was peak. There was an obvious effect that the lawn could reduce the ground surface temperature in the summer(Yang 2009).The ground surface temperature of point 2 was lower and changed a little all day. Though the same ground surface materials but thermal environment of piloti is better than other space, which showed that blocking out the sun radiation can improve thermal environment.

The characteristics of Shale brick pavage are hard, not bibulous, less water content and highthermal effusivity, absorbing more heat and cooling slowly when exposed in the sun. It makes the building fa çade and air around get hot. In summer, ground surface temperature gets higher and makes the outdoor thermal environment poorer when no shading component in the sun. So the hard impervious materials are not suit for the public space of outdoor.

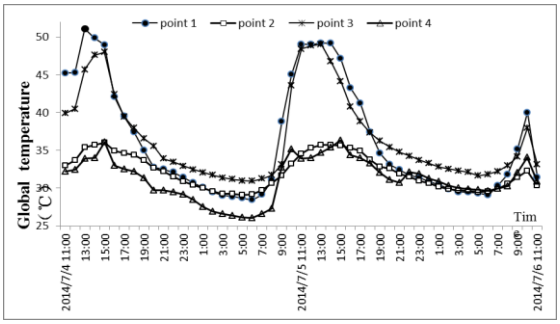

Fig.7 Global temperature

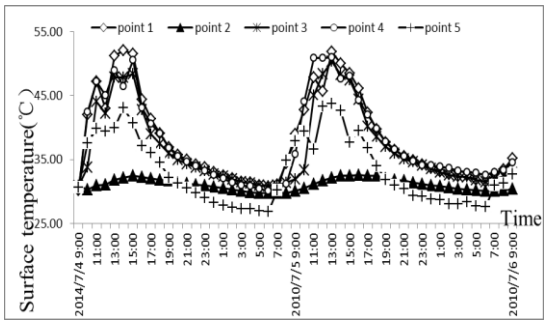

Fig.8 Surface temperature

SIMULATION

The new version of ENVI-met model (4.0) was used to simulate the microclimate of the experimental site. The actual environment and elements of the site, such as building, vegetation, soil and pavements, etc, were defined in an ENVI-met area input model (Fig. 9and Fig. 10). More detail please look at their web site(Anon.).

Fig.9 Simulation model plan

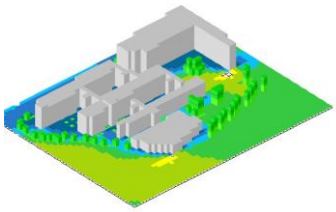

Fig.10 Simulation model perspective

In horizontal direction, a mesh of 85× 60 grids was allocated to the entire model area (170×120m), with a resolution of 2 m. For the reason of numerical stability, 3 nesting grids were set for the area surrounding the main model with loam surface by considering the high greening rate of the island. In vertical direction, the total number of vertical grids is 25， varying grid sizes were used as we focused on the near-ground microclimate in this study. For the space below 2 m, equidistant grids were used with a fine resolution of 0.2 m (dz) and, for the space above 2 m, telescoping grids were used with a telescoping factor of 20%.

The simulation ran for 48 h, starting at 06:00 on 4 July and ending at 06:00 on 6 July. Table 1 summarizes the major input parameters for the ENVImet simulation. The hourly meteorological data from the weather station and from the on-site observation were used to generate the forcing file for the simulation.

Table 1. *Major input parameters for the ENVI-met simulation*

meteorological	wind speed : Hourly data from the meteorological station temperature and relative air humidity :Hourly data from the meteorological station Solar radiation: Hourly data from the meteorological station
vegetation	the height and the number of trees and the shrubs are obtained by visual estimation
building	Exterior wall K=1.5 [W/(㎡K)]， reflectivity =0.2； Roof K=0.87[W/(㎡K)]， reflectivity =0.3
initial temperature of soil	0-20(cm):305(K)；20-50(cm):307(K) ； Below50(cm) :306(K)

The default leaf area density (LAD) values in ENVI-met were used for these plants. The thermal properties of the buildings envelope were derived from the local building design code (Anon.). The initial soil temperature profile was determined according to the measured front research (Yang 2013)

RESULT OF COMPISON AND DISCUSSION

Fig. 11 depicts the comparison between the observed and modeled air temperature at 1.5m heights for the five points on july 4th.

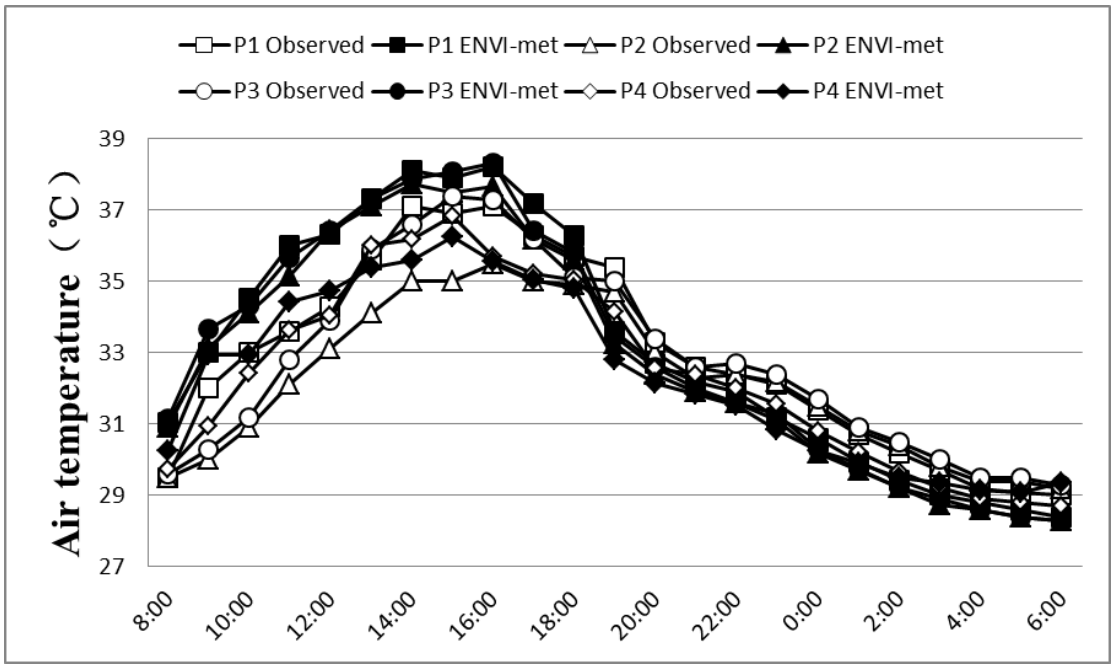

Fig.11 Comparison of modeled and observed air temperature at the points 1-5

Compares the modeled and observed temperatures at the points 1-5 at the heights of 1.5 m. All point except point 4 the observed temperature lower than modeled air

temperature until 18:00.The observed temperature differences among those locations at 18:00 and 06:00 are well reproduced by the ENVI-met results. At 14:00, although relatively large errors between the predictions and the observations are observed at points 1and 2, the general spatial distribution features of the observed temperature are reflected by the ENVI-met model. Both the modeled and observed data show that the temperature differences among these positions diminish with the increase of height.
Table 2 showed the maximum error and the time of the day.

Table 2. *Maximum error and the time of points*

	Point 1	Point 2	Point 3	Point 4
Maximum error	7.08%	10%	11.20%	6.42%
Time	11：00	12：00	9：00	9：00

The author explores the possible reasons for the error occurs: 1)simplify boundary conditions and physical processes(can not simulate climate background, clouds and natural wind effects); 2)There is a deviation between the actual state of the plant and input the ENVI-met Model,which the parameters according to the visual; 3)Measurement exists the deviation;4)The new function “full forcing” has been implemented in ENVI-met4.0, which allows users to employ the measured meteorological data to force the model during the simulation. The wind envieronment simulation has a deviation between the actual state, because of “full forcing”file let the wind direction and velocity be changed every hour. Wind speed and air temperature has a direct negative correlation.

CONCLUSION AND IMPLICATIONS

Measurement results show thermal environment texture in differents space. The lake and piloti can reduce the pedestrian air temperature,global temperature and surface temperature effectively at summer daytime. The piloti, which design form adapts the climate in Guangzhou, can effectively improve the outdoor thermal comfort in hot summer.

The measurement results are further used to verify the ENVI-met model. The results show that: the ENVI-met model reasonably reproduced the majority of the observed spatial and temporal characteristics of the 2-m temperature field over the simulation period, and the relative errors are within 11.2%, which proved that ENVI-met is a reliable model to simulate the different urban scenarios.

Just air temperature were compared between the the modeled and observed,next we should compared more paremeters to validate the ENVI-met model.

ACKNOWLEDGEMENTS

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