ICUC9 - 9th International Conference on Urban Climate

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Among Winds, Water Bodies and Urban Elements

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AIMS

- This analysis consists of evaluating the variation of air temperature and absolute humidity on the surroundings of two margins of an urban water reservoir.

- This paper analyses the joint action of local winds and water body on the microclimate of the surroundings of a water reservoir located in São José do Rio Preto, SP, Brazil.

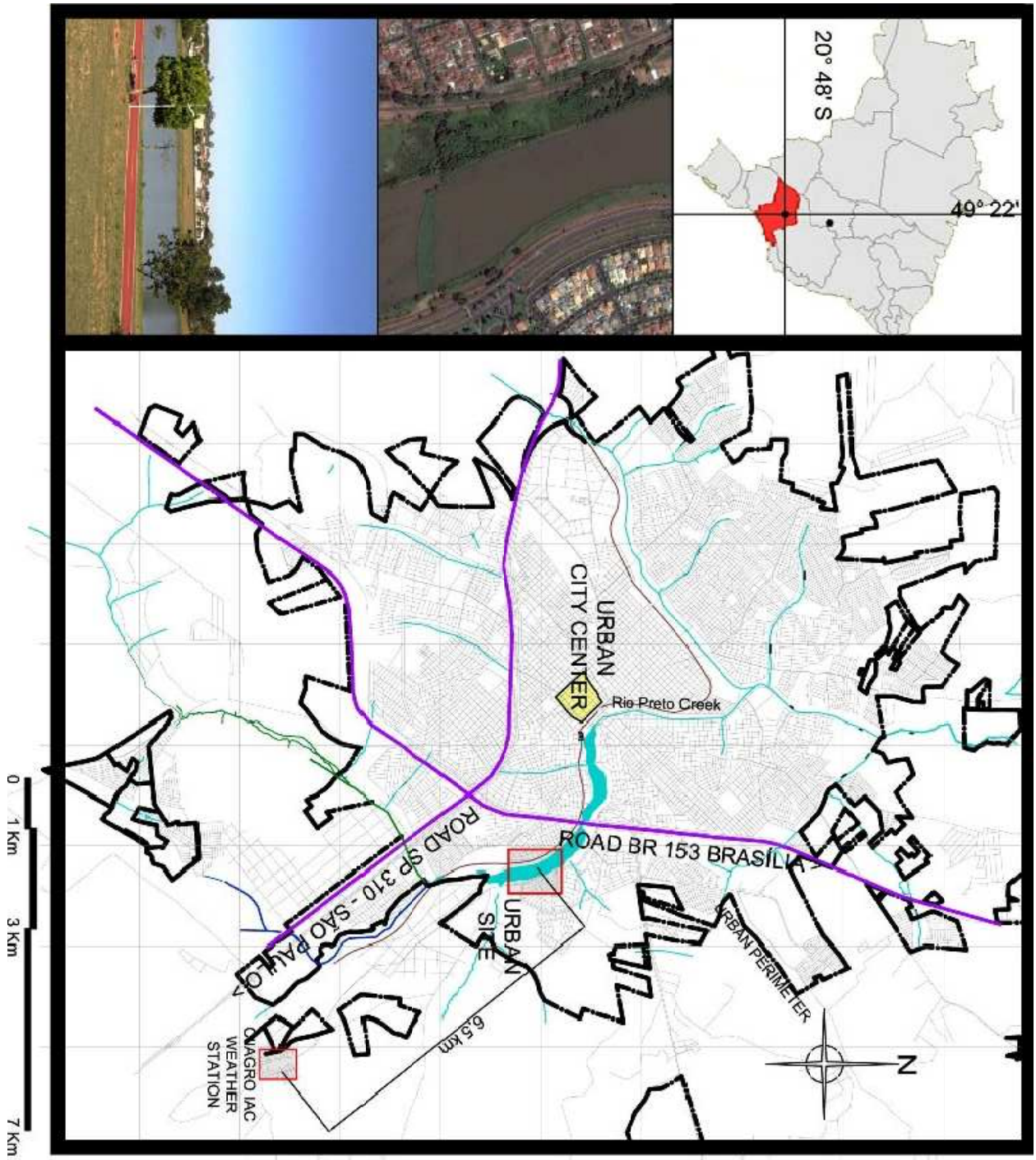
- After collecting the data from the field, a digital model of the area was developed by applying the ENVI-met 3.1 software.

INTRODUCTION

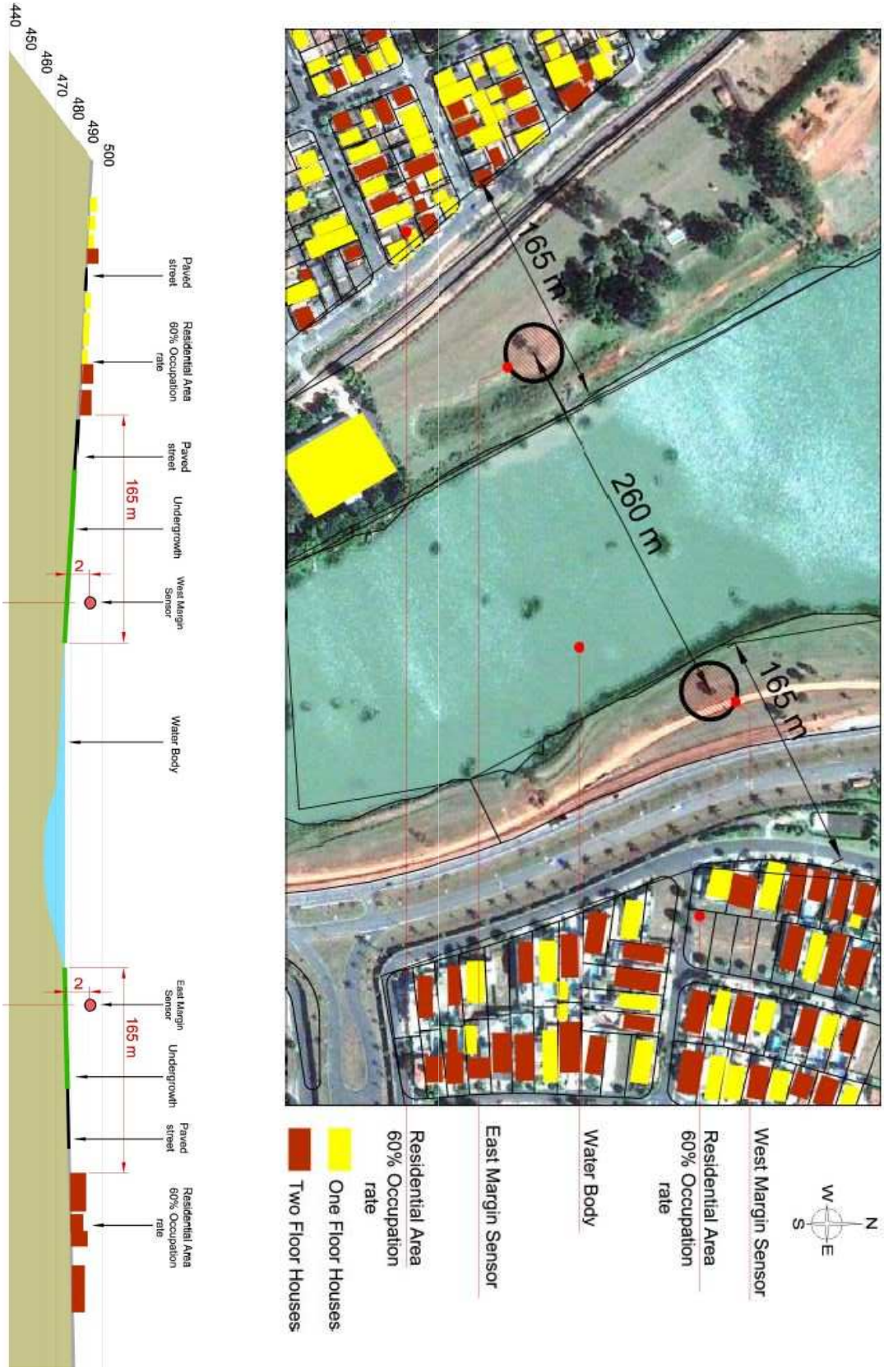
- The action of prevailing winds may provide necessary energy to facilitate the evaporative cooling process.

- As long as the wind makes contact with the water surface, water droplets may spread throughout the urban environment and may contribute to reducing the temperature and increasing the absolute humidity in their neighborhoods.

- The effect of adiabatic direct evaporative cooling related to water bodies can contribute to decreasing the air temperature and increasing the humidity index.


20° 48' S
49° 22'
URBAN CITY CENTER
Rio Preto Creek
ROAD SP 310 - SÃO PAULO
ROAD BR 153 BRASÍLIA
URBAN SITE
URBAN PERIMETER
6,5 km
CIIAGRO IAC WEATHER STATION
N
0
1 Km
3 Km
7 Km

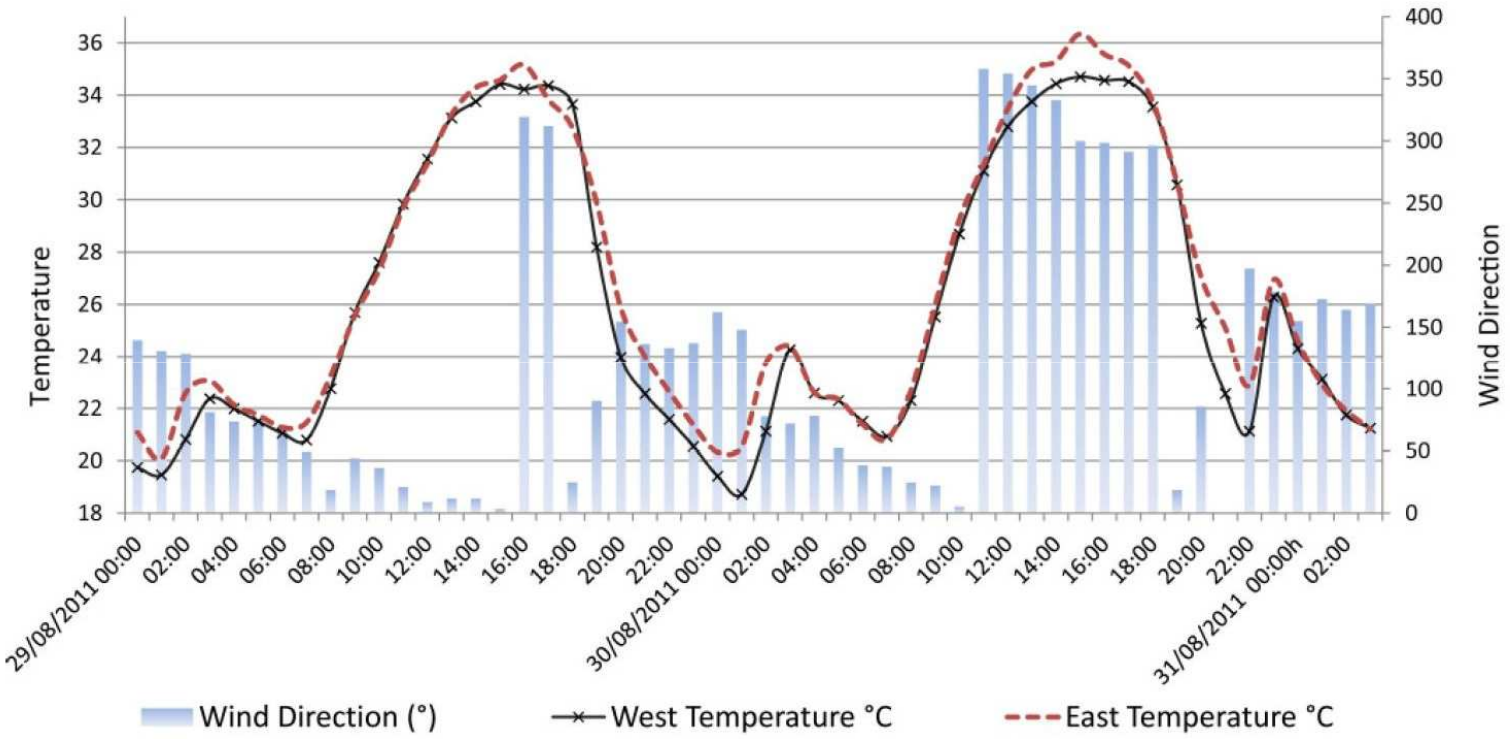
METHOD


440
450
460
470
480
490
500
Paved street
Residential Area 60% Occupation rate
Paved street
Undergrowth
West Margin Sensor
Water Body
East Margin Sensor
Undergrowth
Paved street
Residential Area 60% Occupation rate
165 m
165 m
2
2
165 m
260 m
165 m
West Margin Sensor
Residential Area 60% Occupation rate
Water Body
East Margin Sensor
Residential Area 60% Occupation rate
One Floor Houses
Two Floor Houses
N
W
E
S

METHOD

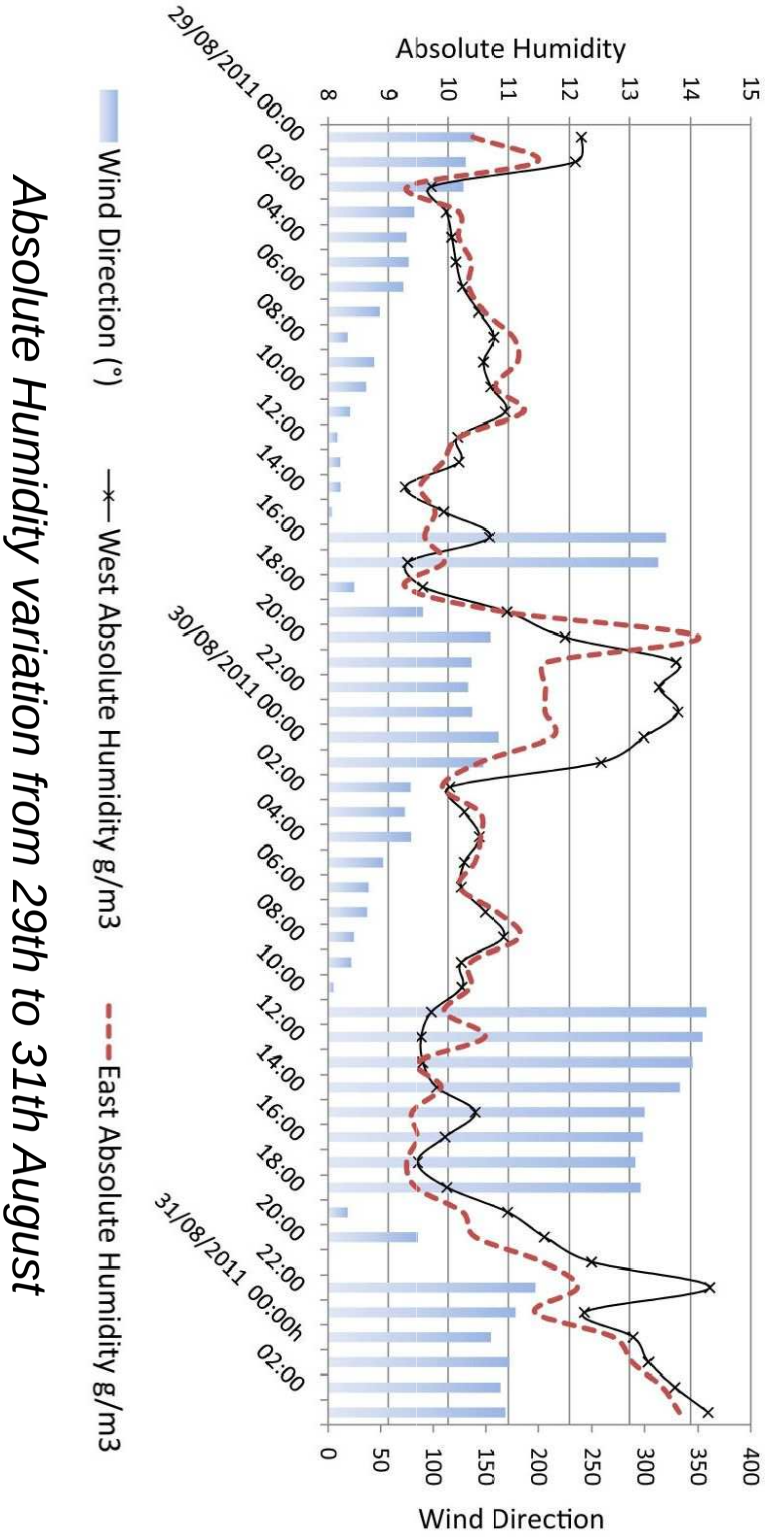
Input data applied to the ENVI-met model

Contents	Input values
Wind Speed at 10 m Ground	2 m/s
Southeast Wind Direction	178°
Initial Temperature Atmosphere	299.99K
Specific Humidity at 2500m	10g Water/kg air
Relative Humidity at 2m	65%
Model size	180x180x20m
Height of buildings	Z = between 5 and 10m
Grid	2 x 2m
Latitude	20°49'11" South
Longitude	49°22'46" West



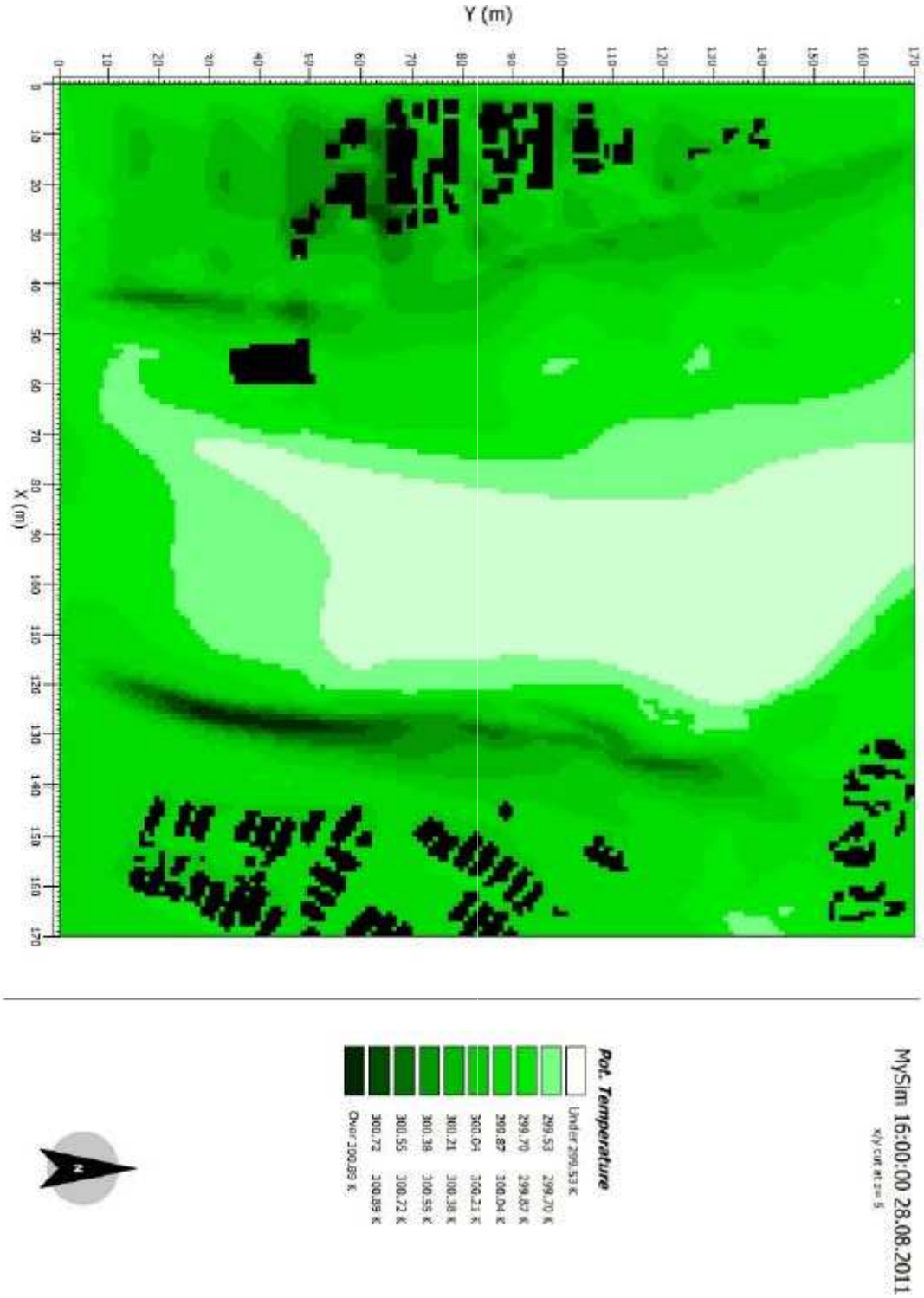
Temperature variation from 29th to 31th August

RESULTS



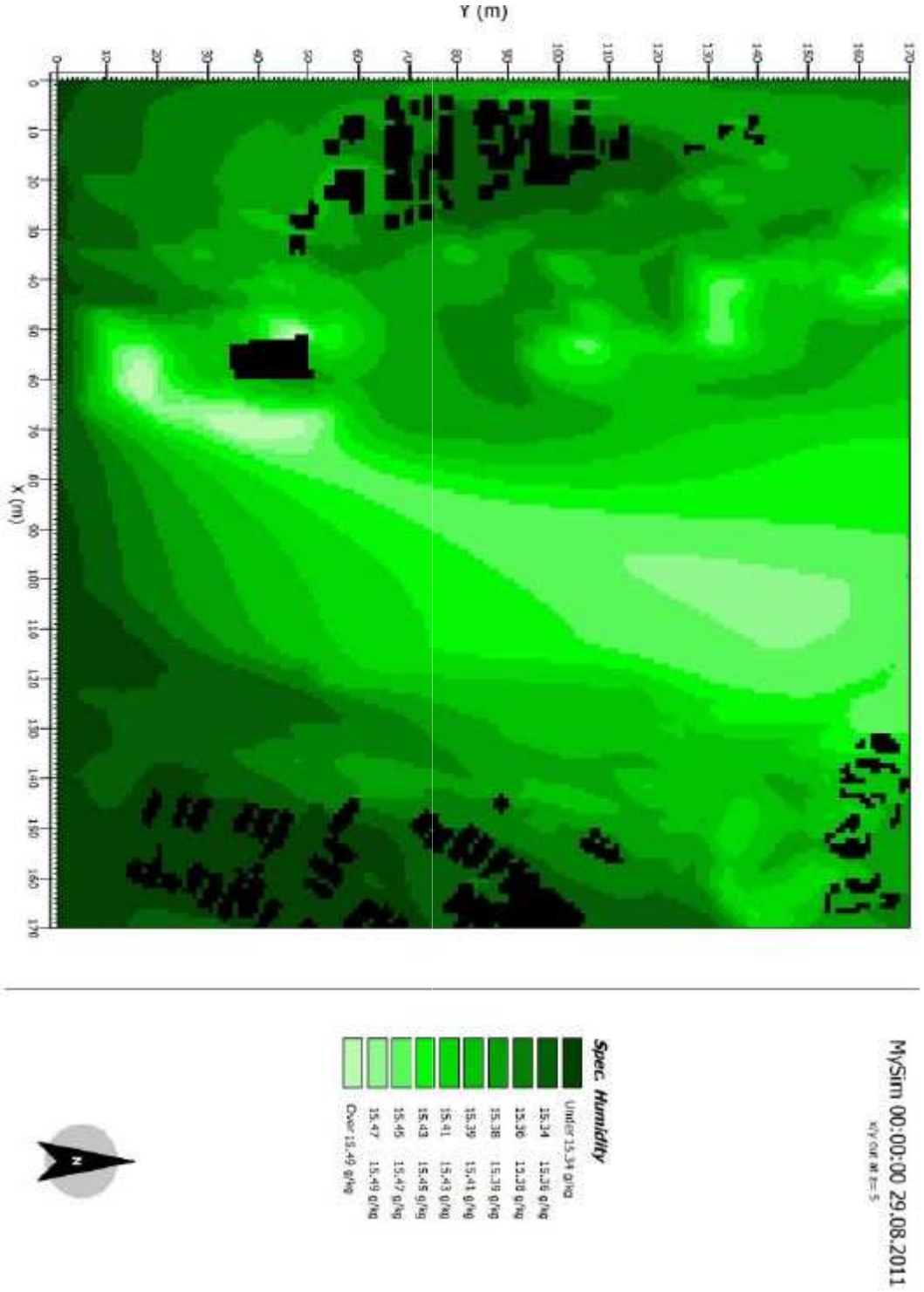
Absolute Humidity variation from 29th to 31th August

RESULTS



Temperature map variation at 16:00h

RESULTS



Absolute Humidity variation at 0:00h

RESULTS

RESULTS

- It was observed that as the wind blows in a predominantly Southeastern direction, and during Northeastern and Northwestern gusts of wind, the temperatures and absolute humidity on **the east bank tend to be higher than the values found on the west bank**.

- On average, throughout the experiment, it was found that the combination of winds with the water supply in the environment was able to keep **the western margin 0.5℃** colder and with absolute humidity **0.4 g / m³ higher than the eastern one**.

CONCLUSION

- **There is evidence that the dam is an important element to maintain thermal quality of the urban air increasing humidity levels and having direct influences on its surroundings.**

- **Thus, the water bodies may play an important role in mitigating harmful effects of urban heat waves in cities**

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THANKS FOR YOUR ATTENTION!

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