



A coupled modelling method for evaluating the pavement solar collector performance

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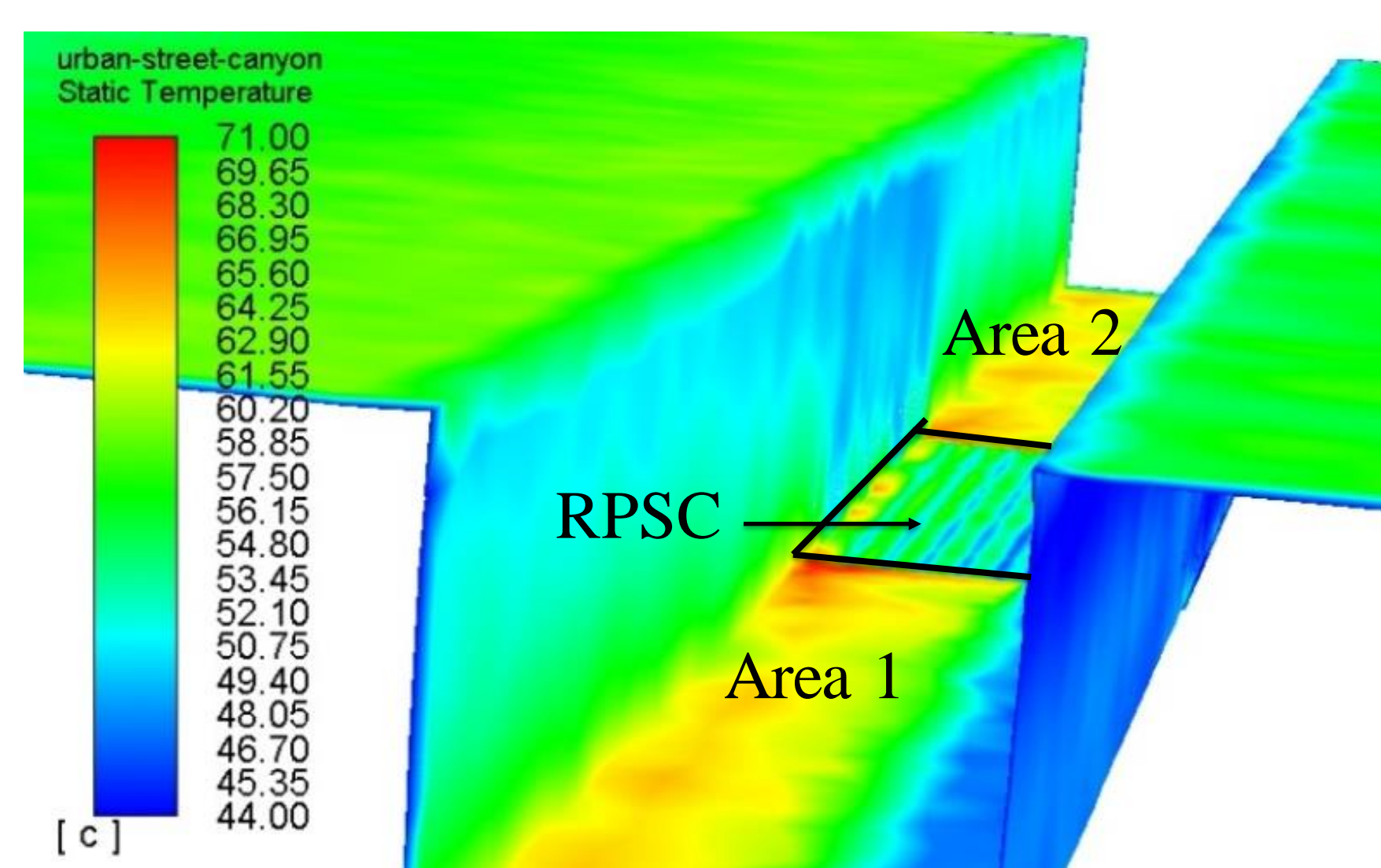
Background

Cool pavements showed high mitigation of urban heat island (UHI) effect and cooling potential, reducing the sensible heat flux to the atmosphere and then decreasing the temperature on the urban environment.

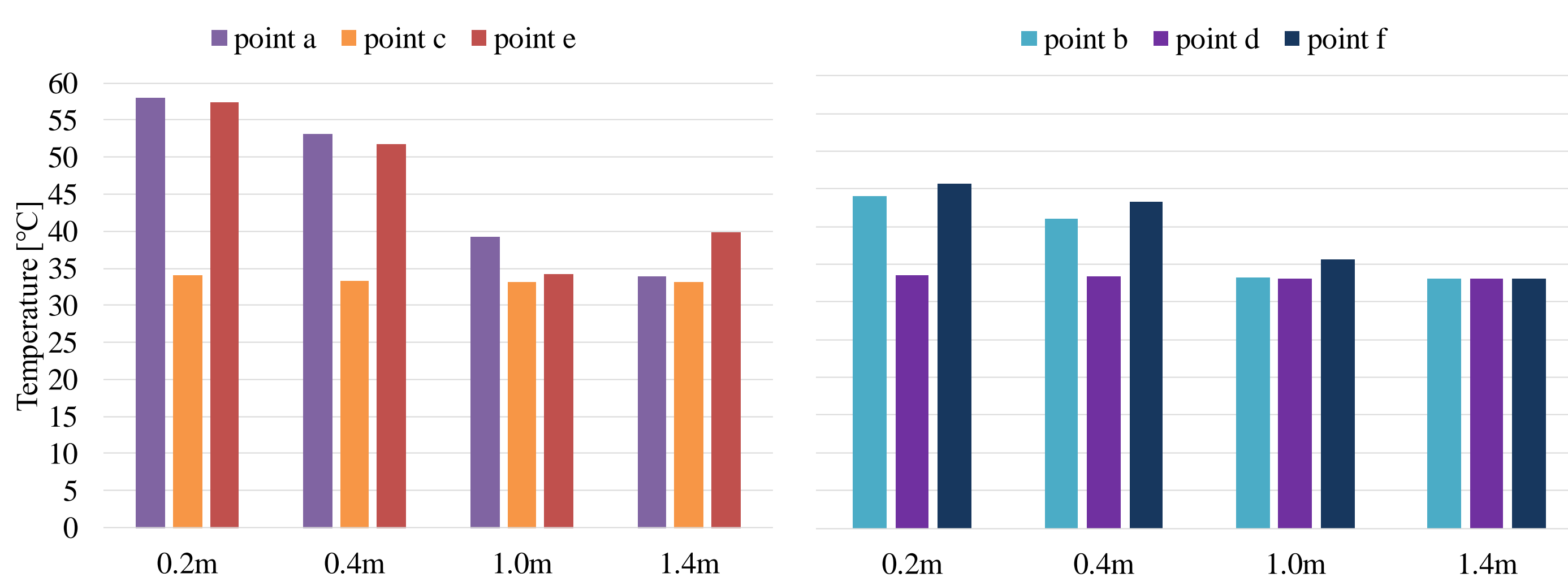
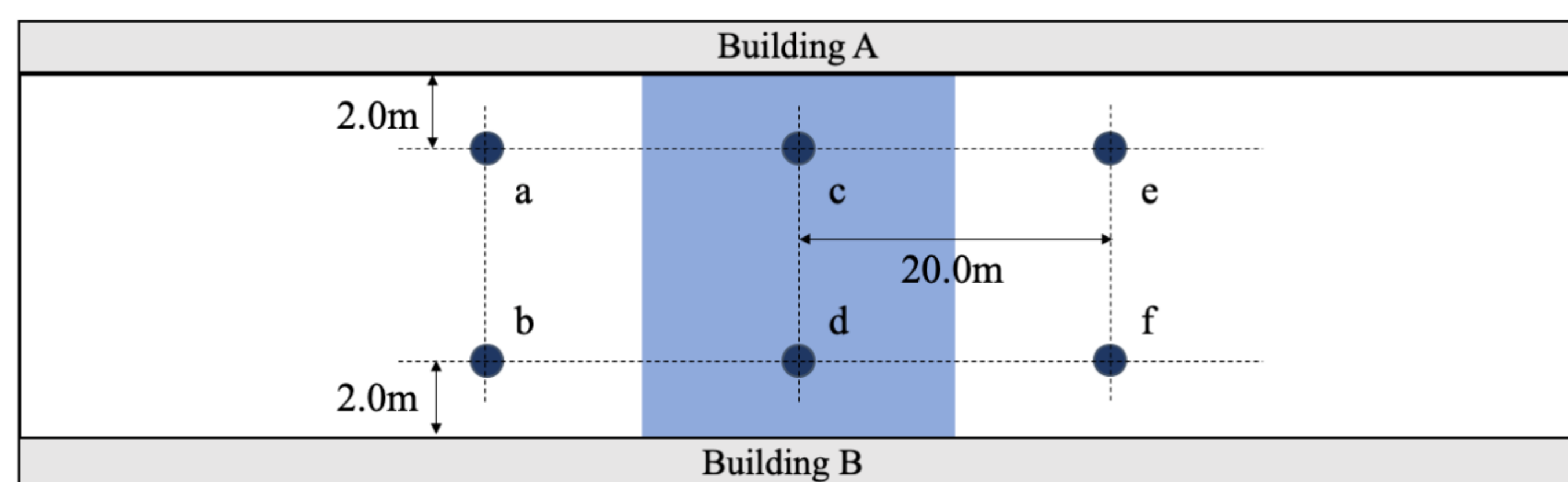
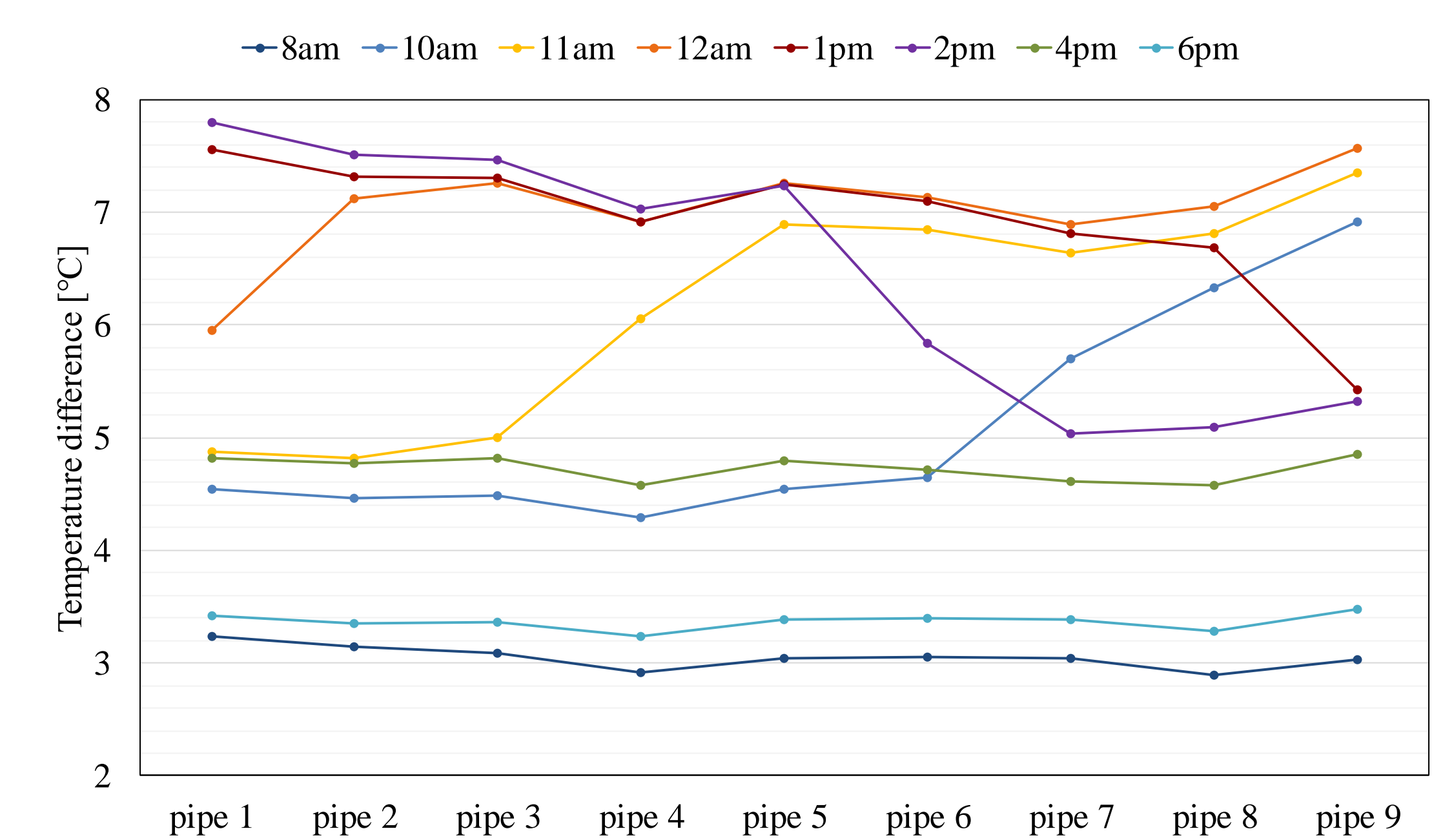
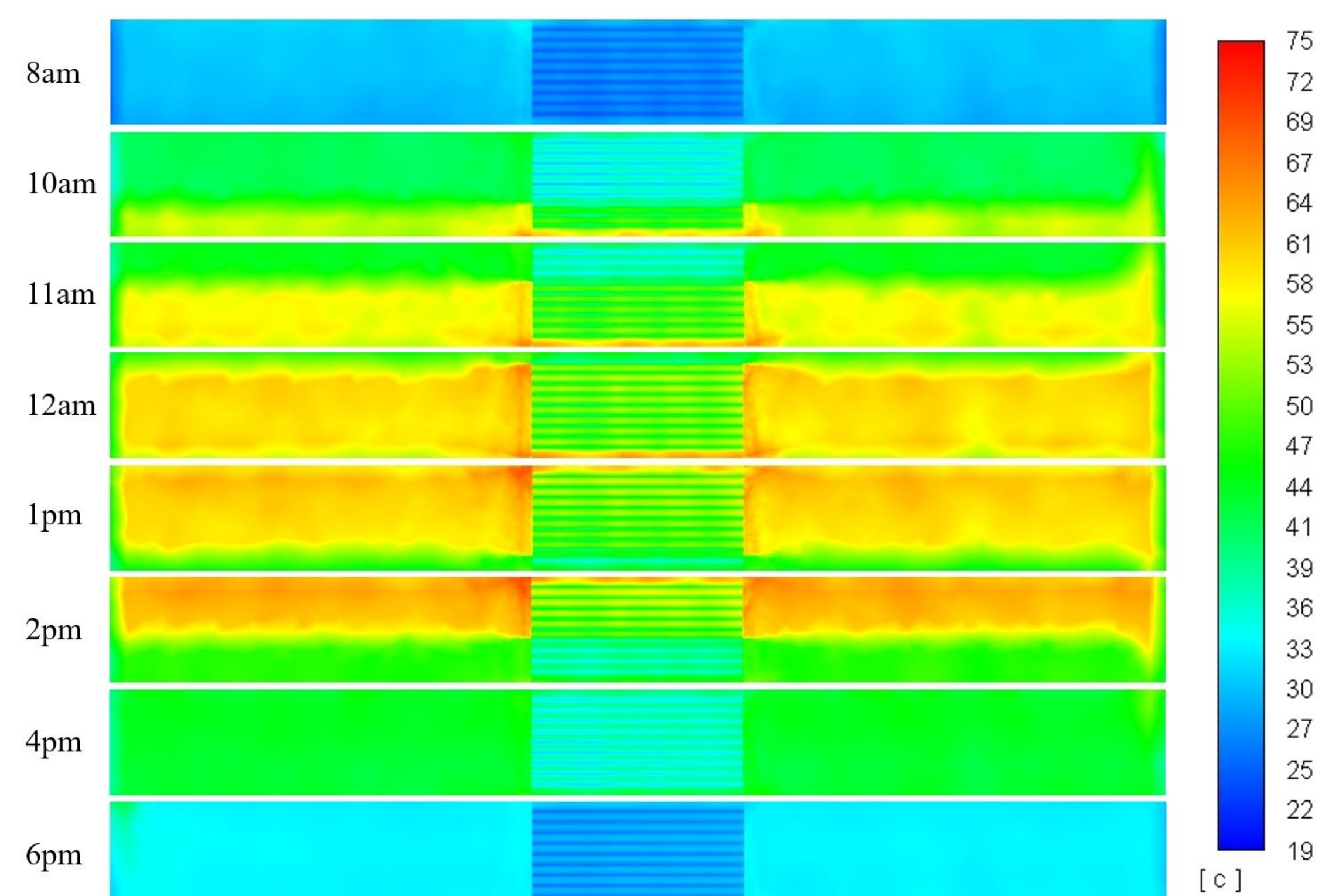
Pavement solar collector (PSC) is a system that allows heat to be transferred from the pavement surface to the bottom layers, the water pipes of the system can remove the heat and cool down the pavement surface temperature.

Objectives

- Investigate the combined effect of the PSC system on building, air and road temperatures.
- Model the heat transfer between urban street canyon and PSC by using a coupled computational approach.
- Assess the potential thermal collection by PSC system



The near-ground-air in Area 2 had about 10°C higher than that of Area 1.



PSC system significantly impacted the street canyon thermal environment and could reduce the air temperature near the pavement surface.

With higher air temperature and direct solar radiation, the PSC system could provide more cooling effect. Water temperature increment was 15.2% in the morning and at noon can be 35.1%; the solar condition can bring 15.5% difference to the water temperature increment.

Future work

The building wall temperatures will be analysed using more realistic building models to show the influence on building cooling energy demand. Actual climate conditions will be carried out to improve result quality and the future research will be extended to the whole year for accurate predictions.