

ICUC9: 9th International Conference on Urban Climate

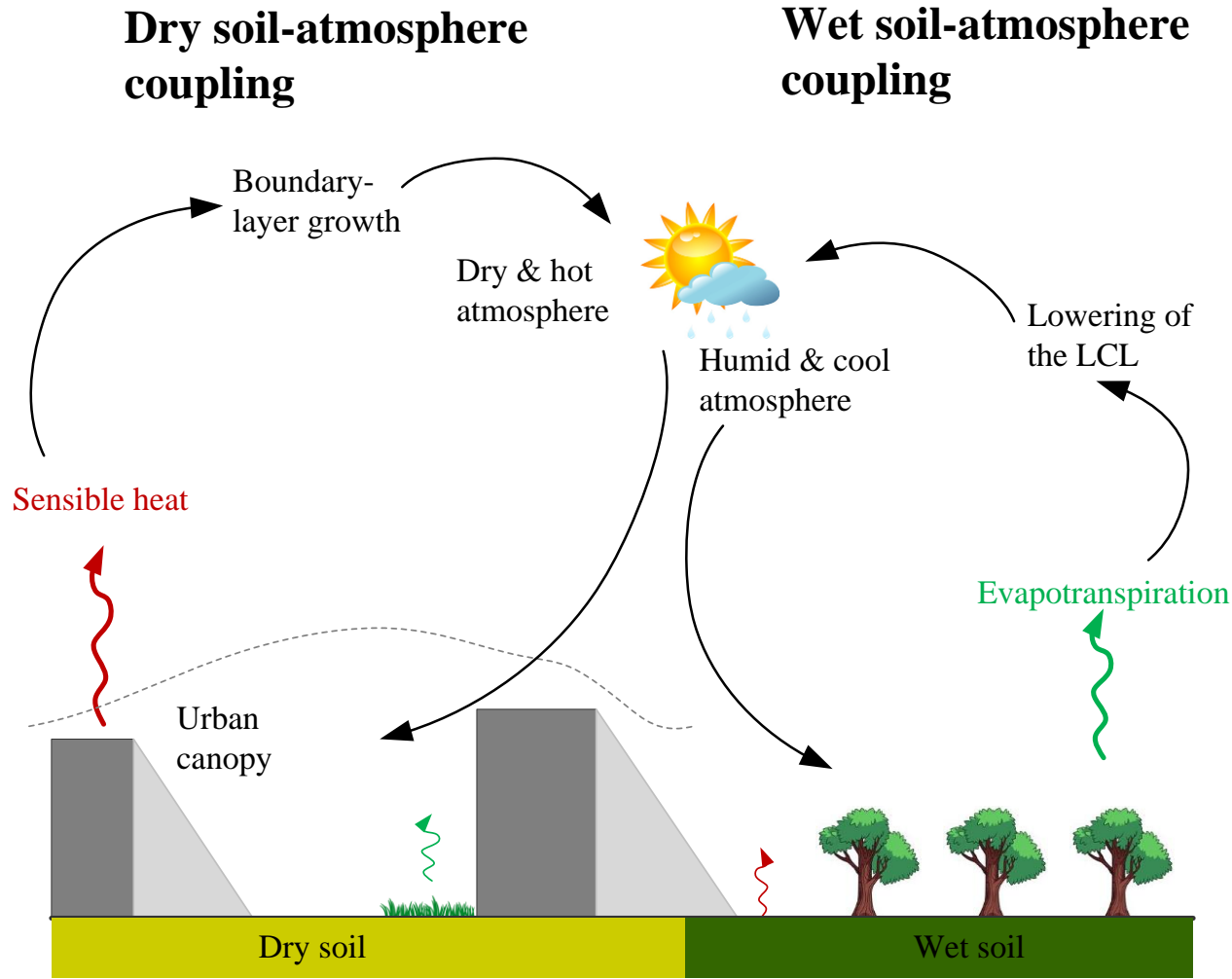
Interfacing the urban land-atmosphere system with a coupled UCM-SCM framework



Zhihua Wang & Jiyun Song

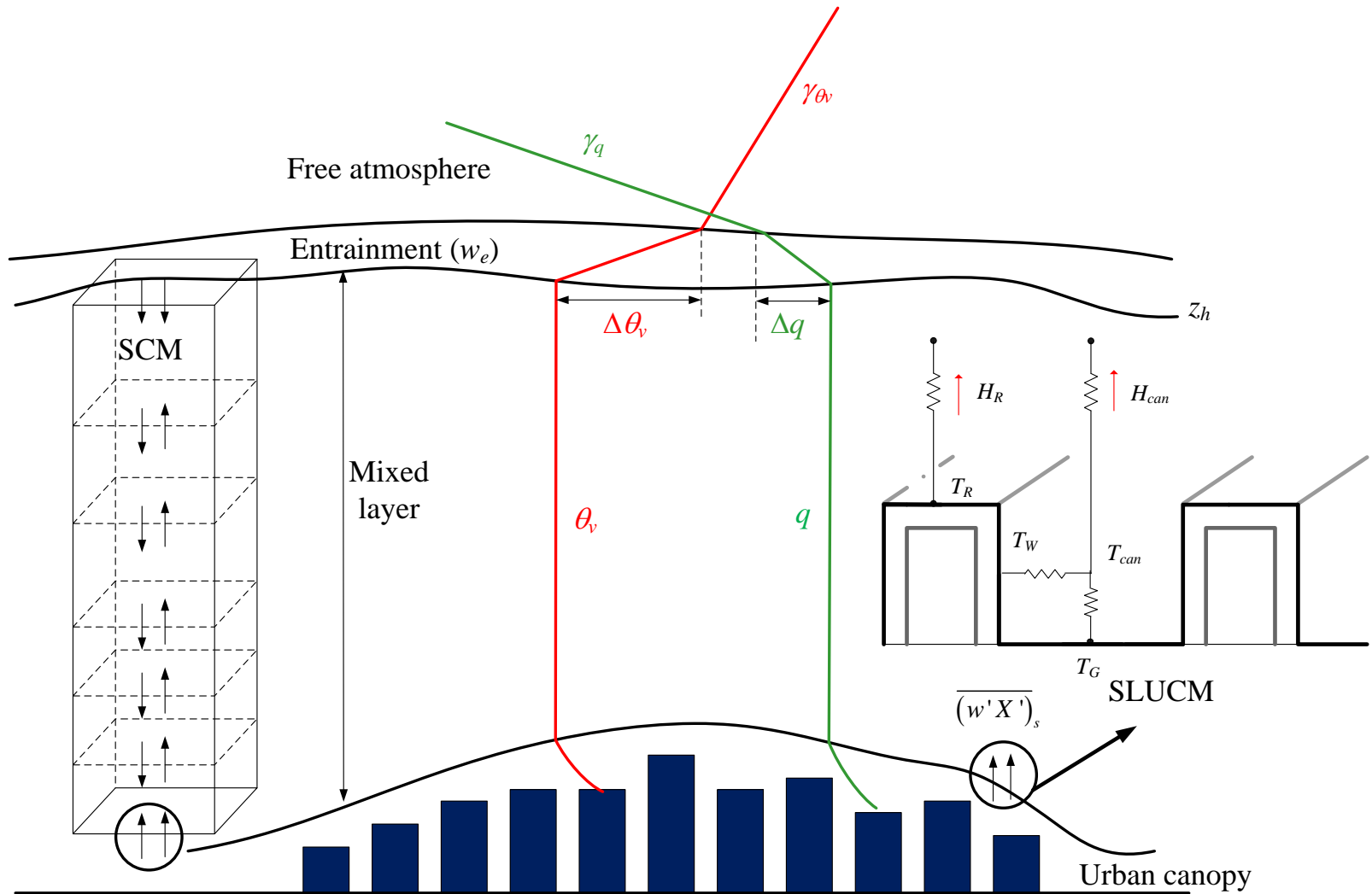
July 24, 2015

Urban land-atmospheric interactions

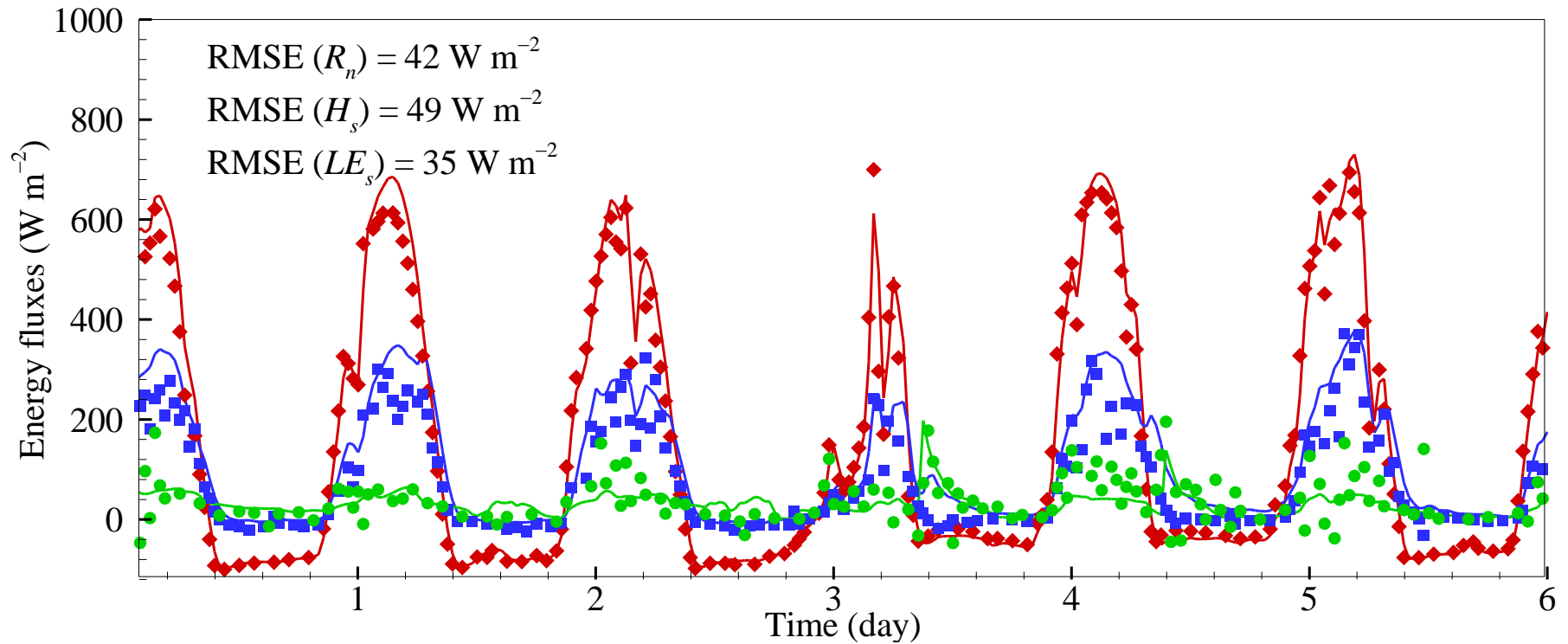


Dichotomic soil moisture pattern

Coupled UCM-SCM framework

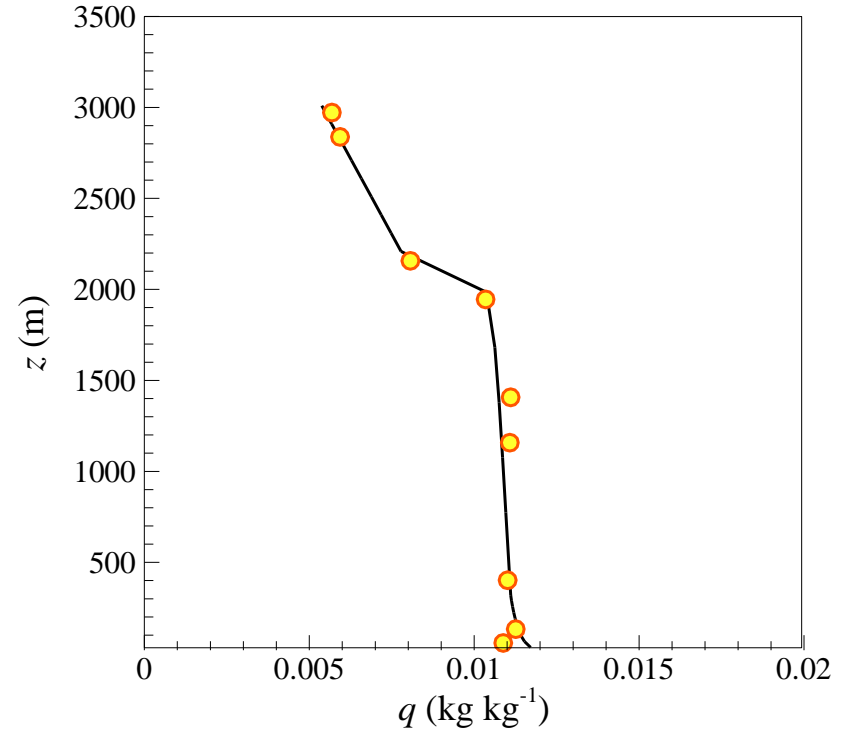
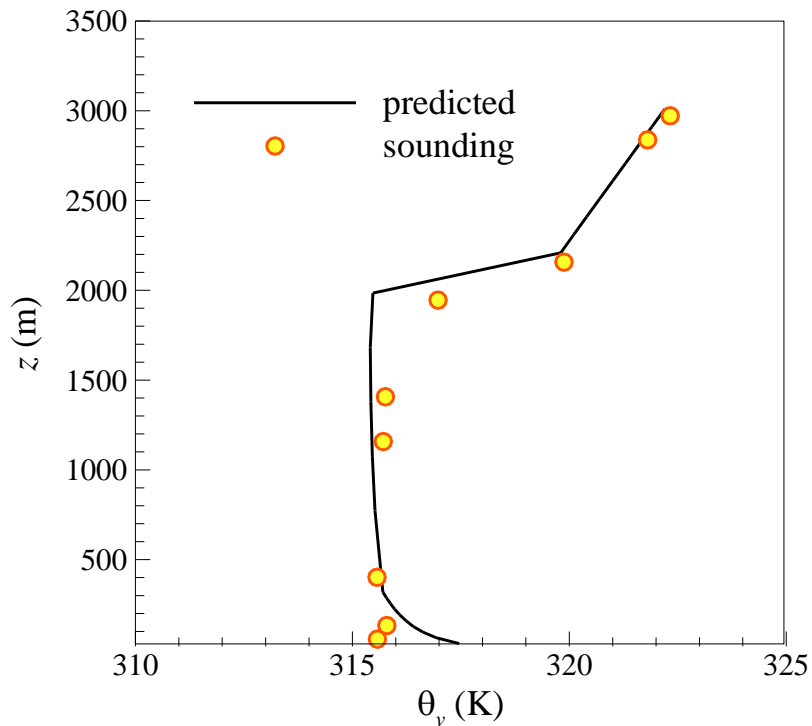


Model evaluation: surface heat fluxes



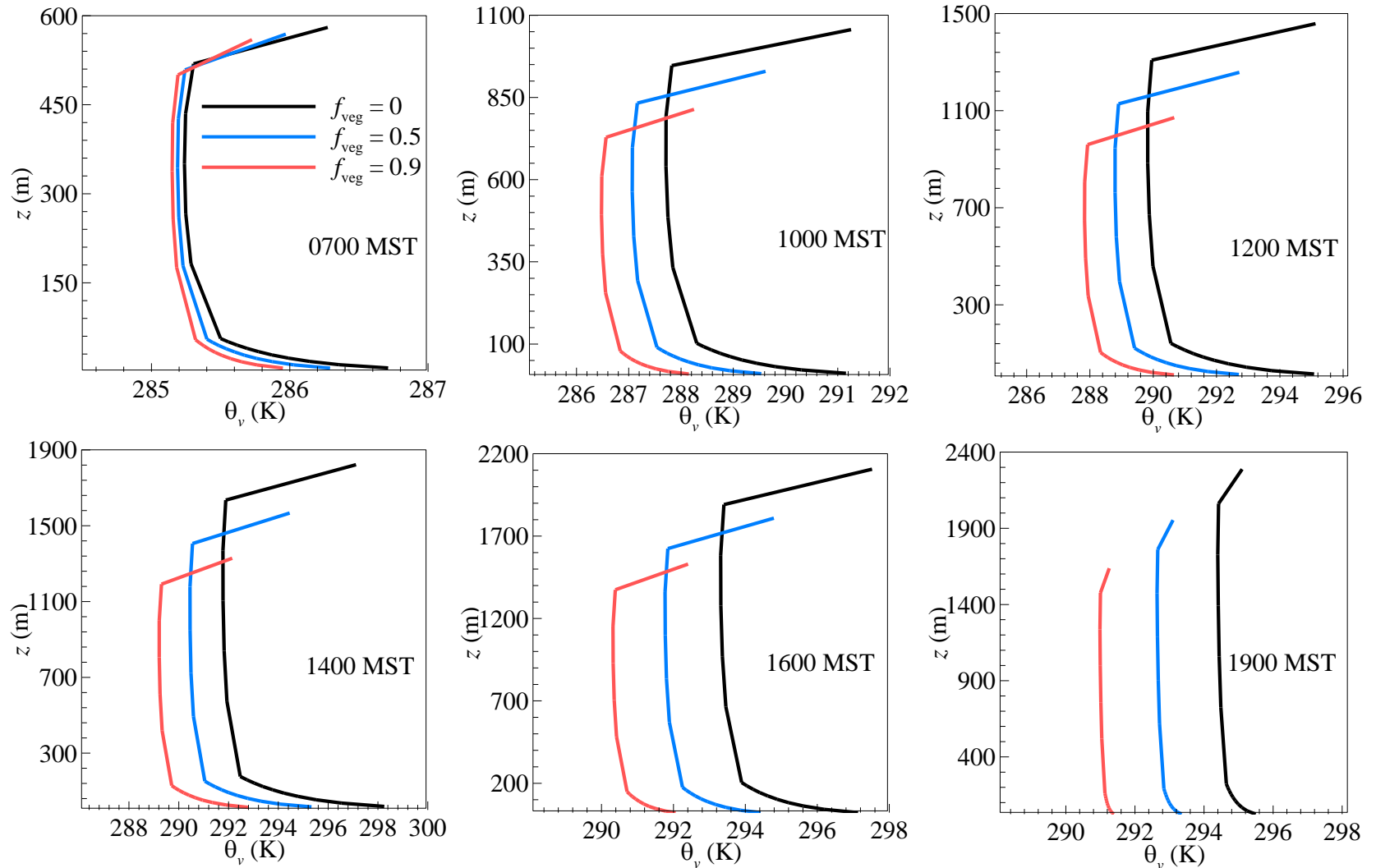
July 25-31, Monsoon season at Phoenix AZ

Model evaluation: coupled UCM-SCM

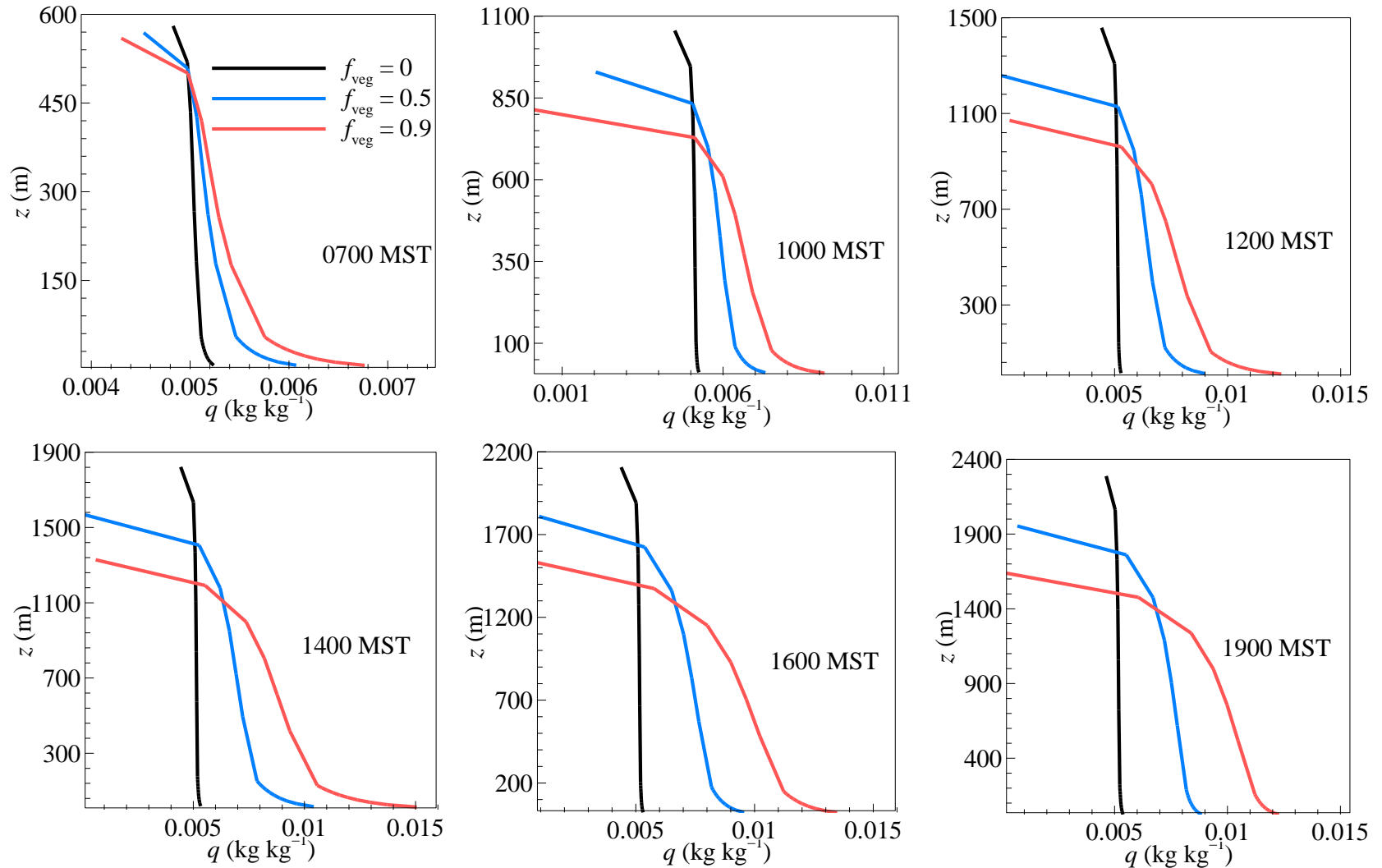


Radiosonde profile recorded at 16:37 pm (LST) on July 9th, 2013, at Phoenix AZ

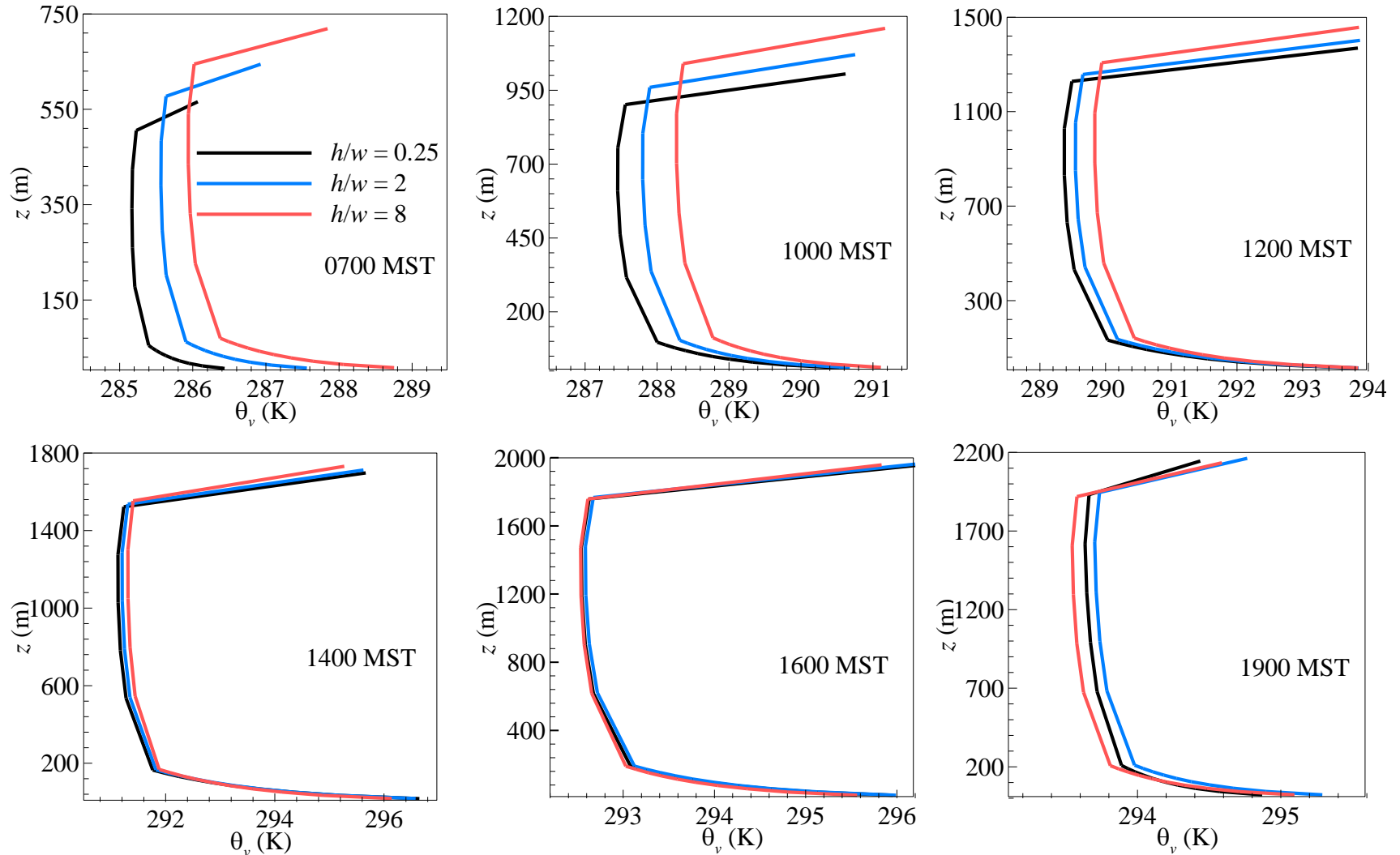
Effect of vegetation: temperatures



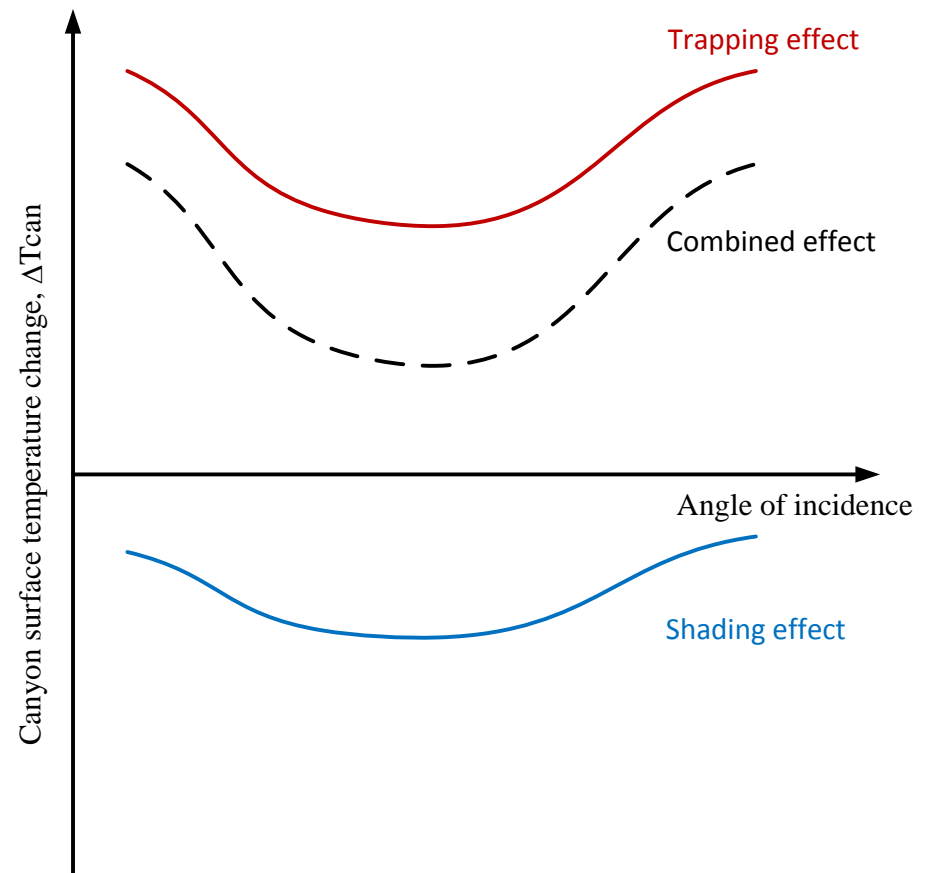
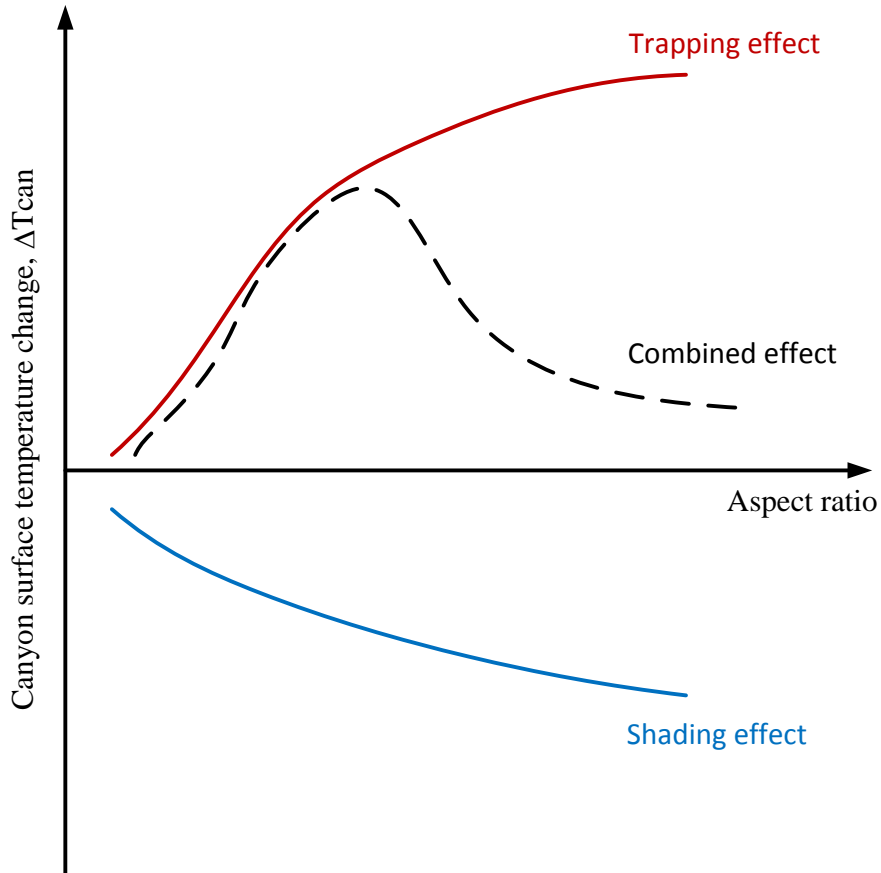
Effect of vegetation: moisture uptake



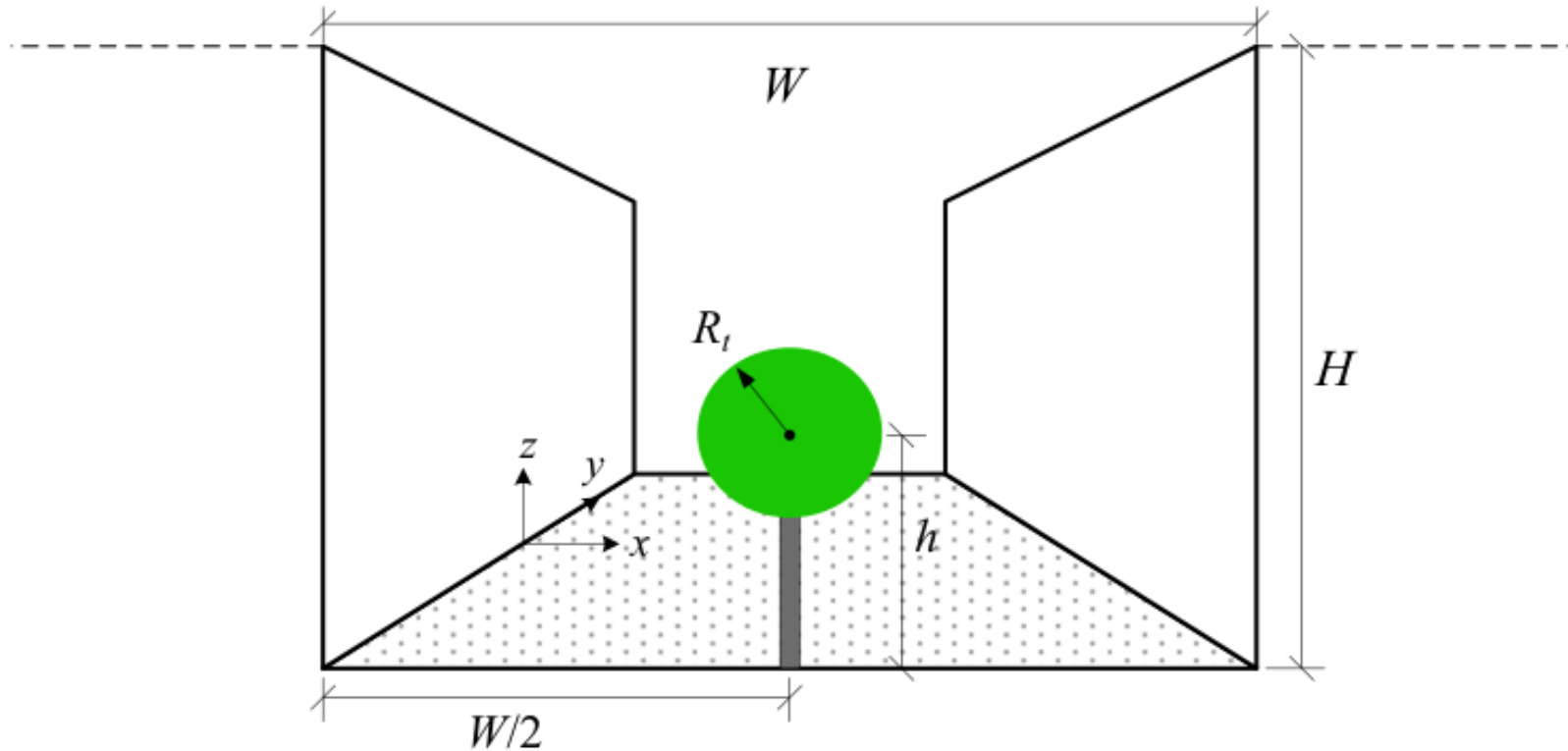
Effect of morphology: more complicated



Nonlinear effect of urban morphology

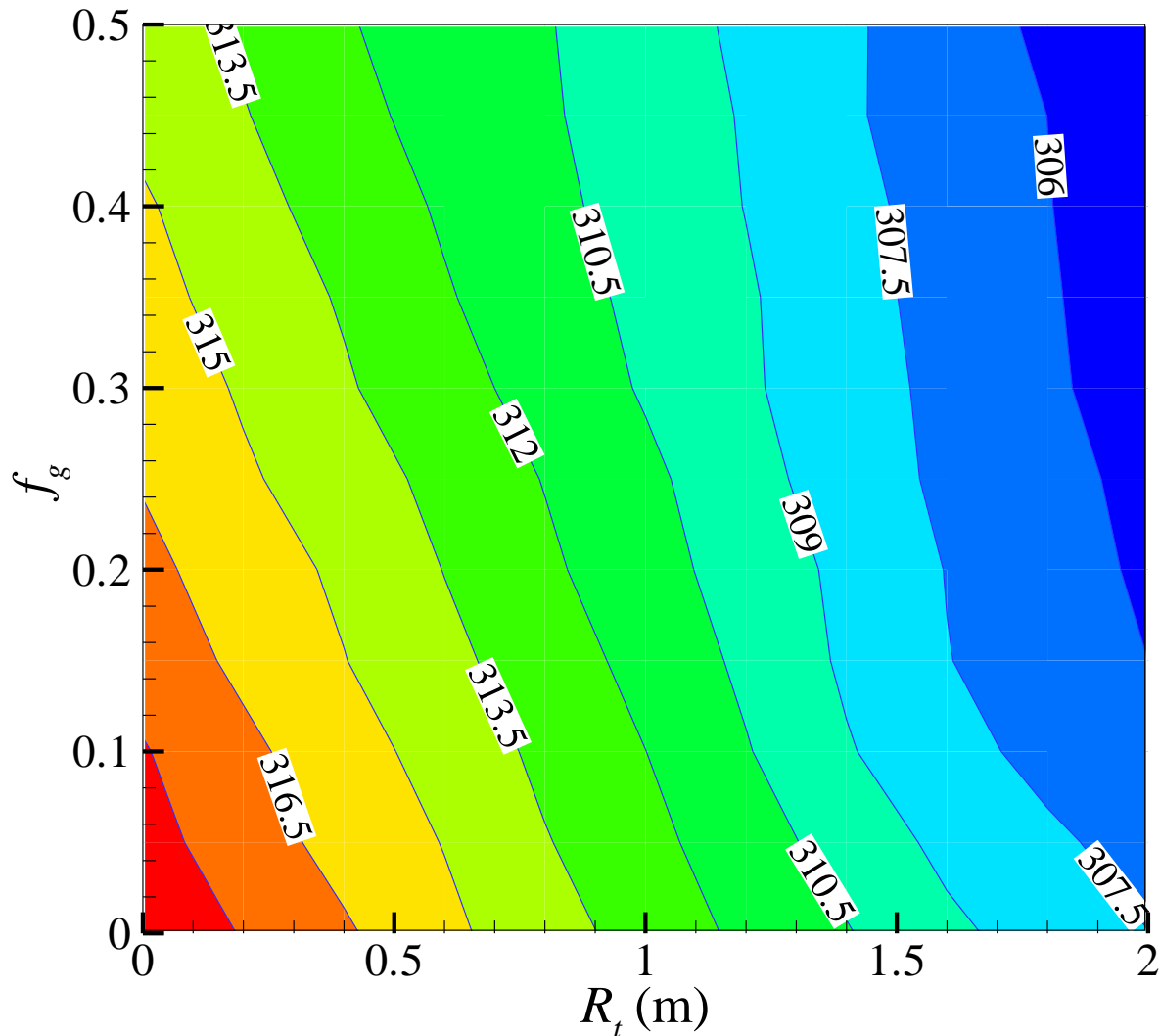


Trees in urban canyon: modified radiation



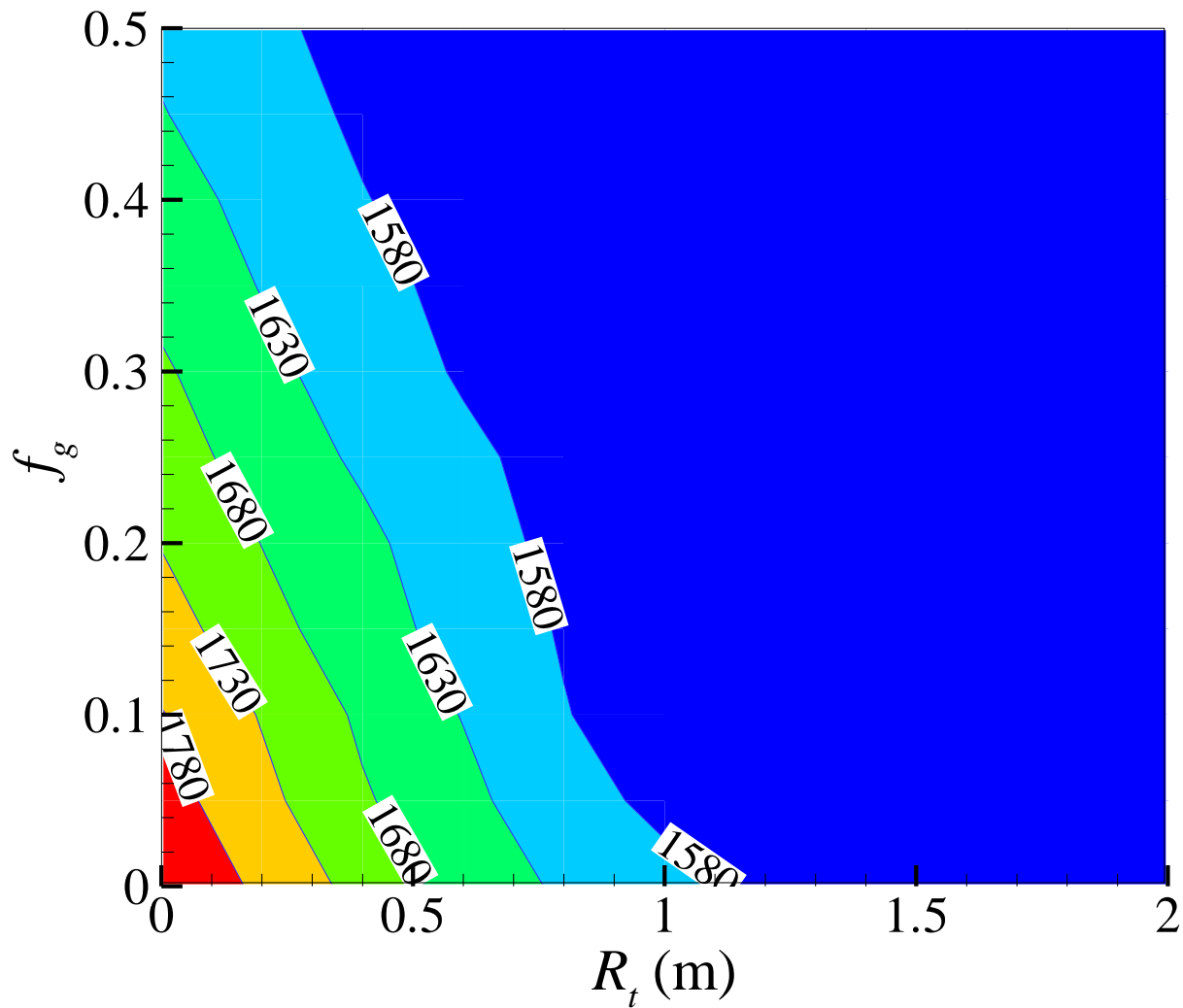
Wang, 2014, *Solar Energy*

Impact of different urban vegetation



Canyon air temperature

Impact of different urban vegetation



CBL height

Outlook

- Inclusion of nocturnal boundary layer schemes for continuous prediction
- More realistic representation of urban vegetation: dynamics, diversity, root-soil physics, etc.
- Physical representation of urban irrigation schemes

Field measurement **dataset** providers:

- Central Arizona-Phoenix Long-Term Ecological Research (CAP LTER)
- Atmospheric Research Measurement (ARM) program
- NOAA/ESRL/Global Systems Division
- National Center of Excellence on SMART Innovations
- Dr. Winston Chow at National University of Singapore



Thank you for your time