Microclimatic features of Moscow city centre and the influence of green infrastructure: a case study of the 2010 heatwave

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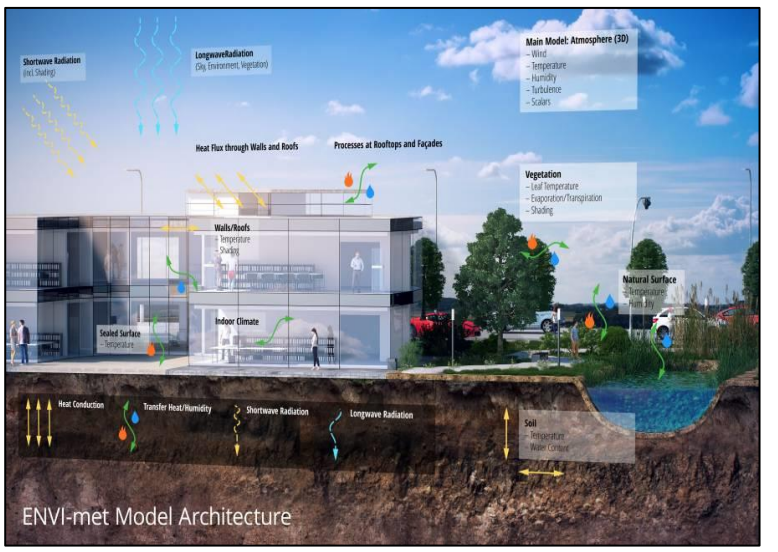
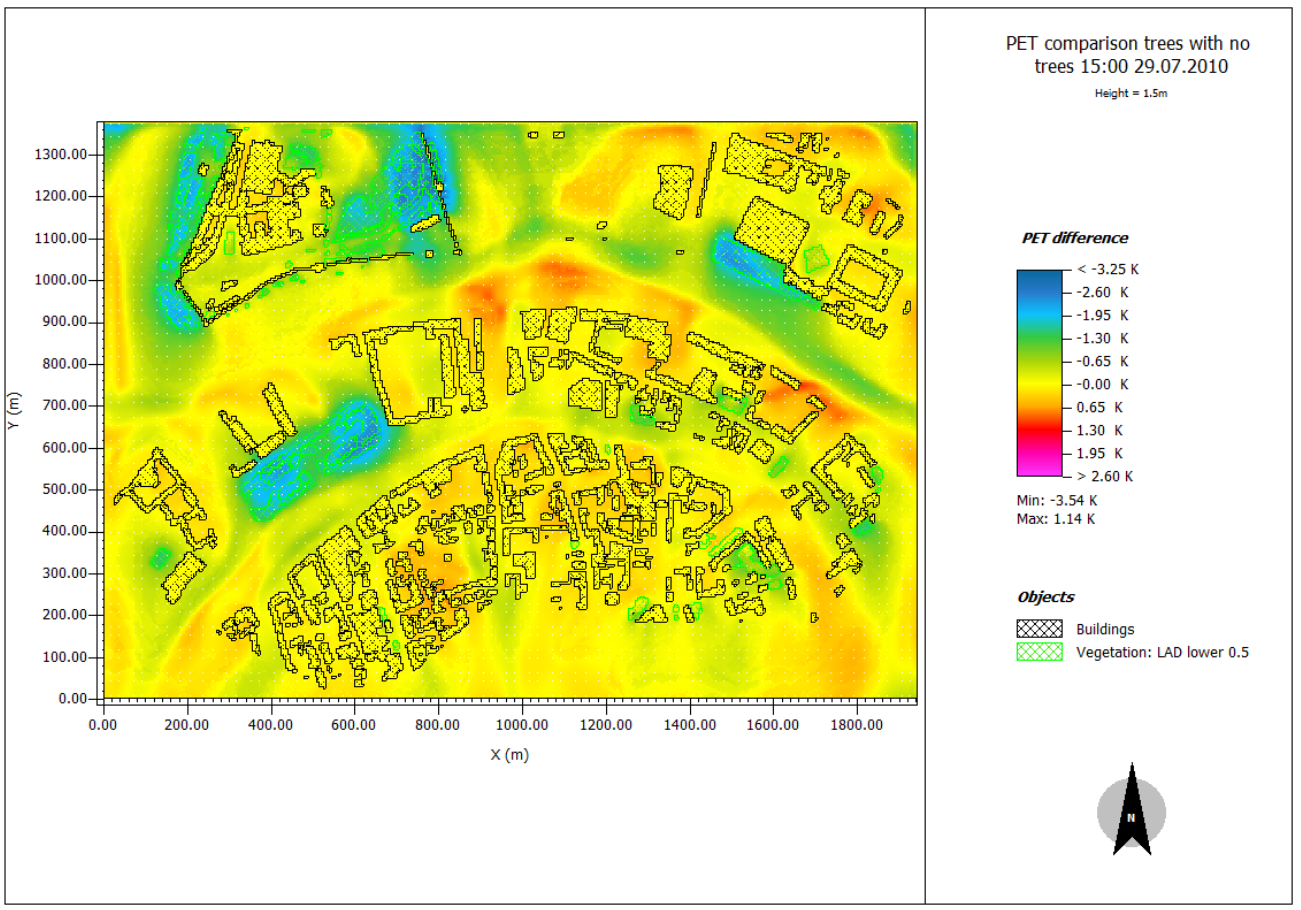
Motivation and model overview

- Prolonged heat wave of 2010 – maximum air temperature 38,5°C, significant heat stress
- Moscow city center – densely built up, large tree canopy areas, major water body (Moskva river)
- ENVI-met - a non-hydrostatic microclimatic model with a rich database of tree and building properties
- Runs with and without trees – 2 hours modelled between 2 pm and 4 pm



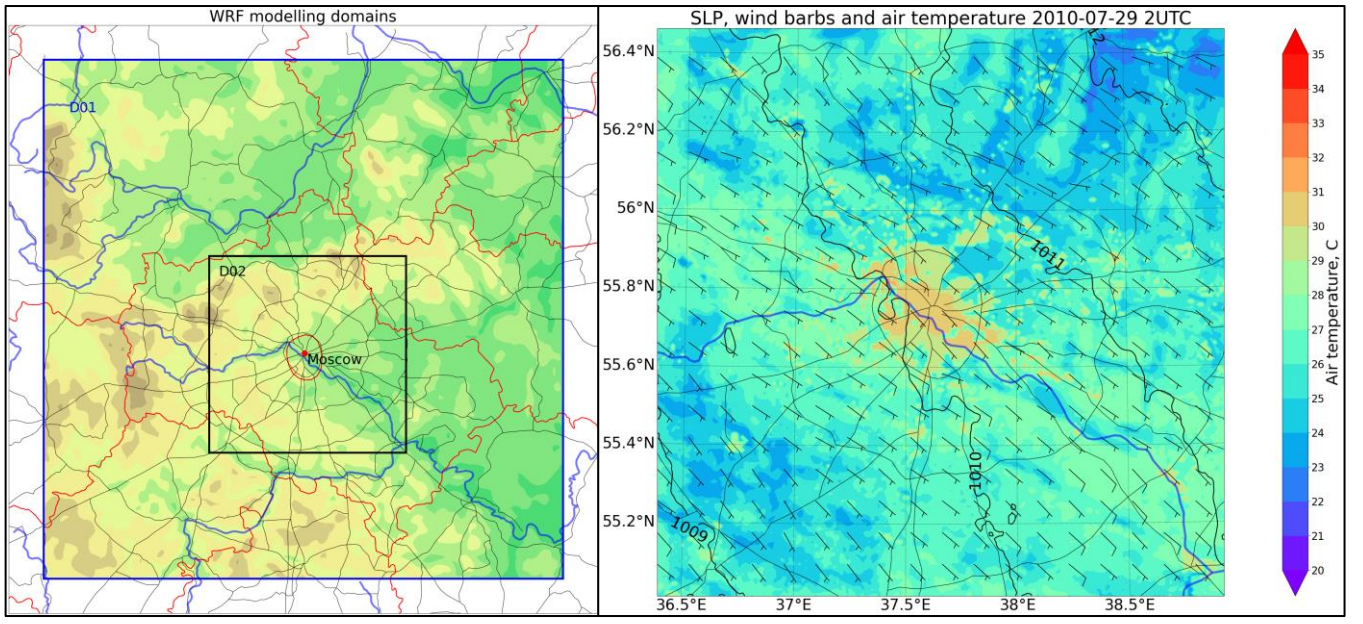


Results

- Air temperature up to 6.5°C over several hours
- PET difference up to 3.7°C – moderate heat stress with trees, strong heat stress without trees
- Wind speed decrease under tree canopy, increase on building corners
- Slight temperature increase near buildings in tree simulation
- Humidity increase under tree canopy up to 15%
- No humidity increase over water

Future improvements

- Coupling with WRF mesoscale modelling
- Possibility to cover arias with no observations
- Newer ENVI-met versions with water body parameters
- Accurate tree data



Conclusions:

- A major difference in air temperature and PET
- More comfortable with trees
- Poor water body modelling – no effect
- Building heat transported by wind