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centre for water sensitive cities

DEPARTMENT OF **EARTH AND ENVIRONMENTAL SCIENCES**
K.U.LEUVEN - BELGIUM

Offline evaluation of the Community Land Model - Urban for Toulouse (France) and Melbourne (Australia)

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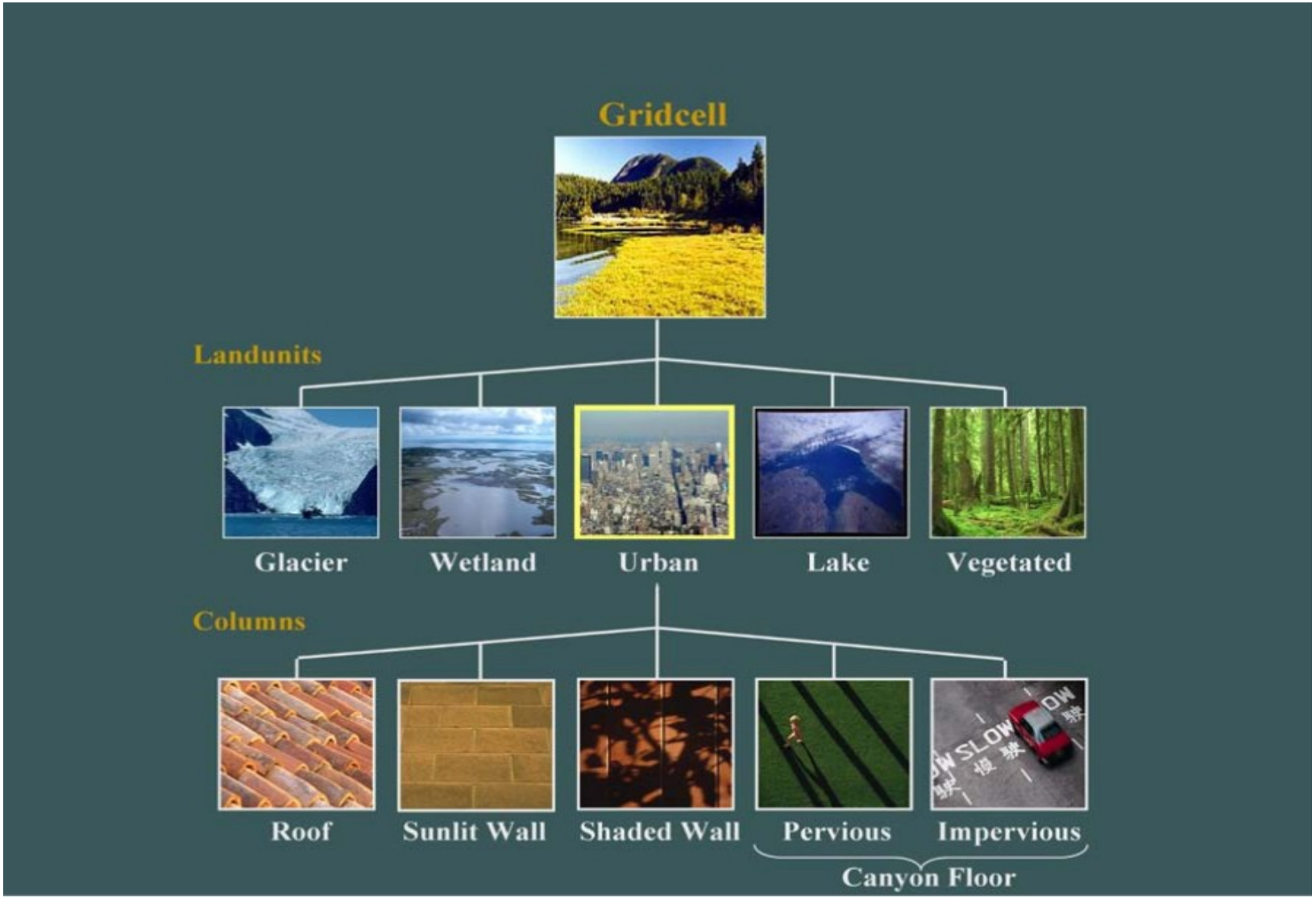
Community Land Model - Urban



(Oleson et al., 2010)

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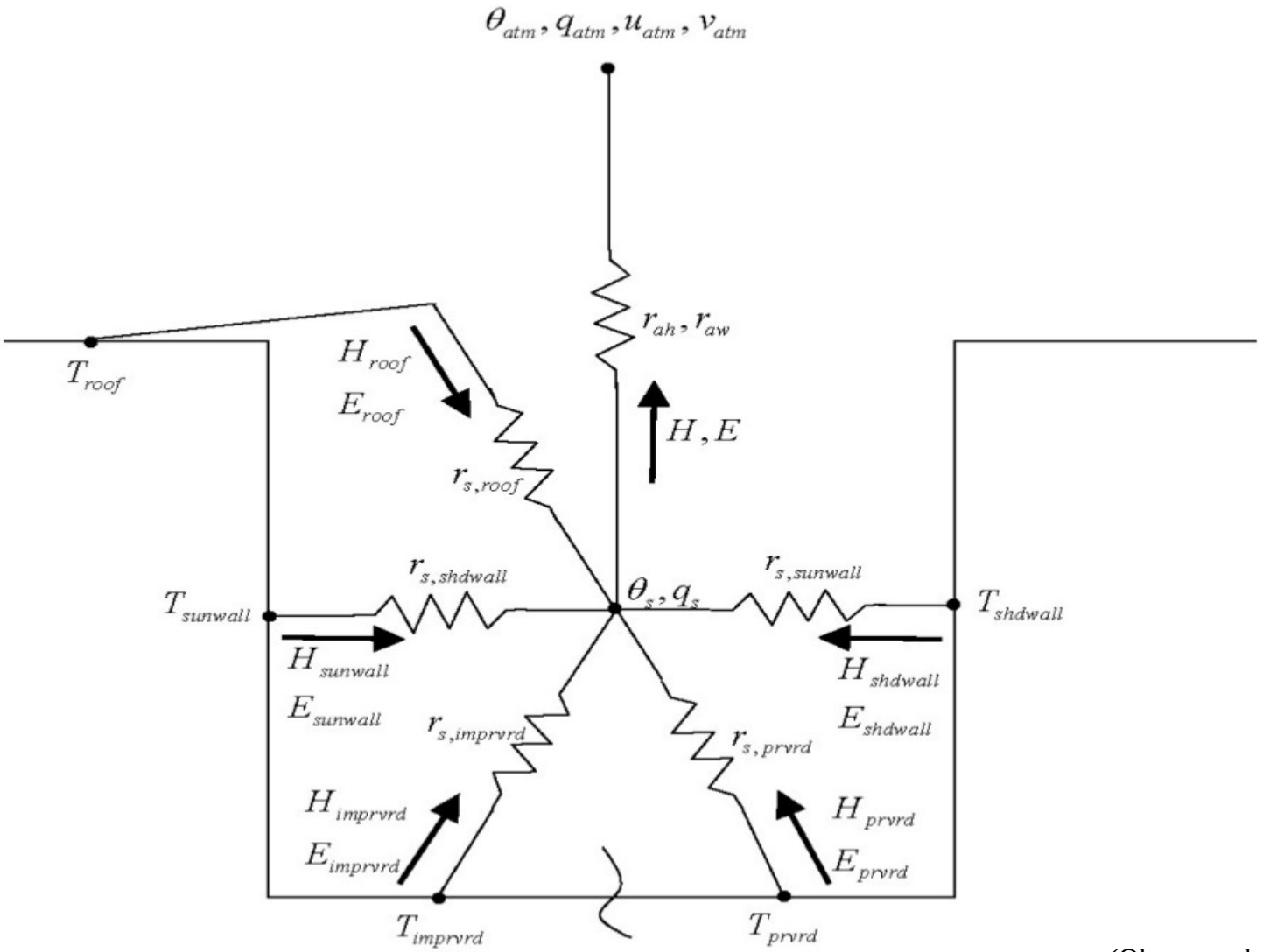

(Oleson et al., 2010)

OFFLINE simulations

- Model is used with OBSERVED atmospheric forcing (incoming short- and longwave radiation, pressure, temperature, wind speed and humidity from Toulouse and Melbourne

Toulouse, France

Preston (Melbourne), Australia

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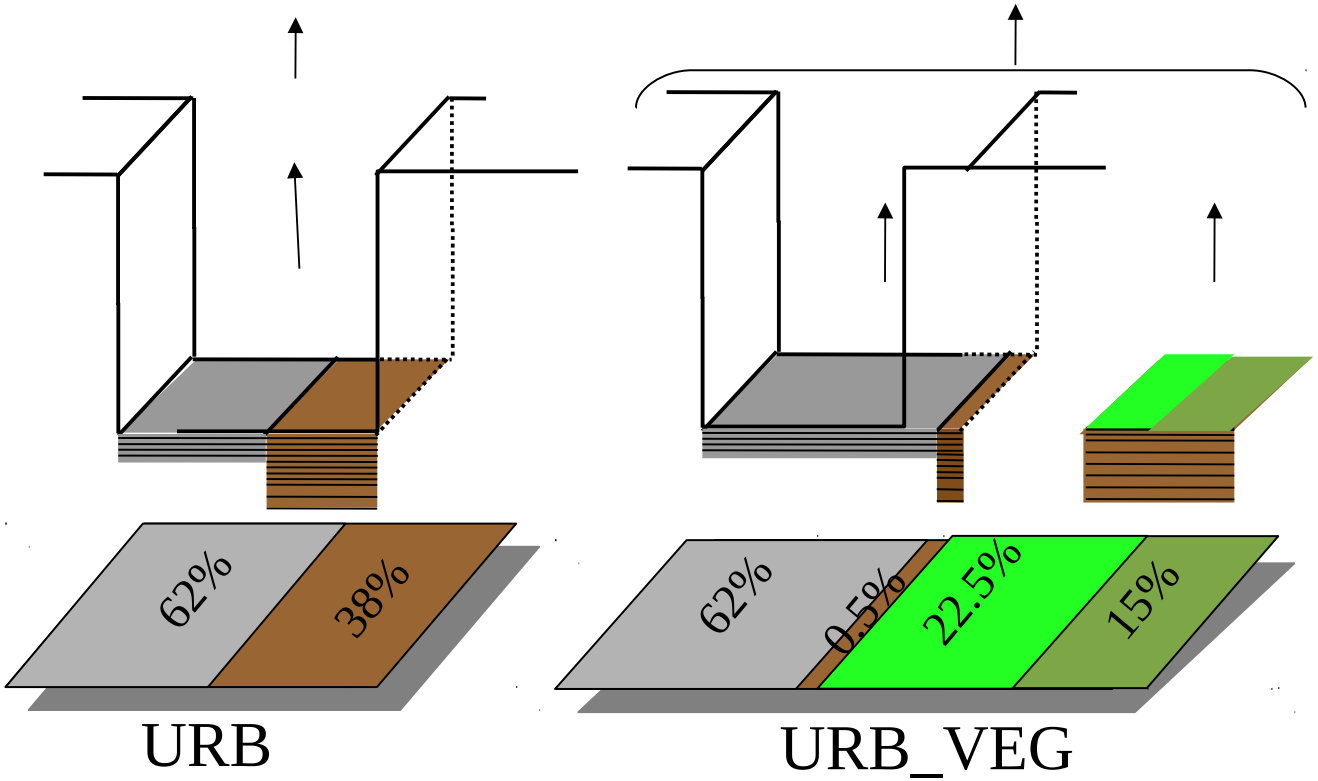

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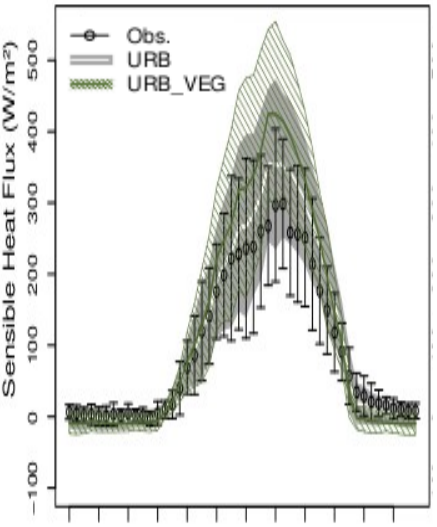
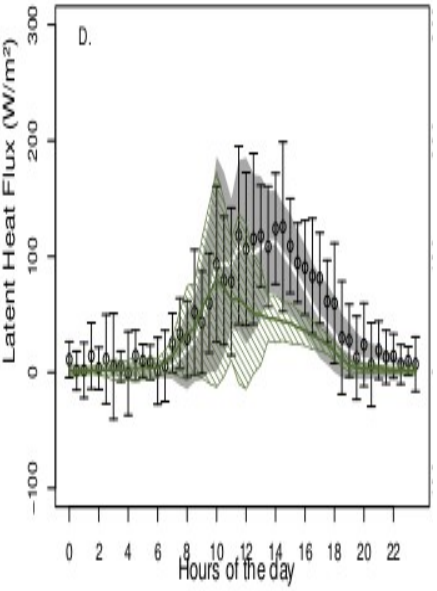
- Anthropogenic heat is taken into account
- CLM-U is run for 2 configurations: URB & URB_VEG
- Evaluation is done per season for which a season refers to one month.

For example, spring season in Melbourne refers to 15/10-15/11/2004.

Results for Melbourne, eg. Preston





$K_{\uparrow}$ well represented

MBE: 0 – 5 Wm^{-2}
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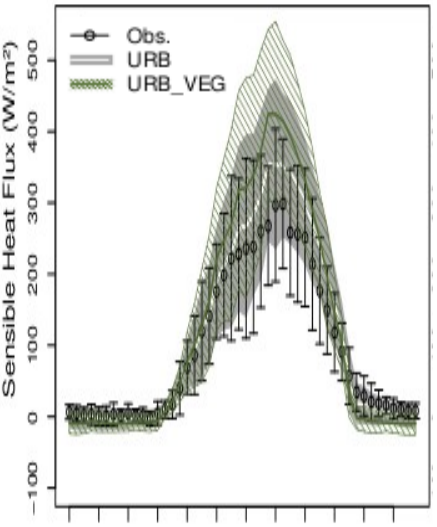

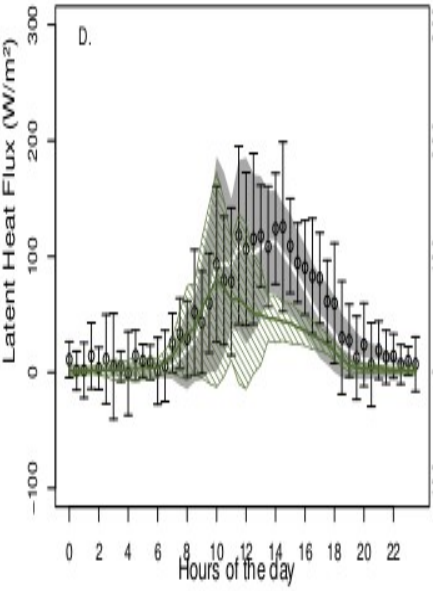

$K\uparrow$	well represented	MBE: 0 – 5 Wm^{-2} RMSE: 1.7 – 5.5 Wm^{-2}
$L\uparrow$	overestimated	MBE: 9.7 – 20.7 Wm^{-2} RMSE: 13 – 35 Wm^{-2}

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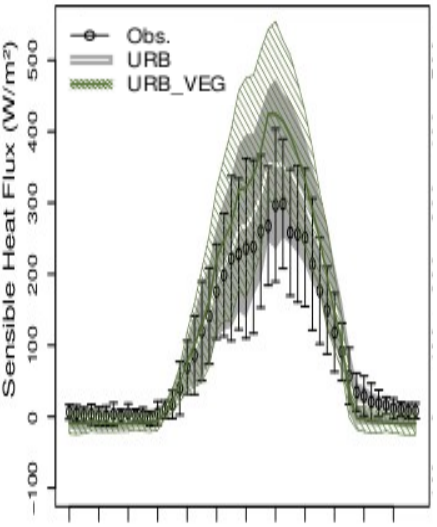

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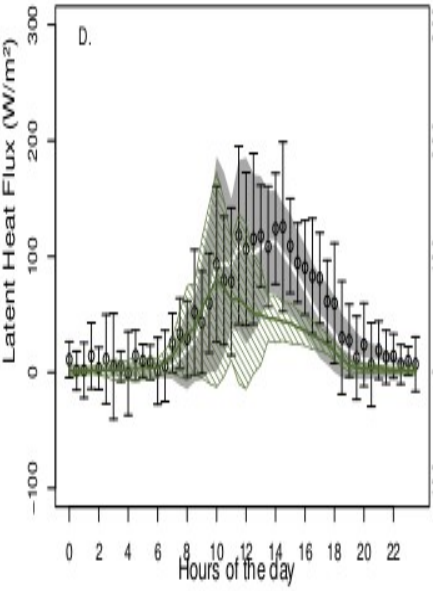

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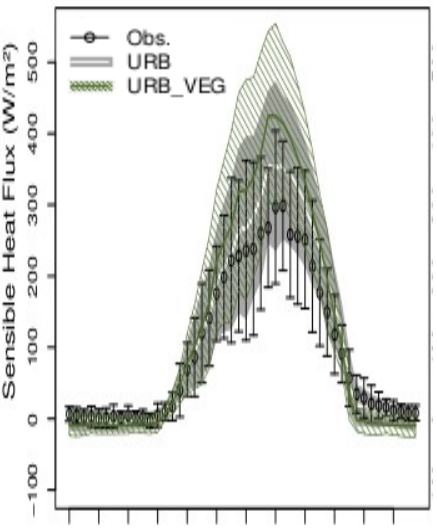

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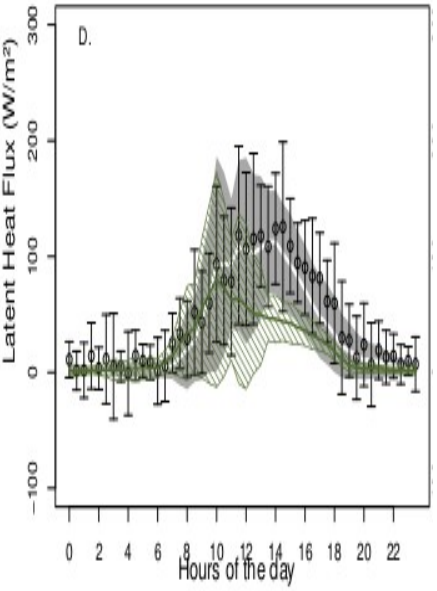

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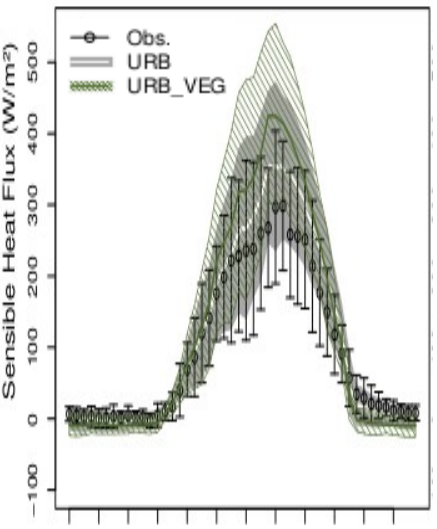
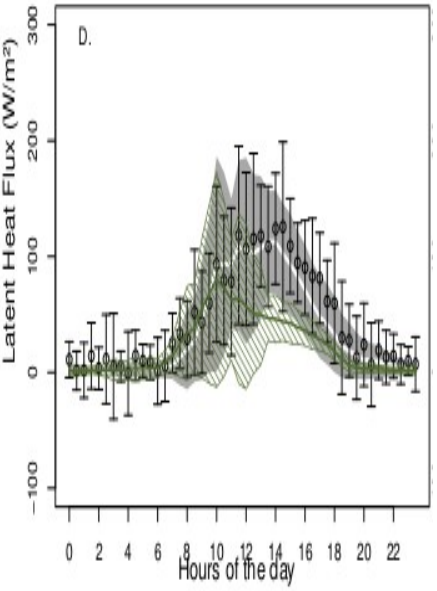
Similar results are obtained for Armadale and Surrey Hills

Results for Melbourne, eg. Preston





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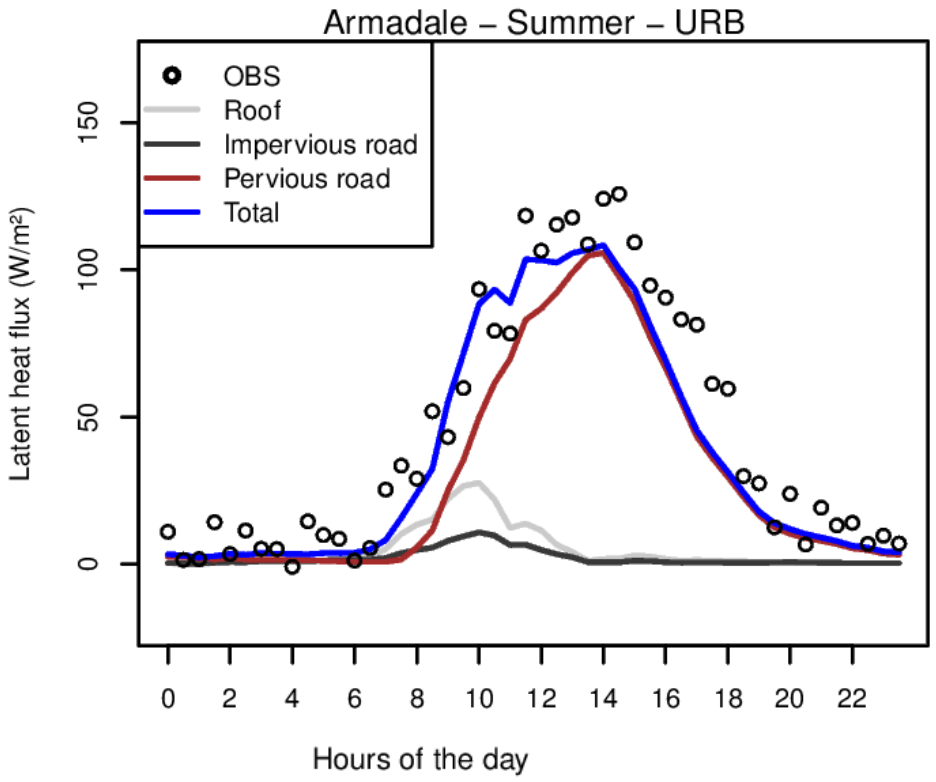
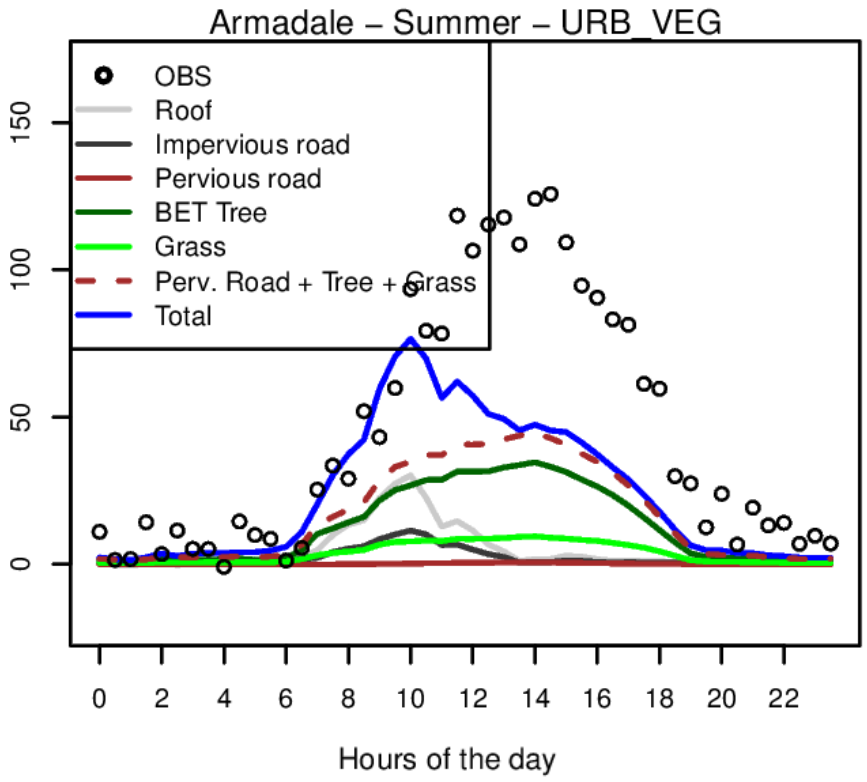
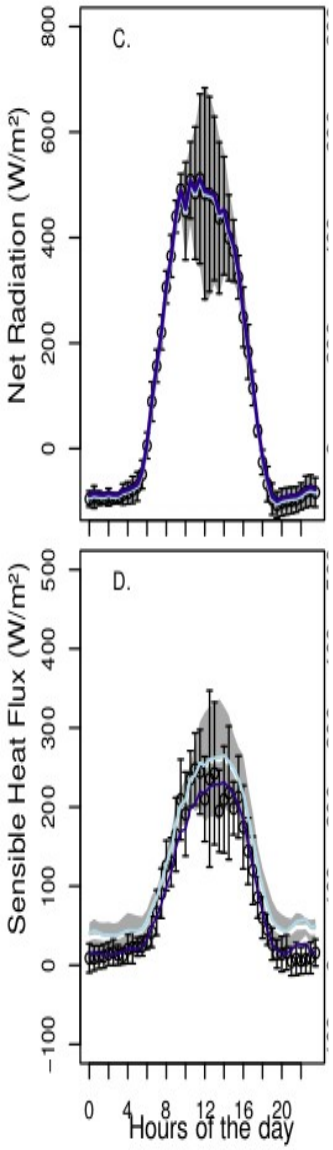
Latent heat flux - Preston

- How do fractions contribute to Qe for URB and URB_VEG?





Results for Toulouse



$K_{\uparrow}$ underestimated

MBE: -9.9 – -2.6 Wm^{-2}
RMSE: 6.3 – 10.5 Wm^{-2}

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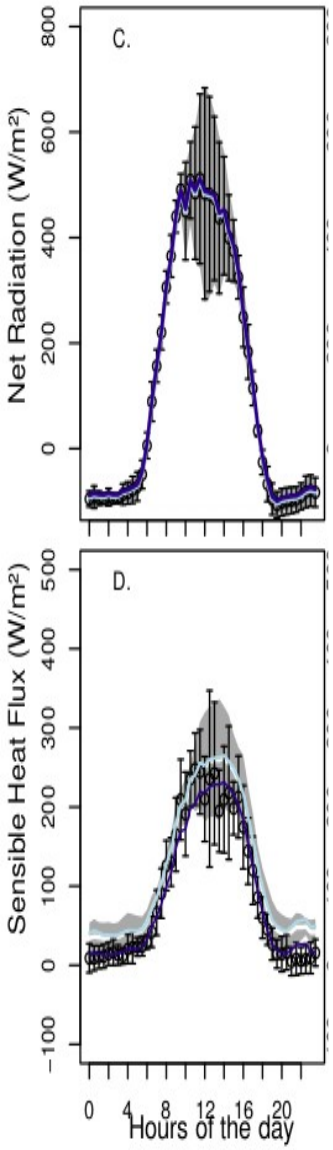

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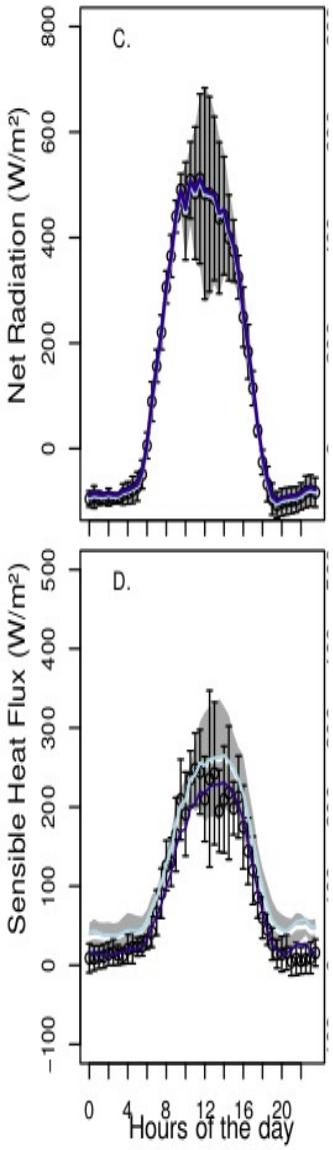

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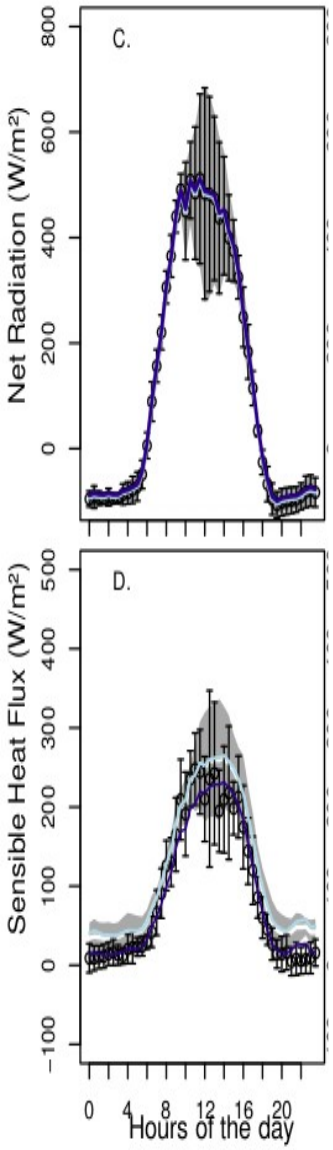

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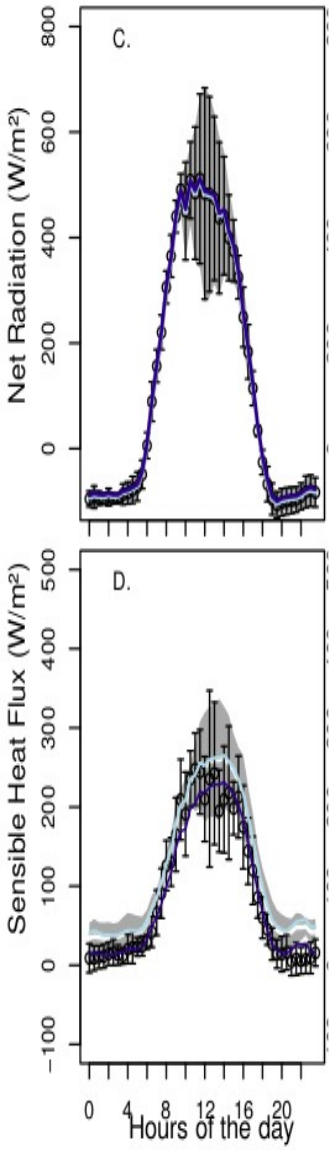

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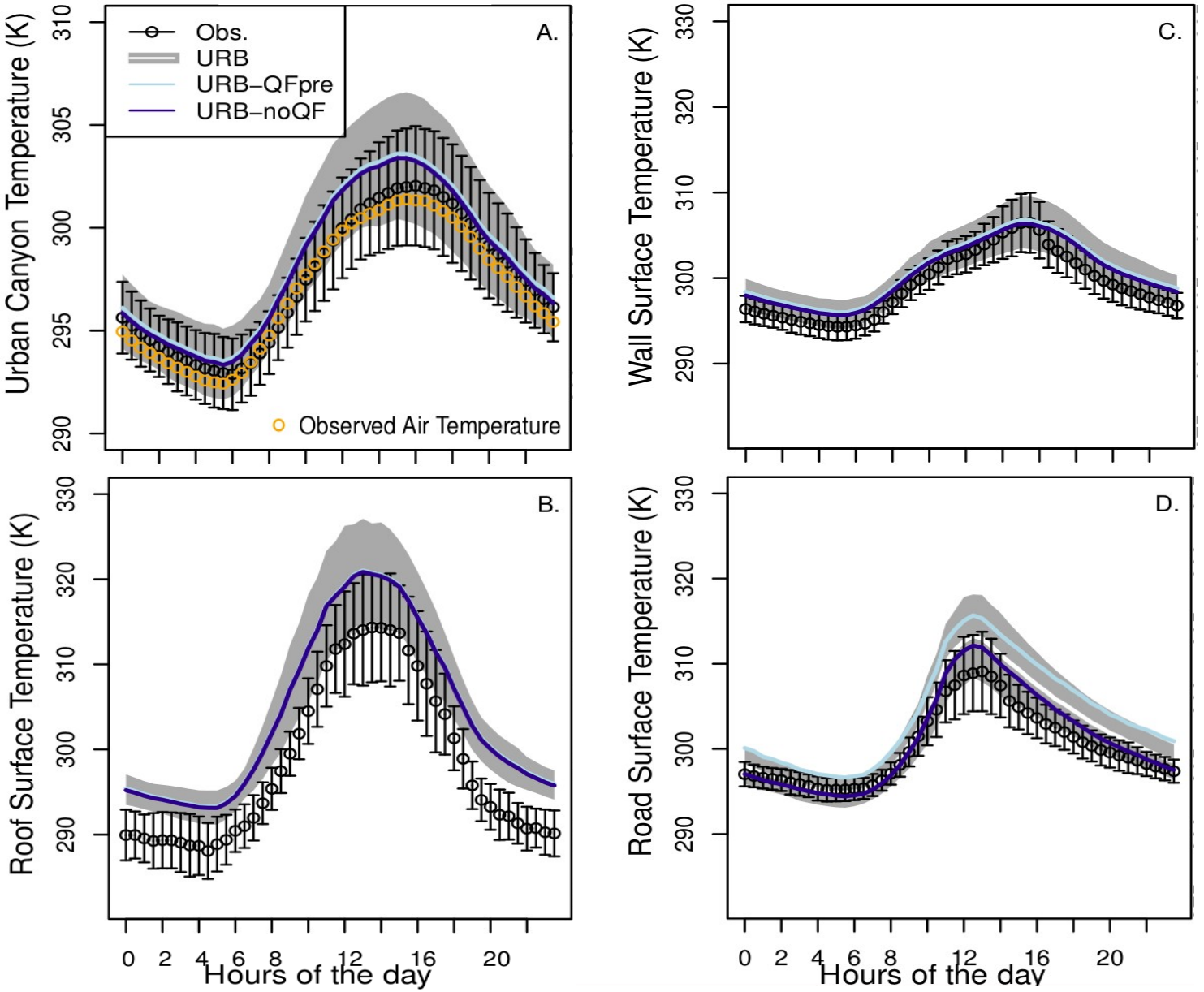
Canyon/Surface T - Toulouse

Summer



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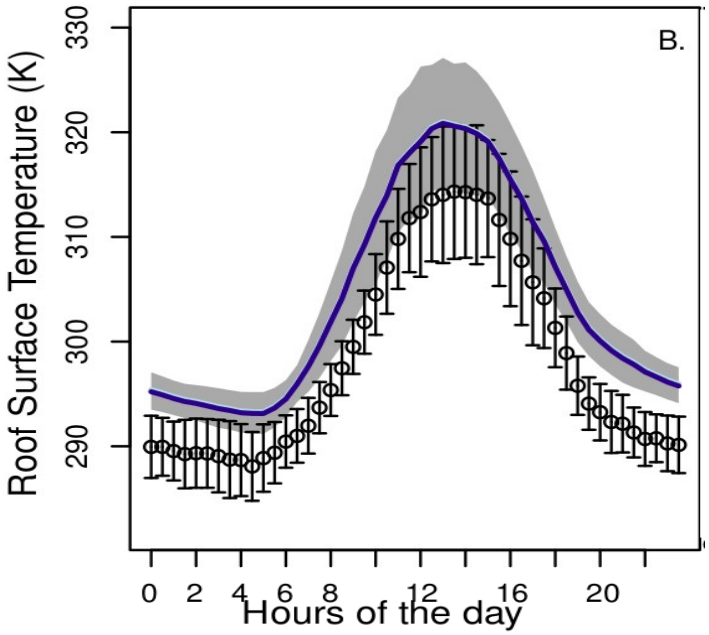
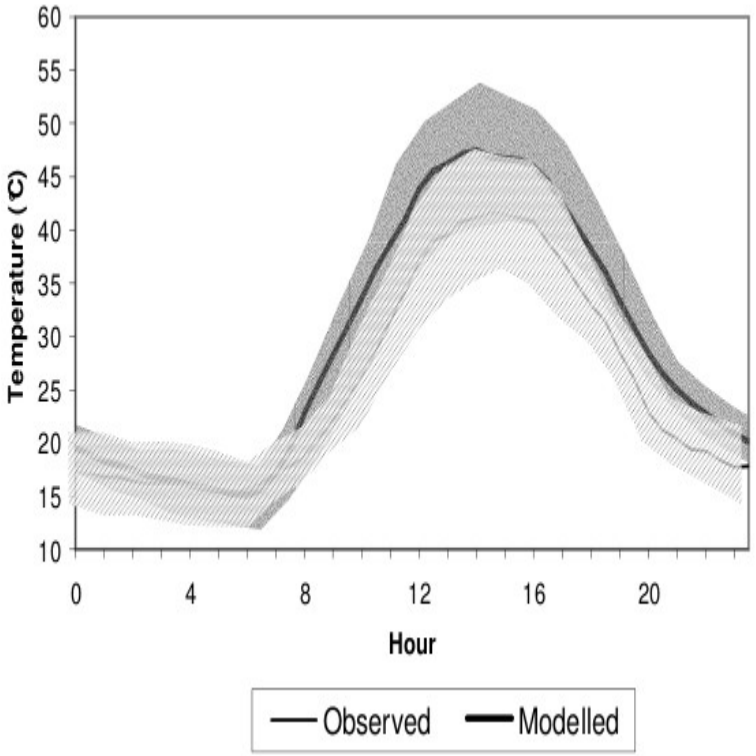
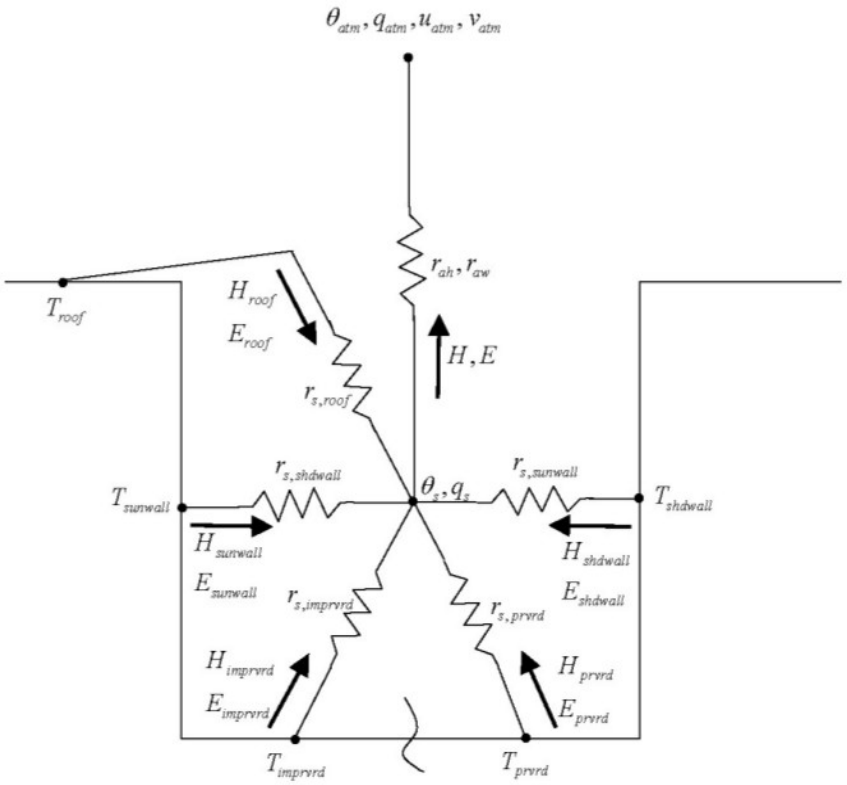
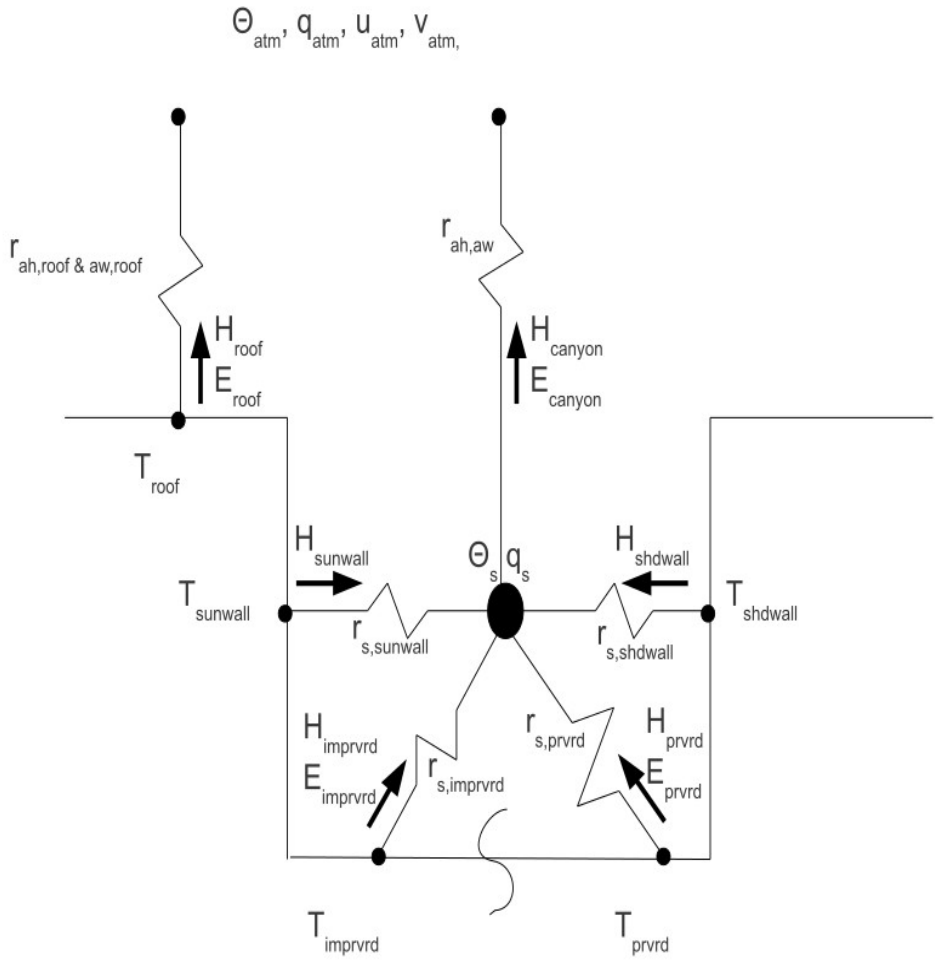


A.M. Moscicki, Msc. (2007)



(de-) coupling of the roof



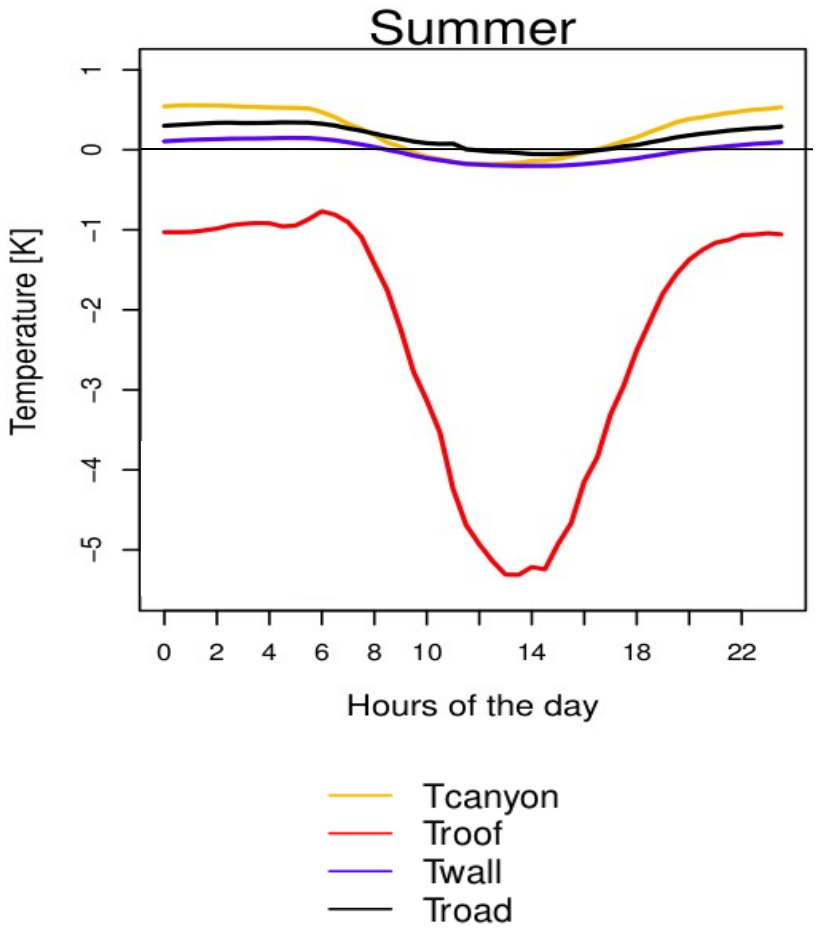


Original CLMU

Adjusted CLMU

(de-) coupling of the roof

$T_{roof\_decoupled} - T_{URB}$



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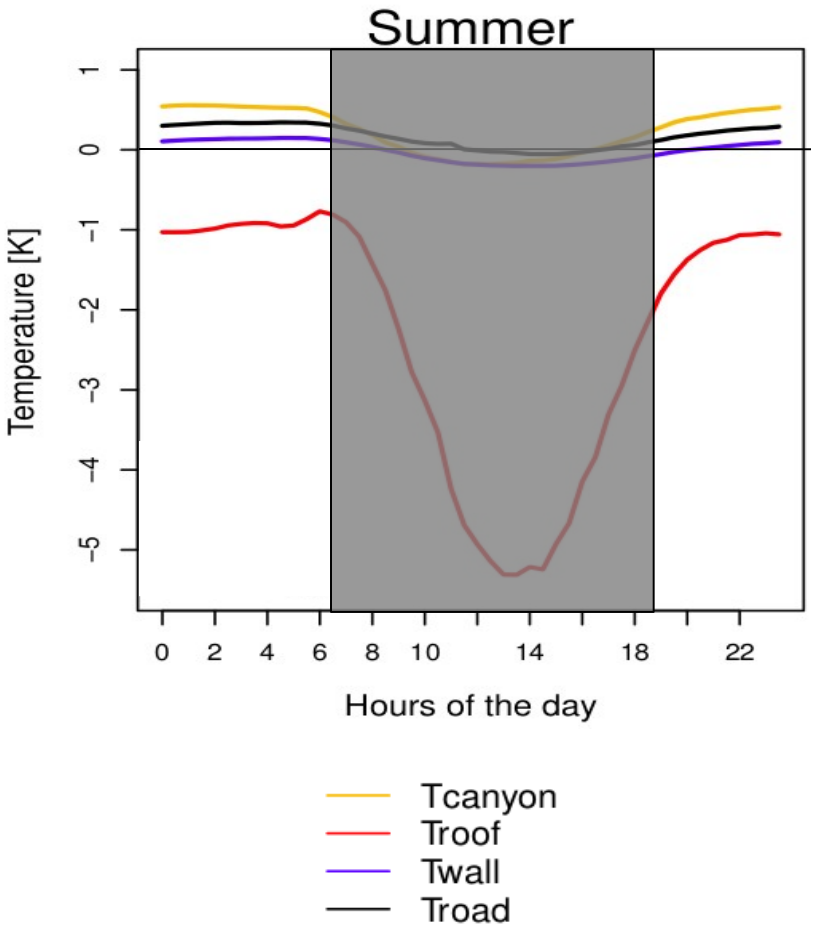

Higher canyon air T
Sligthly higher wall and road T
Cooling of roof T

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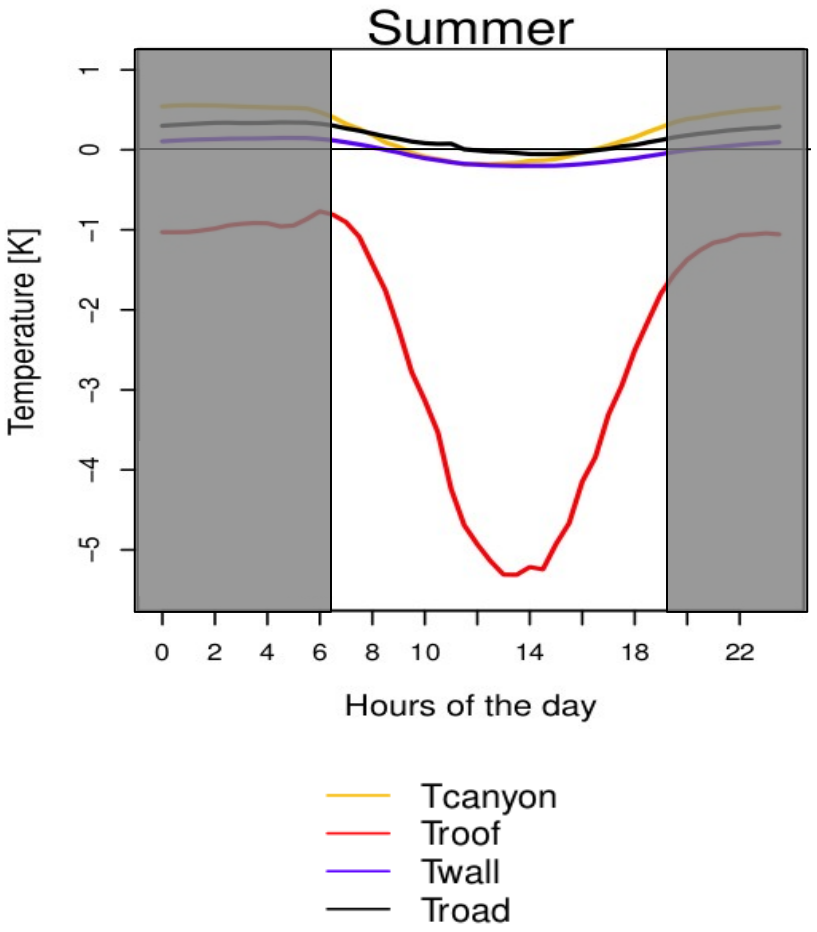

Higher canyon air T
Sligthly higher wall and road T
Cooling of roof T

Similar canyon air T
Minor changes in wall and road T
Strong cooling of roof surface T

Conclusions

- In general, CLMU is able to simulate the urban surface energy balance, with a better performance for Toulouse compared to the Melbourne sites.

- The pervious fraction is able to mimic “vegetation” in the canyon, although e.g. shading of trees is not yet present

- The present anthropogenic heat parameterization is too dynamic.

- As the roof fraction in urban areas can be rather large, the treatment and coupling of the roof to the air aloft / urban canyon properties is important

- Intuitively these results suggest that the choice of “model complexity” relates to the “site complexity”.

Thank you!

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