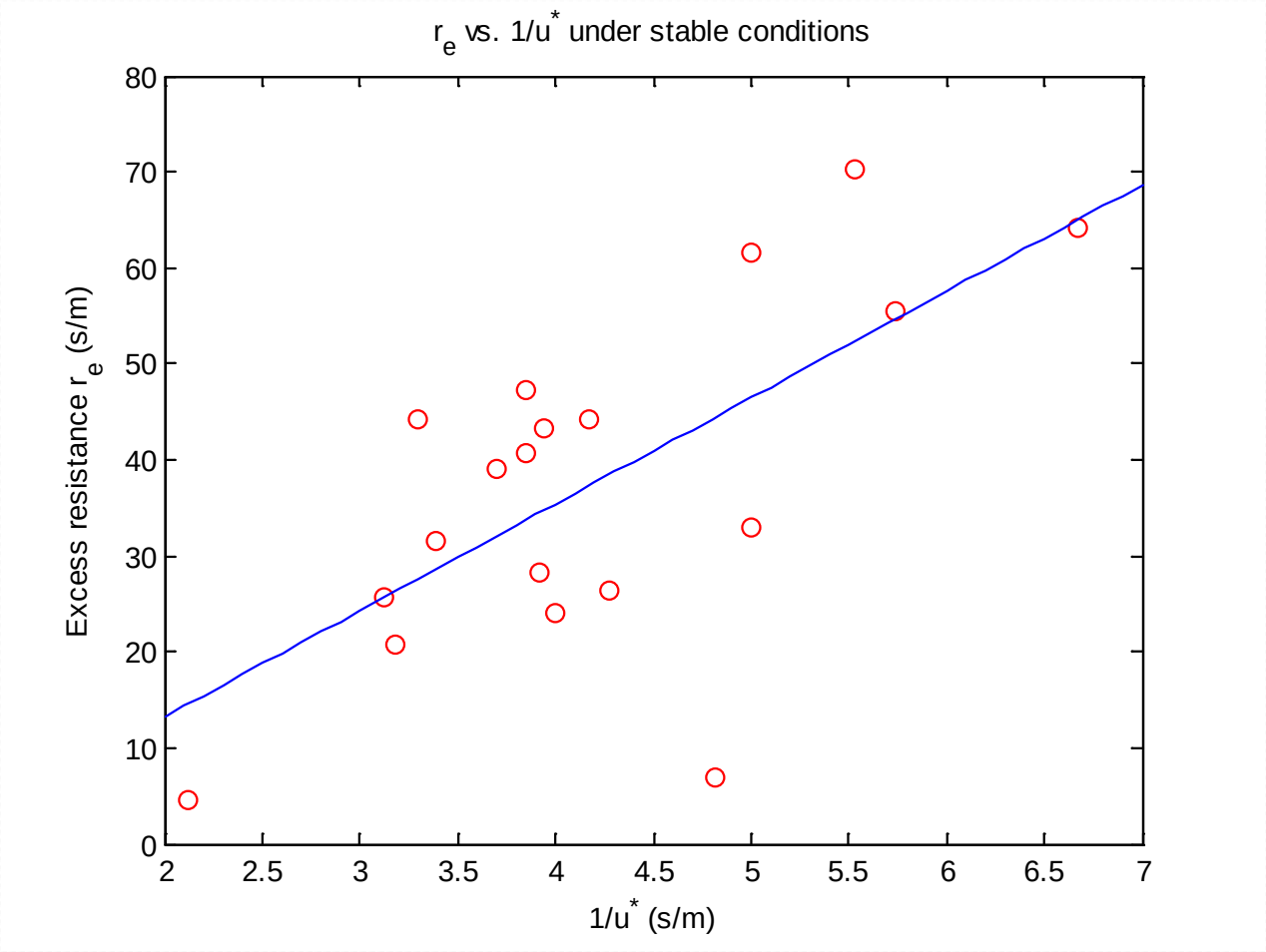
# Updates of Current Project

## -- Determine H from Radiative Surface Temperature

Lei Zhao

May 2011

# Updates of Resistance Parameterization



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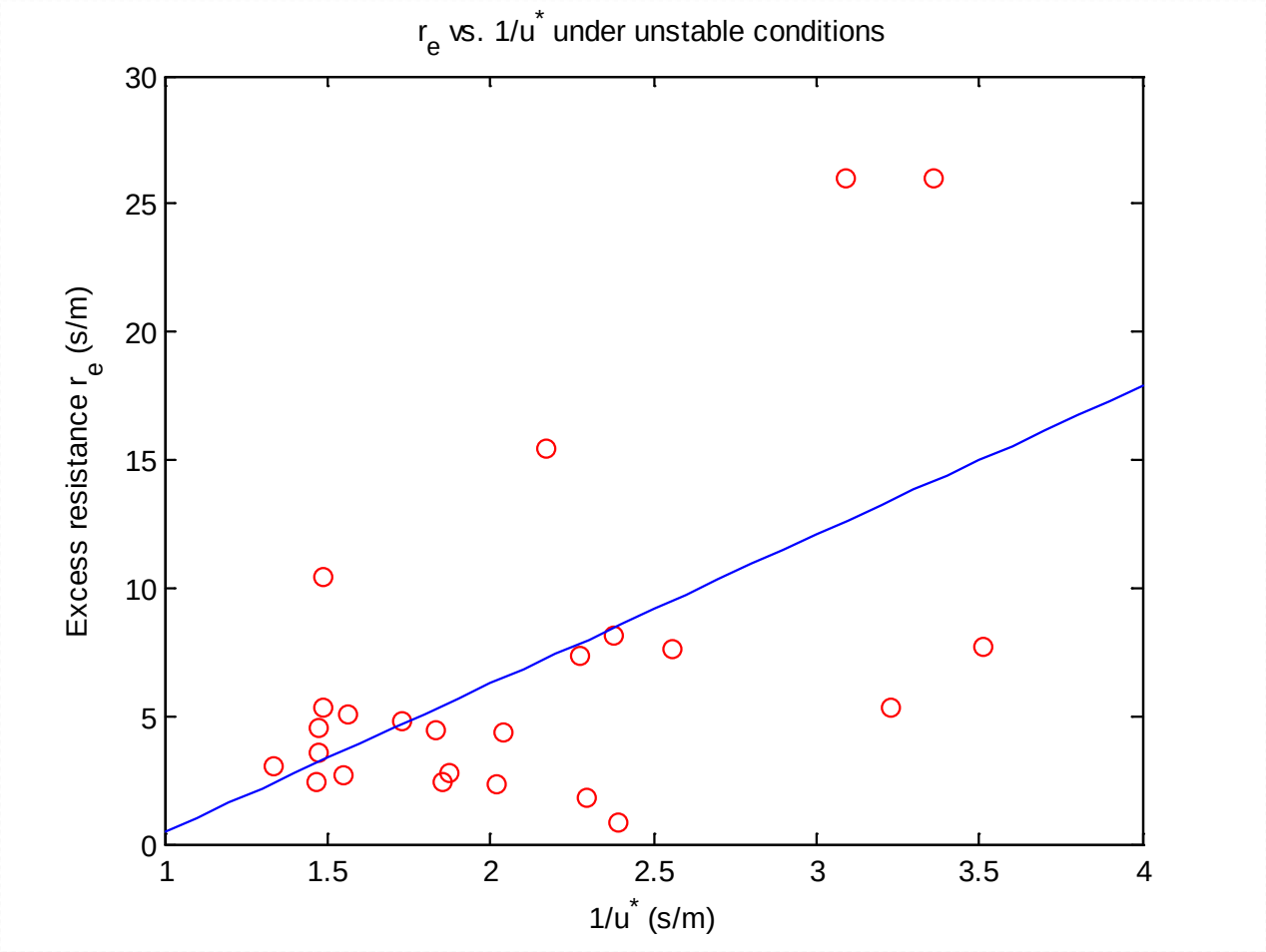

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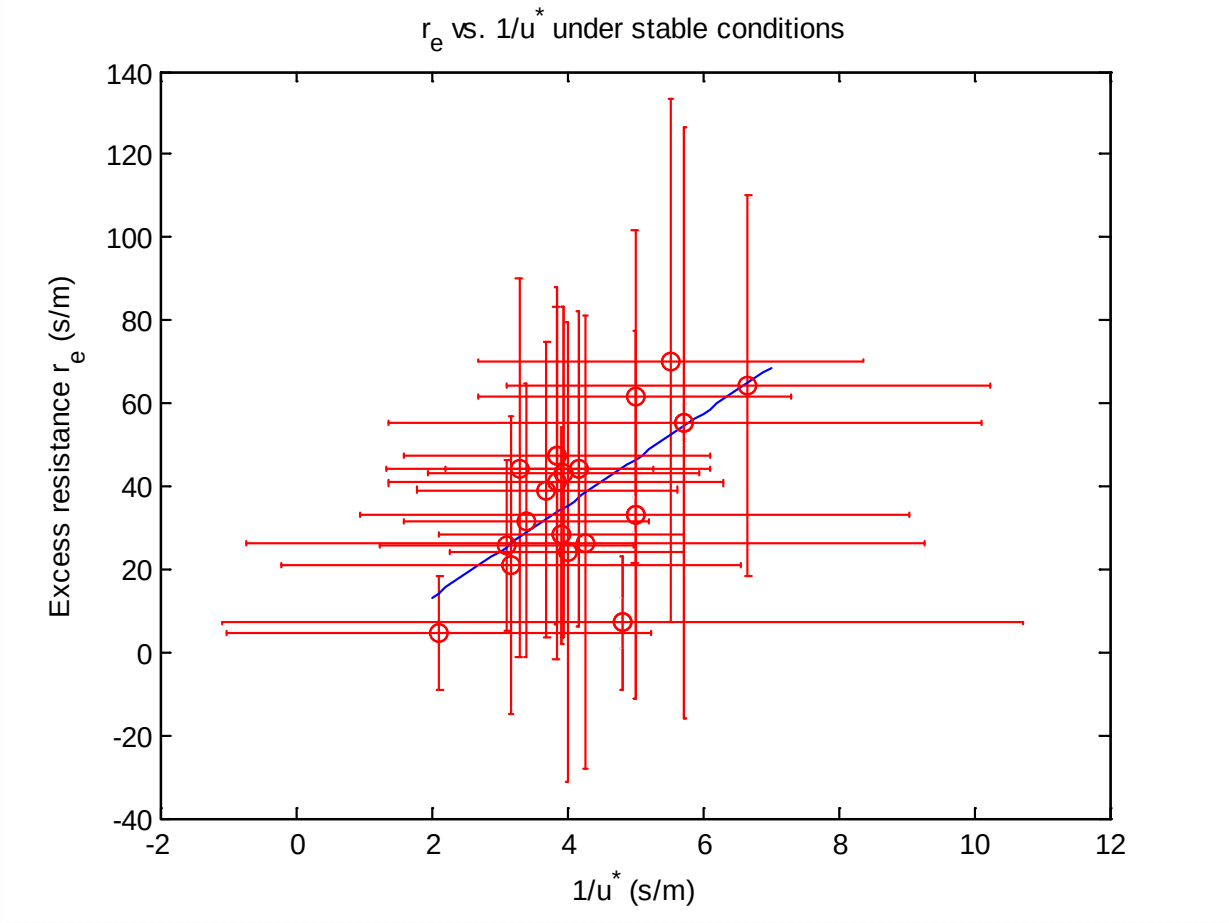

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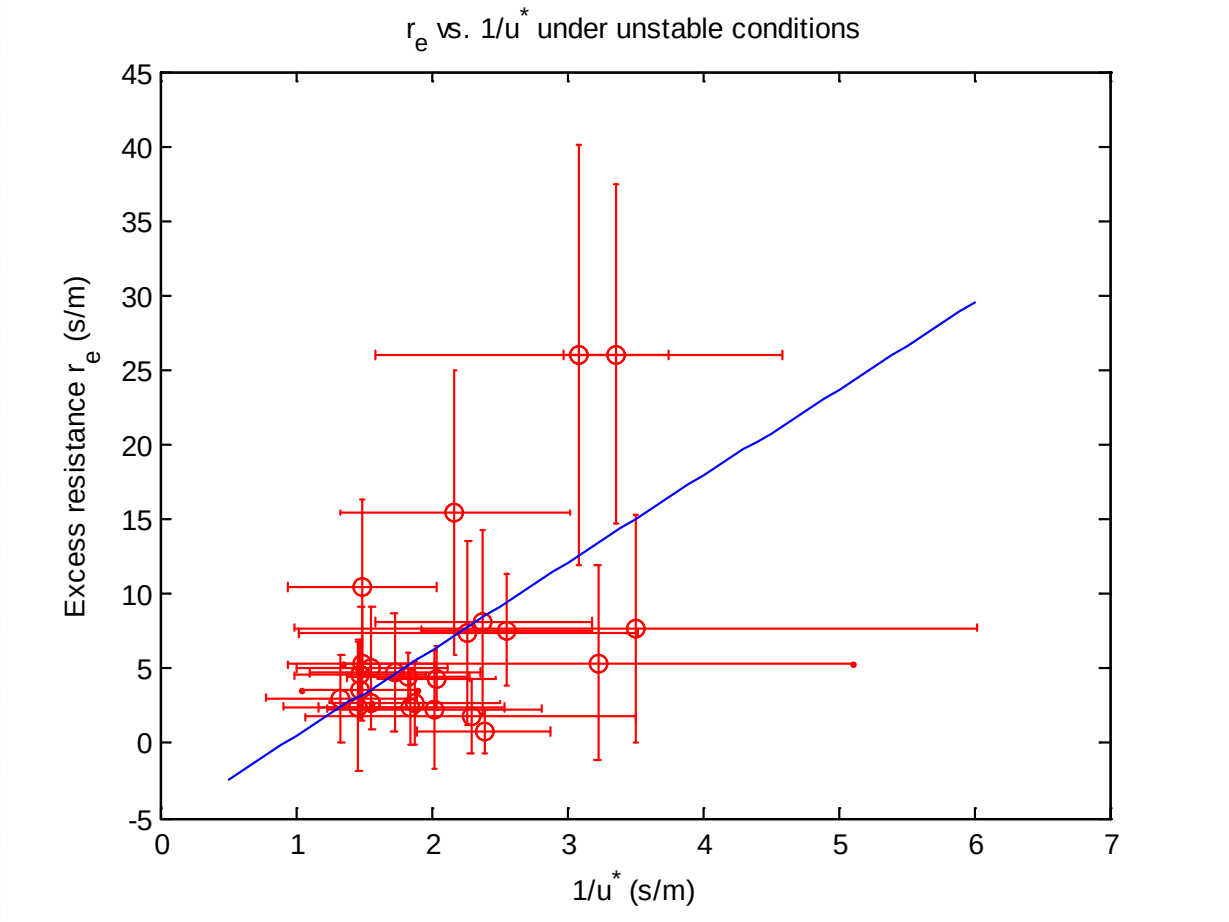

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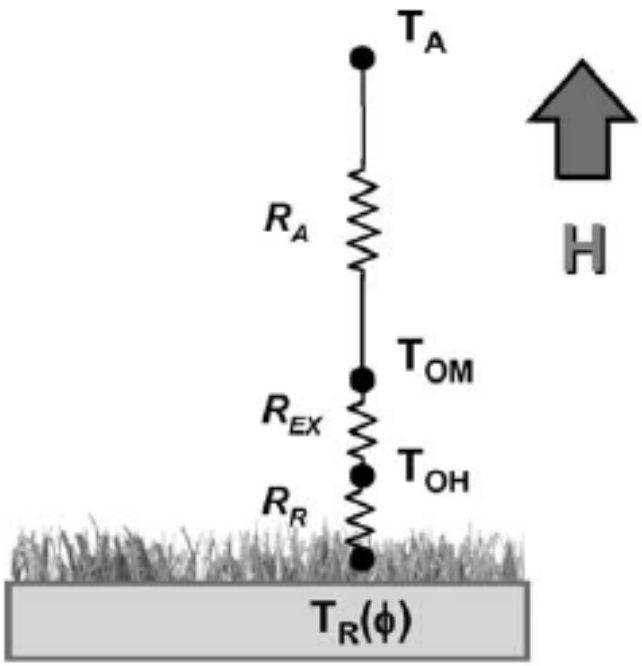


(a) One-source model

$$H = \rho C_P \frac{T_{OM} - T_A}{R_A} = \rho C_P \frac{T_{OH} - T_A}{R_{AH}},$$

$$R_A = \frac{[\ln((z_U - d_O)/z_{OM}) - \Psi_M][\ln((z_T - d_O)/z_{OM}) - \Psi_H]}{k^2 u},$$

$$R_{AH} = \frac{[\ln((z_U - d_O)/z_{OM}) - \Psi_M][\ln((z_T - d_O)/z_{OH}) - \Psi_H]}{k^2 u}.$$

, $R_{EX} = [\ln(z_{OM}/z_{OH})]/[ku_*]$,

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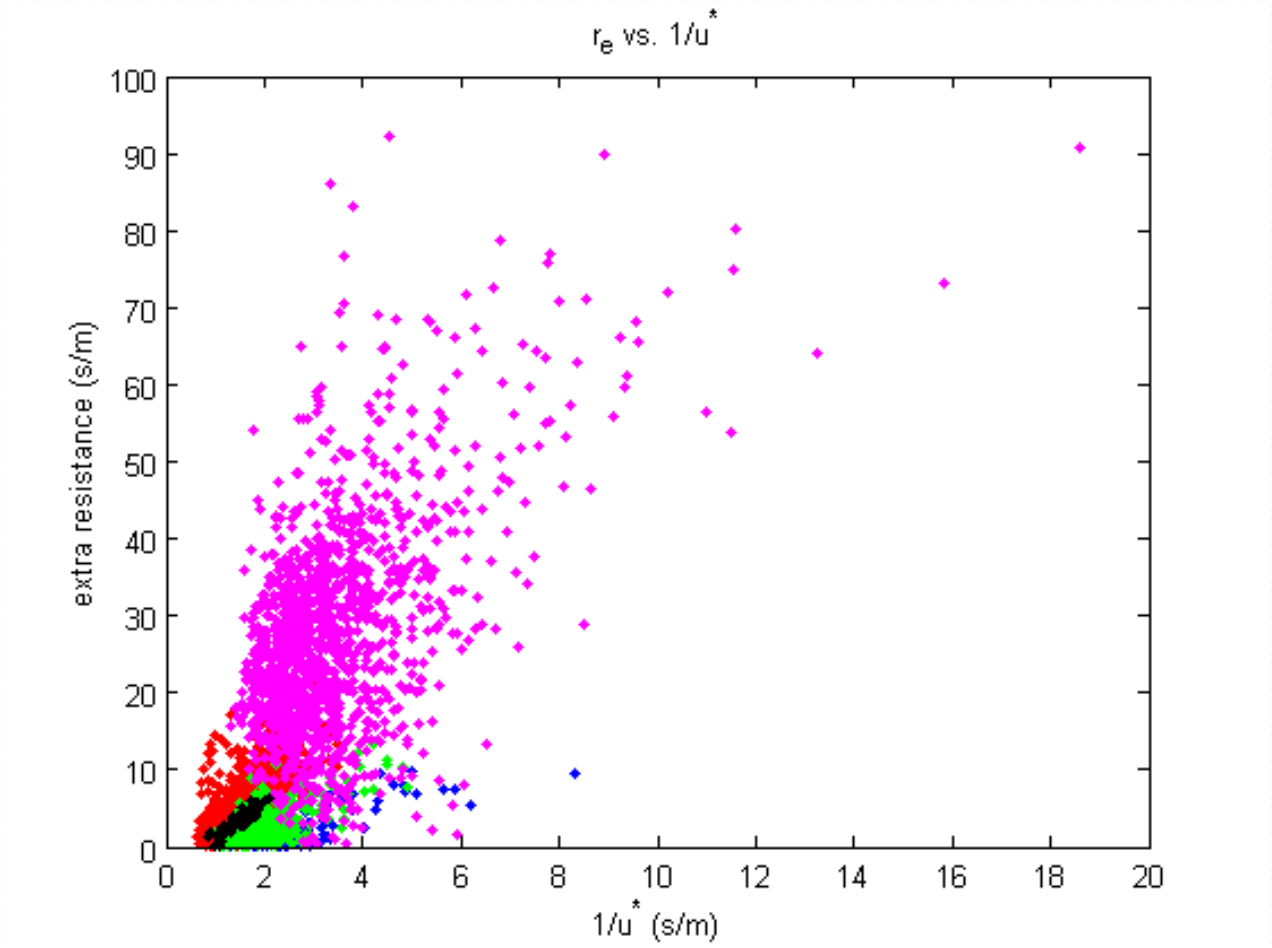


# A Brief Introduction of Modeling of the UHI

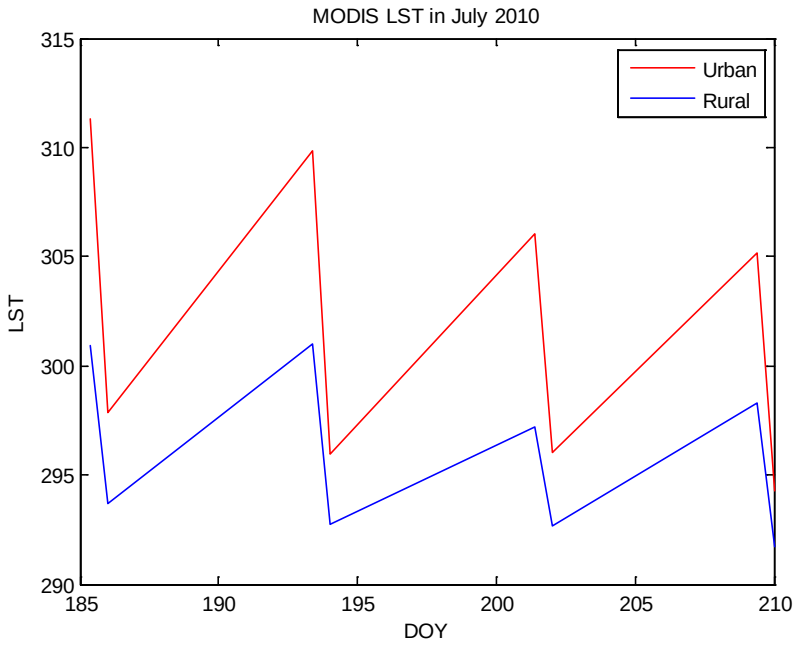
Lei Zhao

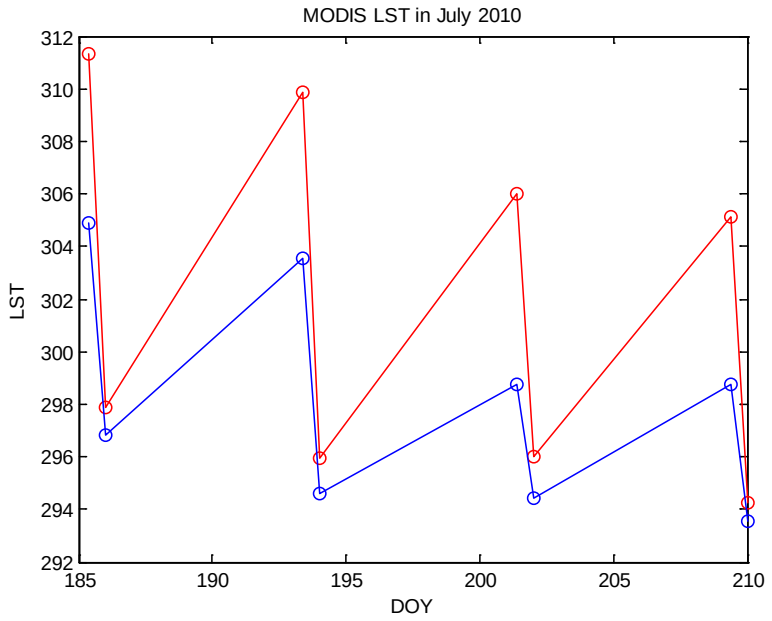
May 2011

# Introduction

- Goal: to partition and quantify each contributor to the total UHI
- Scale : the whole city scale
- Strategy:
  - 1 step – Define UHI Intensity: $\Delta T$ or $\Delta OLR$
  - 2 step – Analytical way
    – Modeling way: replace with our own urban land surface parameterization

# UHI Display from MODIS LST



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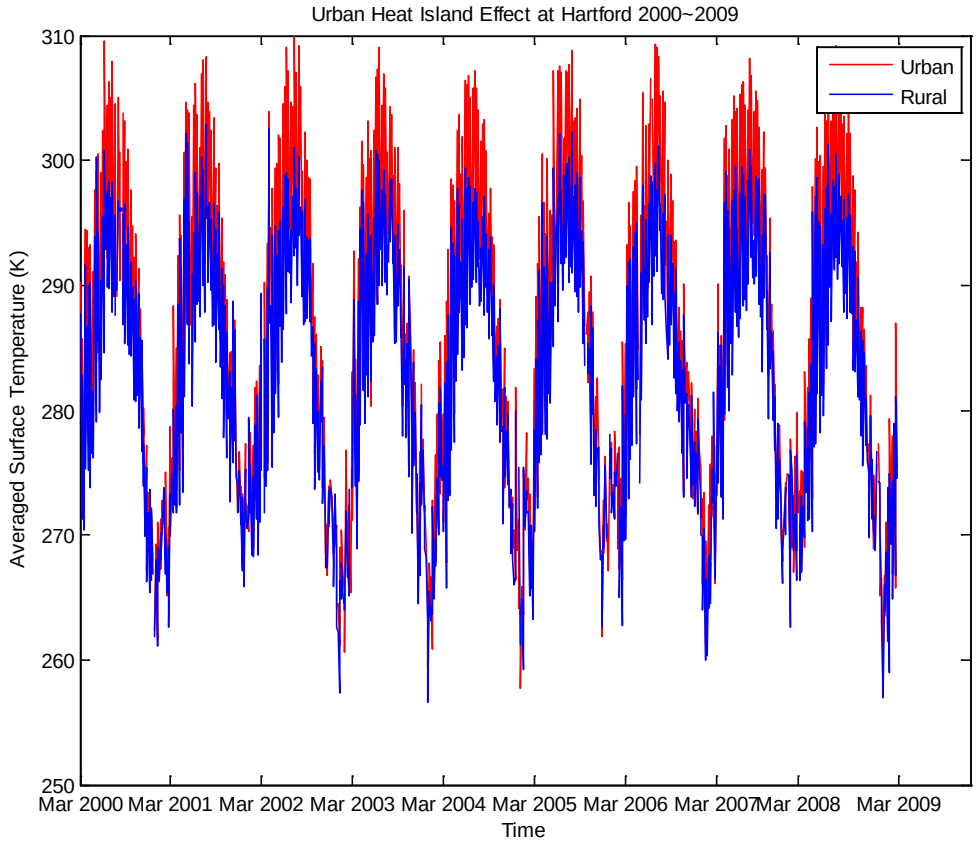

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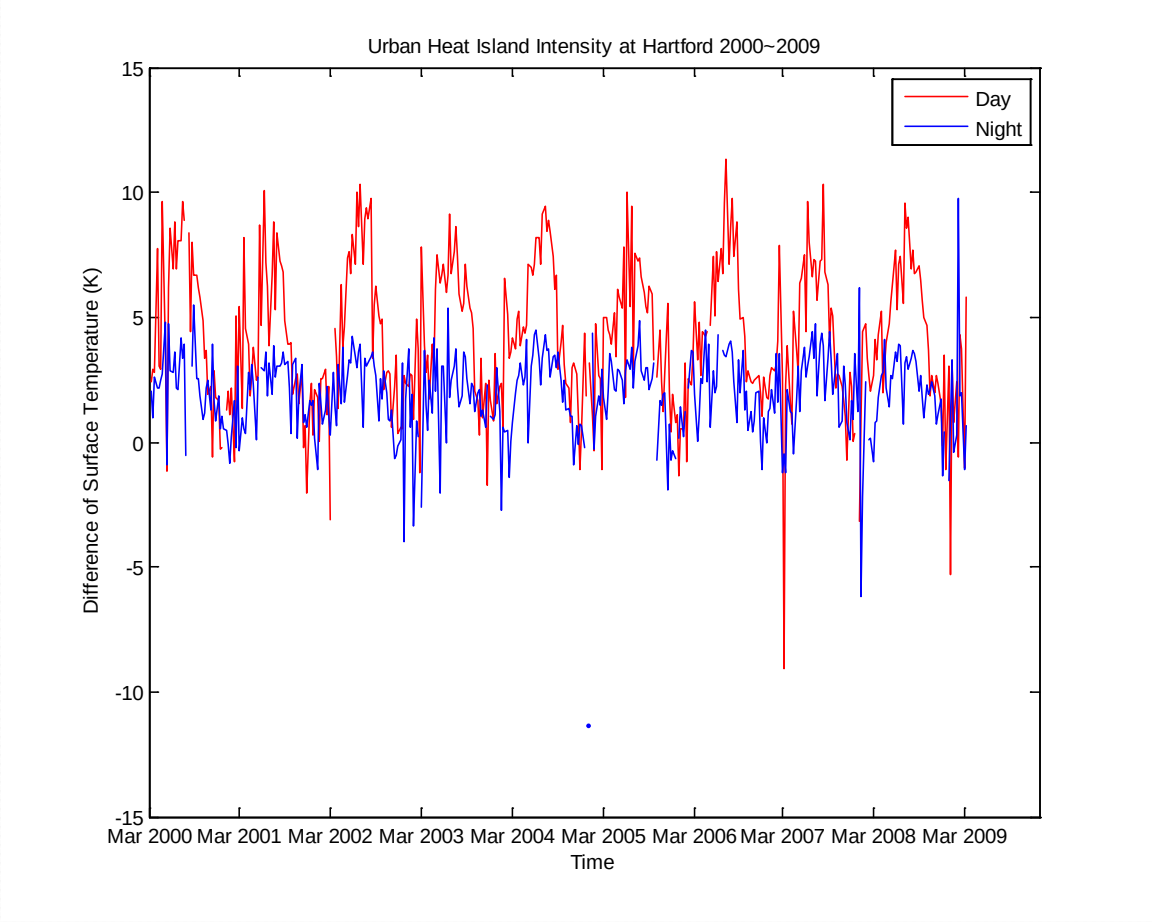

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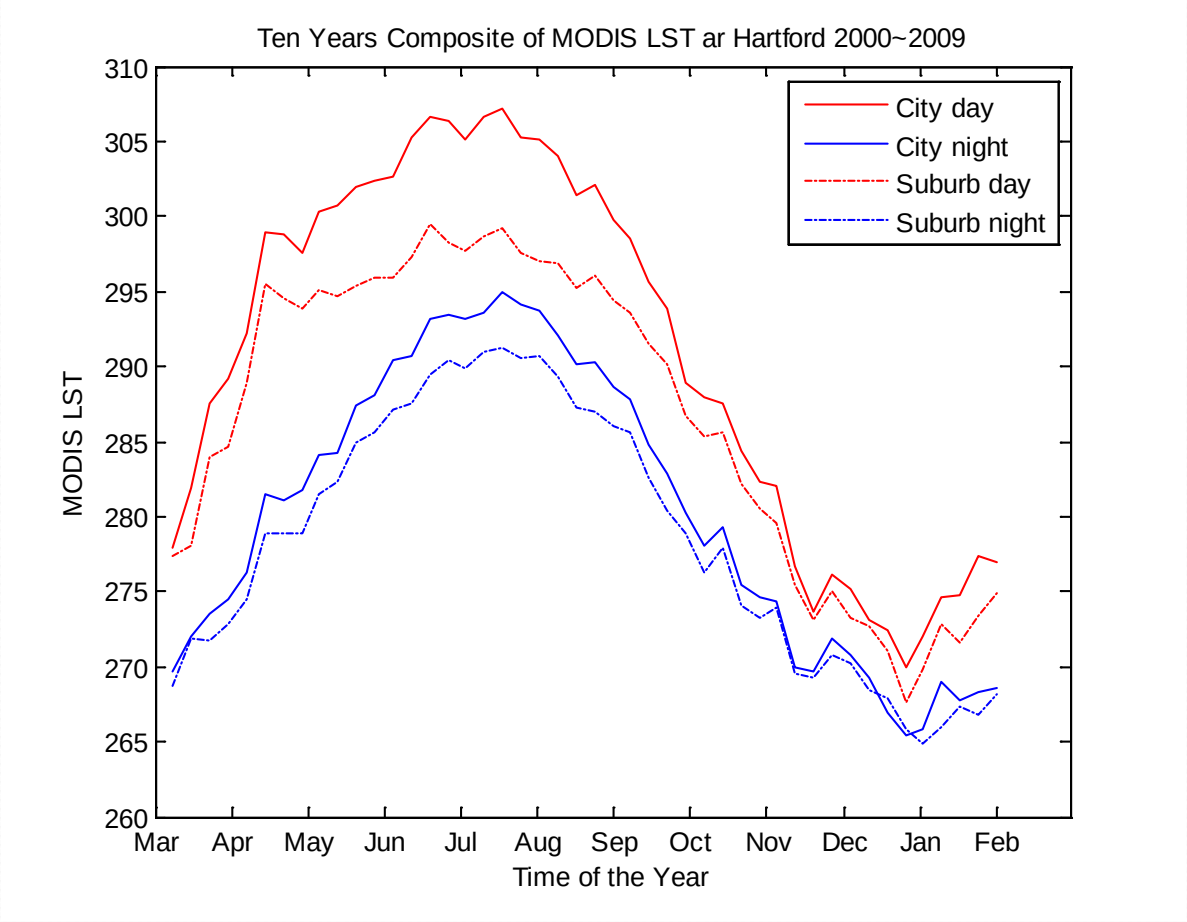

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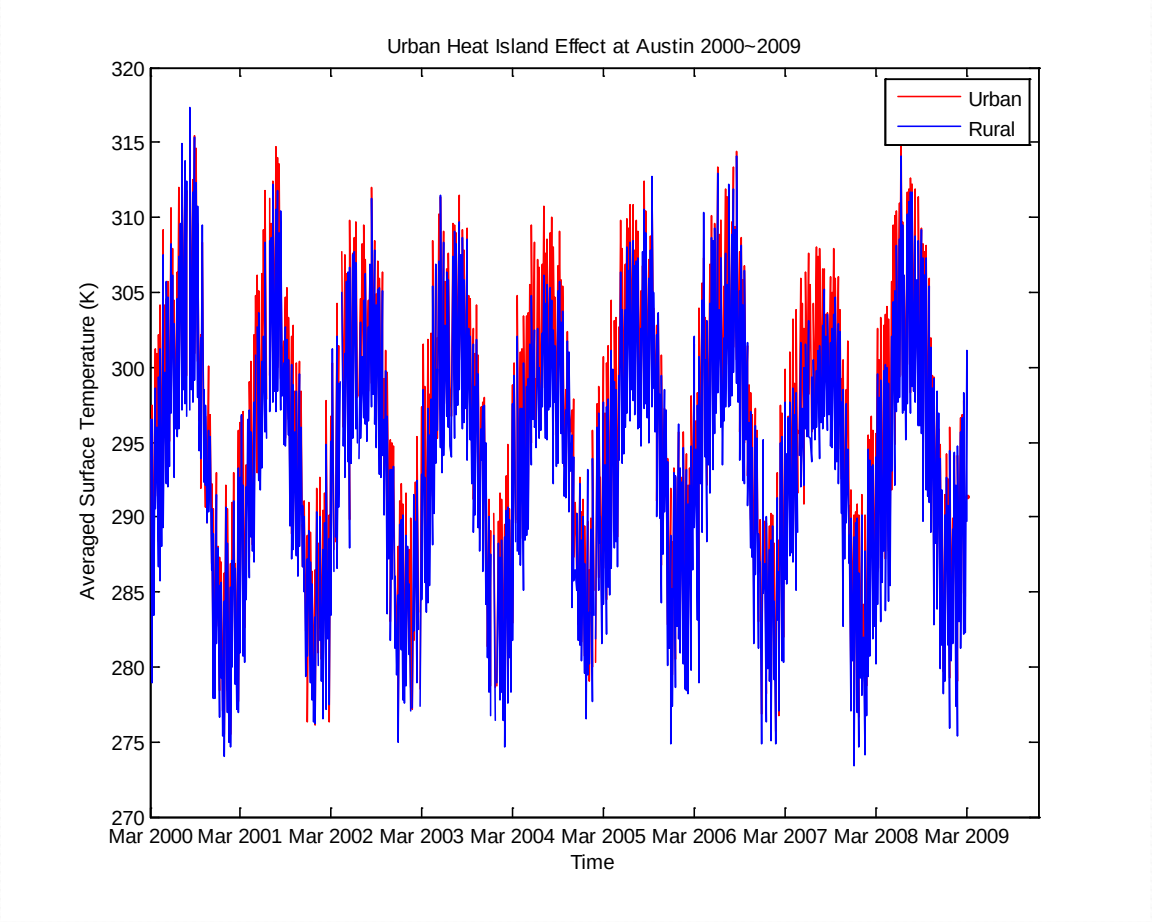

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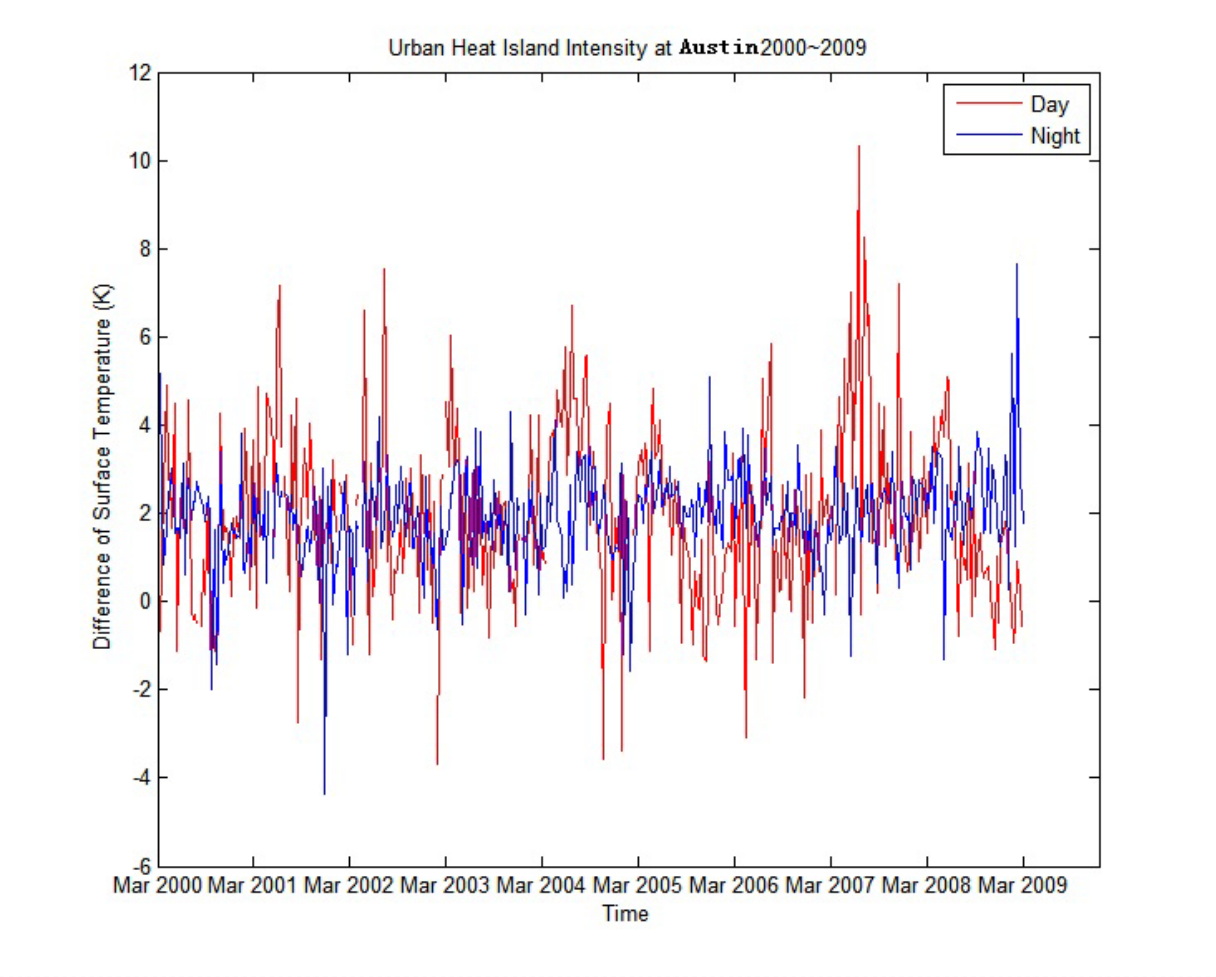

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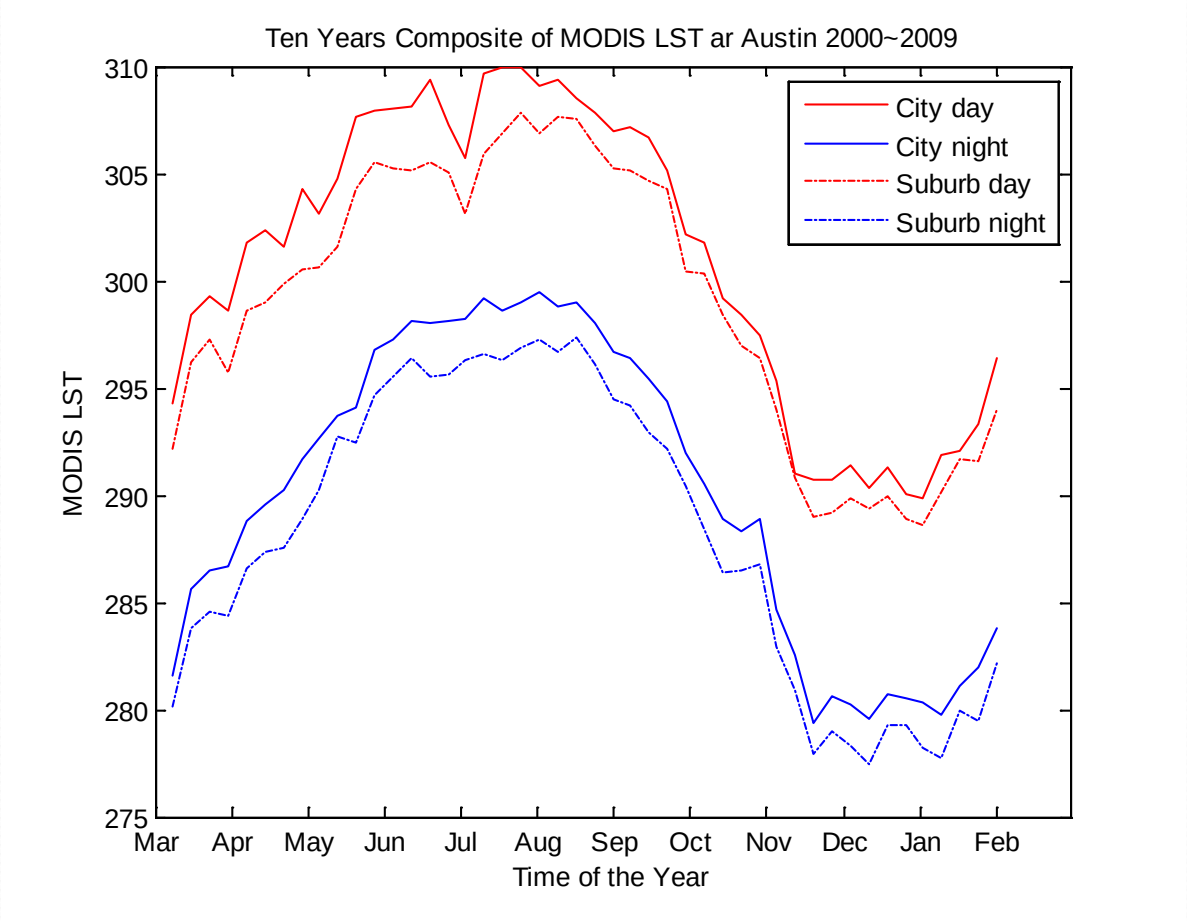
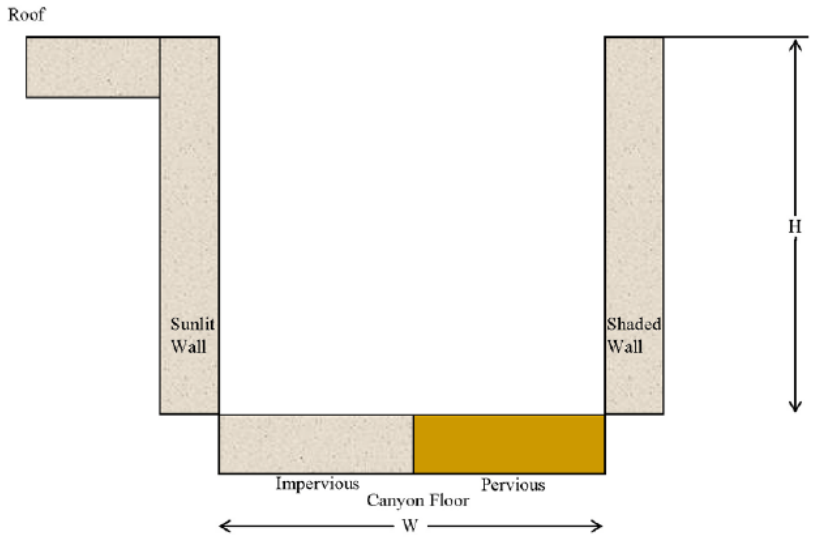


# Candidate Causes for UHI

- Decreased … ncreased absorptio… …ve radiation (canyon e…
- Anthropo…
- Reductior…
- Increased … urban materials
- Reduced t…

Figure 1.3. The urban canyon.



# Relative Contribution

- Embody the factors with parameters:
  - effective albedo
  - effective emissivity
  - roughness length for momentum and heat
  - Bowen ratio
  - heat storage term
  - anthropogenic heat source (function of GDP… )

# Relative Contribution

- Analytical way: derive the sensitivity

- Modeling way:
  - Single-layer urban canopy model
  - NARR data at some blending height to drive the model
  - Difference of the parameters between urban and rural area

# Thank you ☺