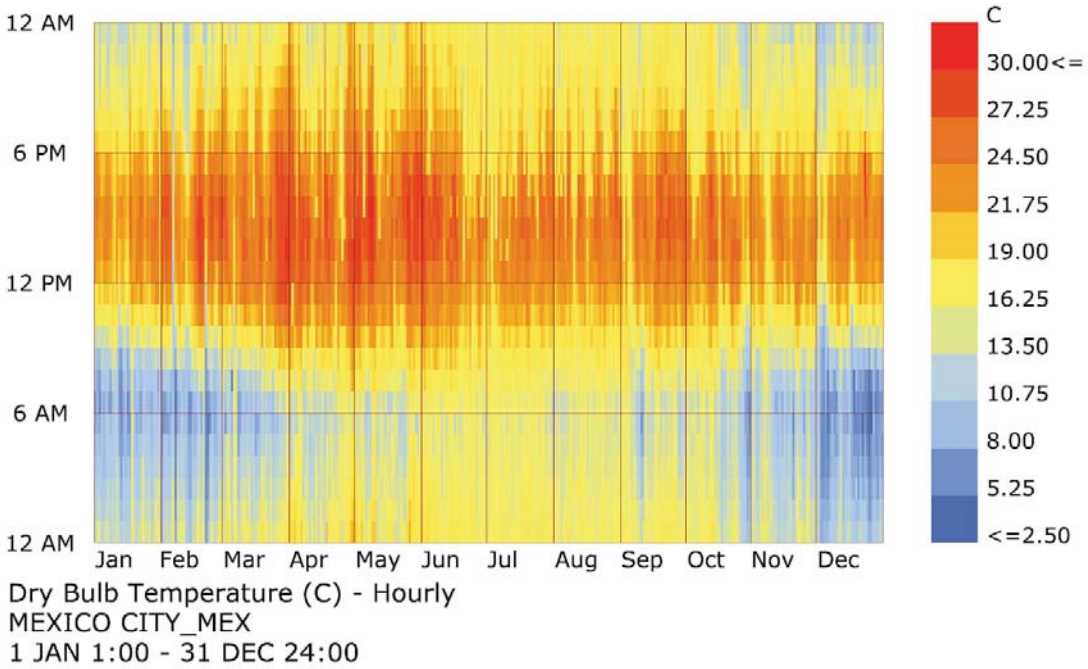
Building Simulation Final Assignment

Mexico City_ Fang Cai

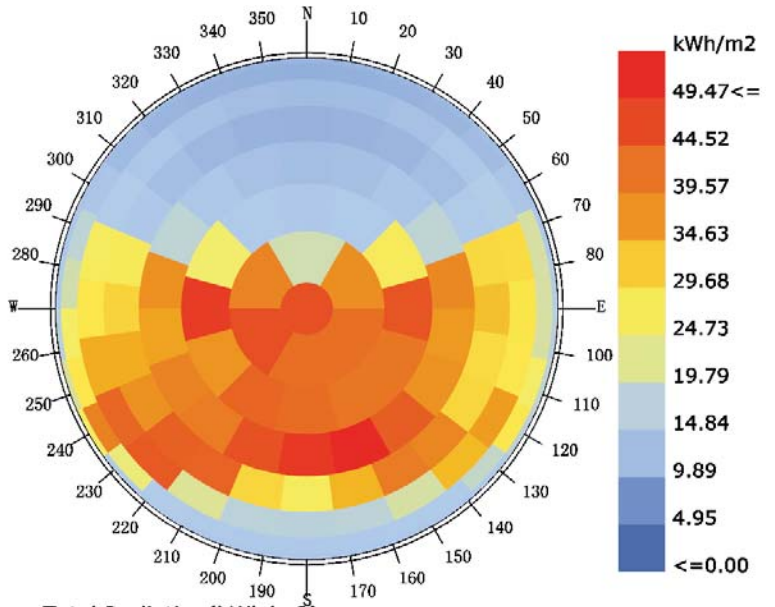
Mexico City
General climate data

Temperature



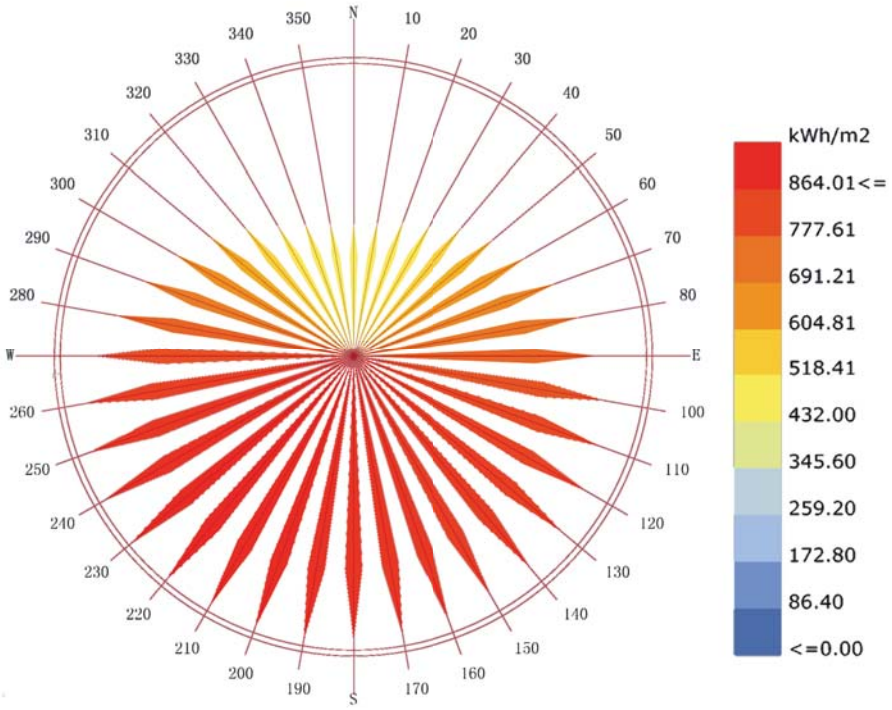
Dry Bulb Temperature (C) - Hourly
MEXICO CITY_MEX
1 JAN 1:00 - 31 DEC 24:00

Total Radiation



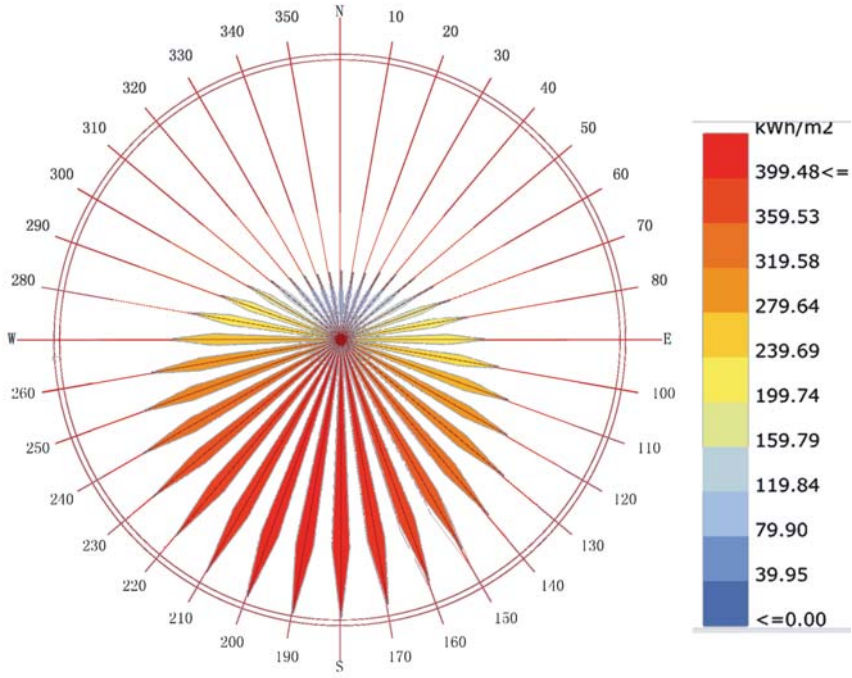
Total Radiation(kWh/m2)
MEXICO_CITY_MEX
1 JAN 1:00 - 31 DEC 24:00

Total Radiation



Total Radiation(kWh/m2)
MEXICO_CITY_MEX
1 JAN 1:00 - 31 DEC 24:00

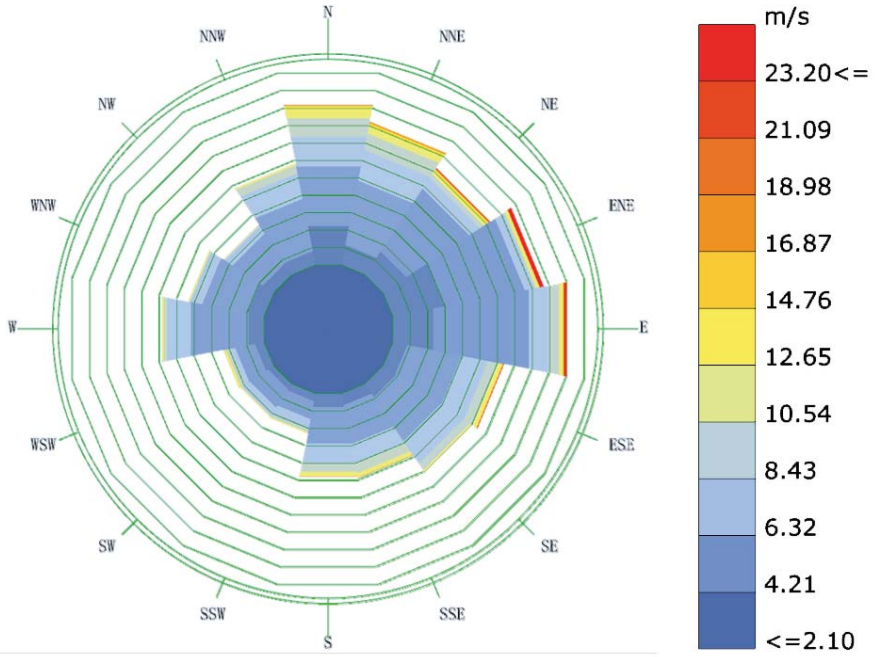
Winter Radiation



Total Radiation(kWh/m2)
MEXICO_CITY_MEX
1 NOV 1:00 - 28 FEB 24:00

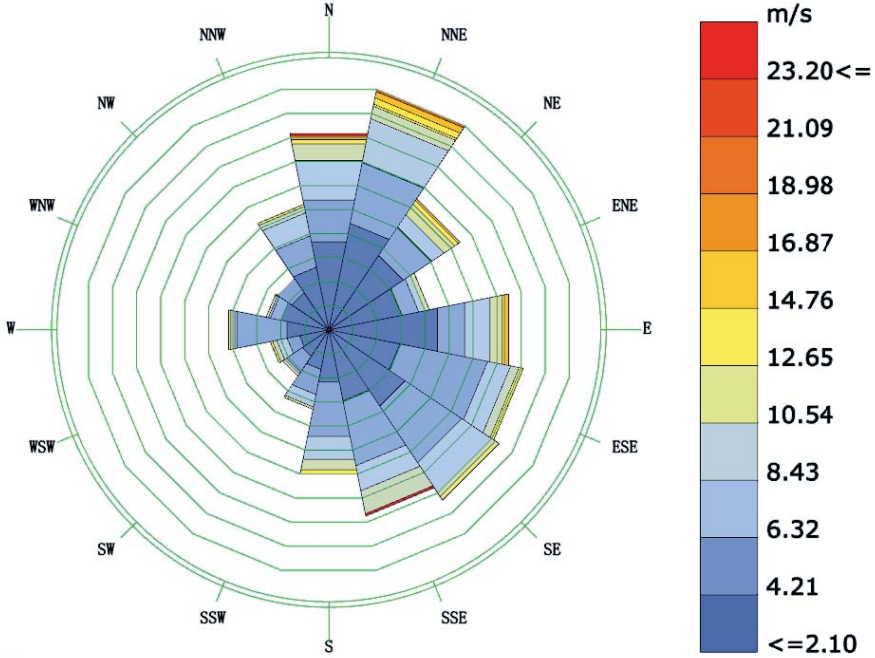
Mexico City
General climate data

Unfiltered Wind Rose



Wind-Rose
MEXICO CITY_MEX
1 JAN 1:00 - 31 DEC 24:00

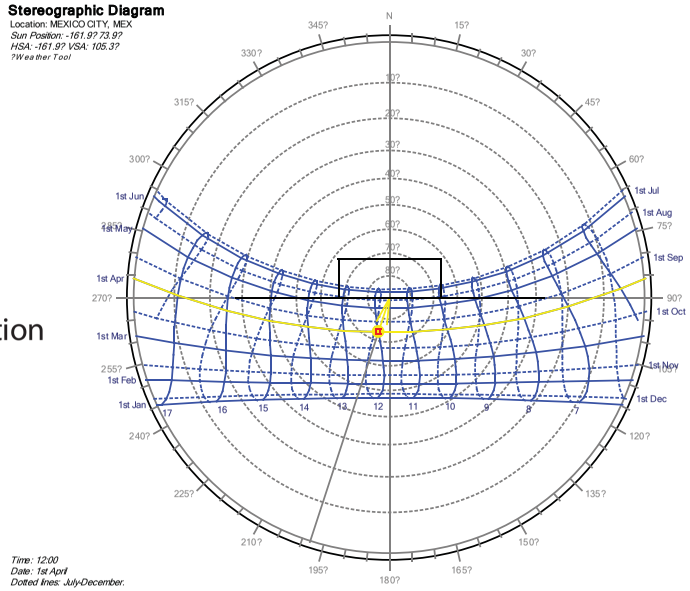
Filtered Wind Rose
Temp 18-22
Humidity<80
Speed<2



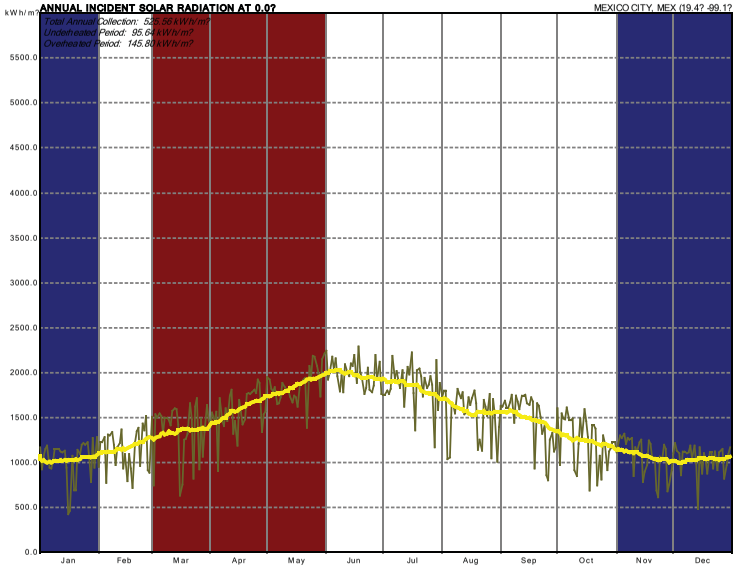
Wind-Rose
MEXICO CITY_MEX
1 JAN 1:00 - 31 DEC 24:00

Mexico City
General climate data

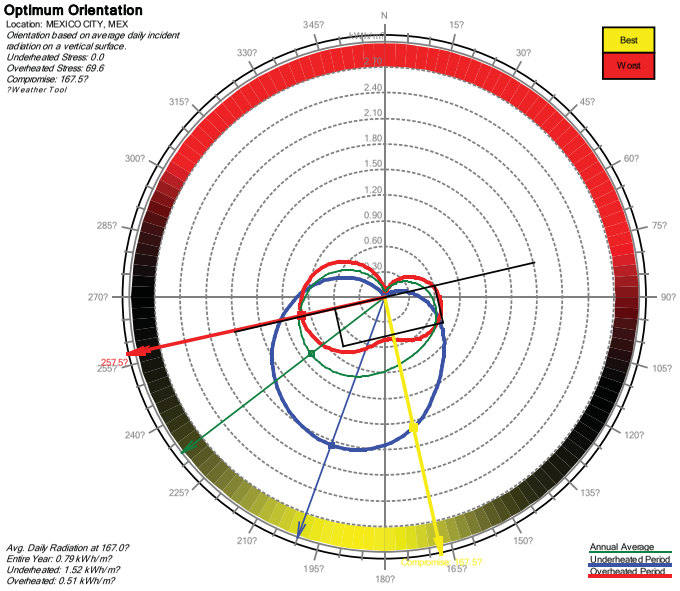
Random Orientation

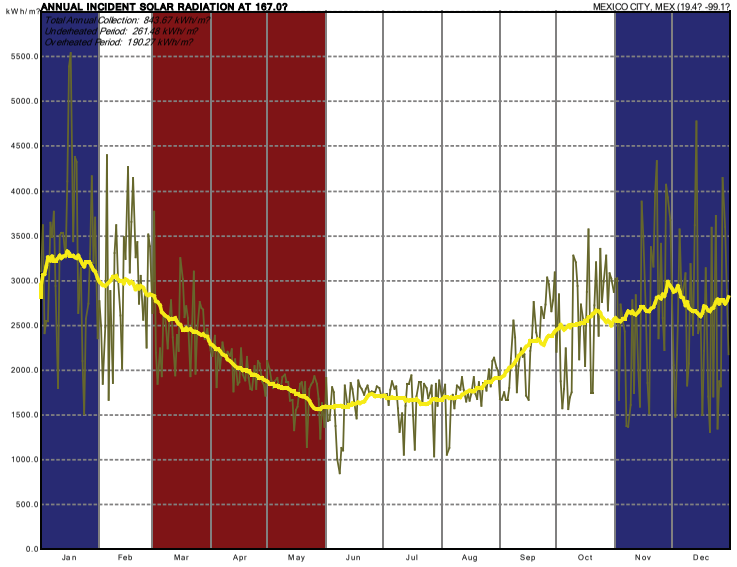


Radiation map



Best Orientation





PASSIVE DESIGN STRATEGY 1

NIGHT PURGE VENTILATION

Psychrometric Chart

Location: MEXICO CITY, MEX
Frequency: 1st January to 31st December
Weekday Times: 00:00-24:00 Hrs
Weekend Times: 00:00-24:00 Hrs
Barometric Pressure: 101.36 kPa
?Weather Tool

COMFORT: Natural Ventilation

comfort zone

modified comfort zone

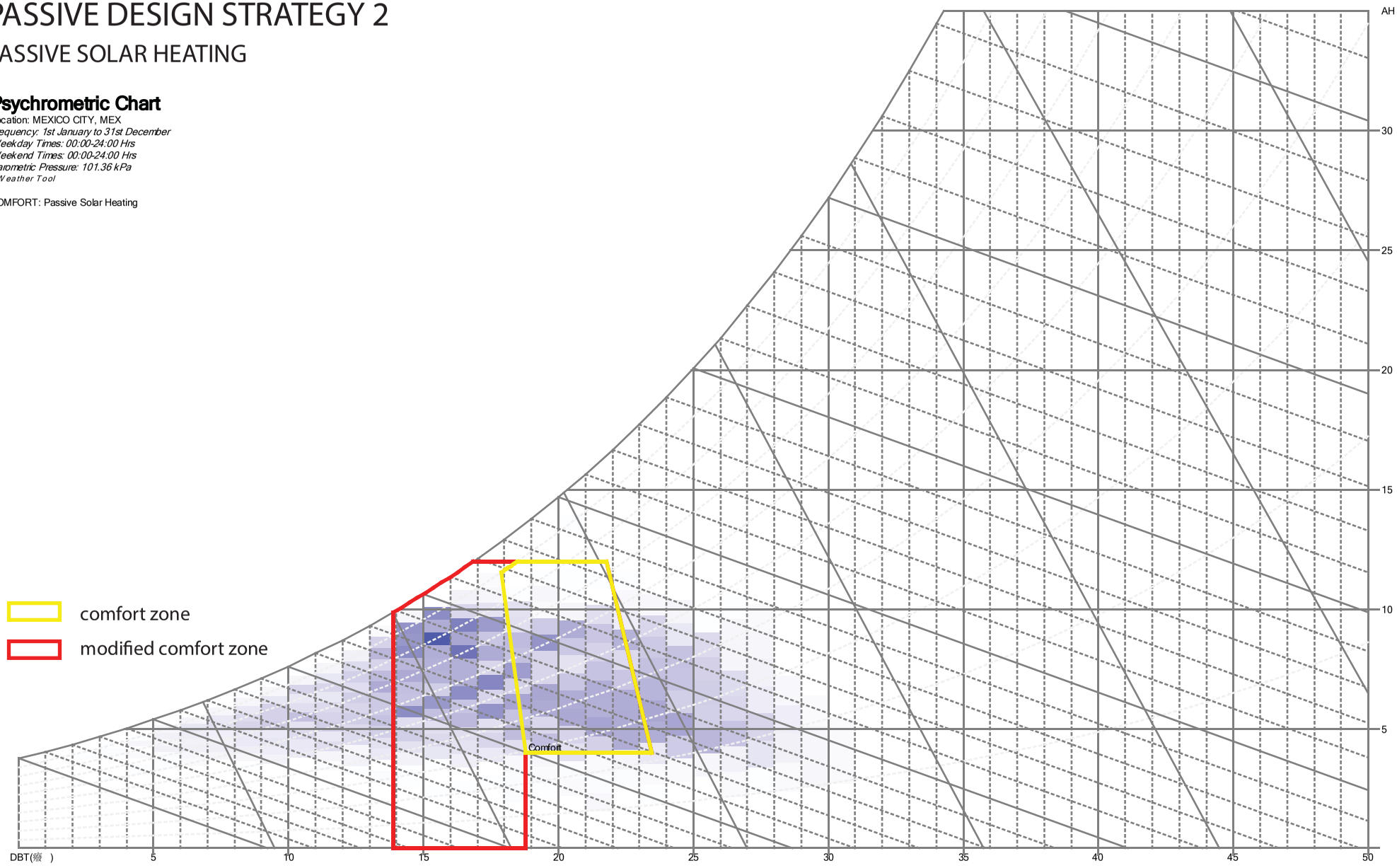
PASSIVE DESIGN STRATEGY 2

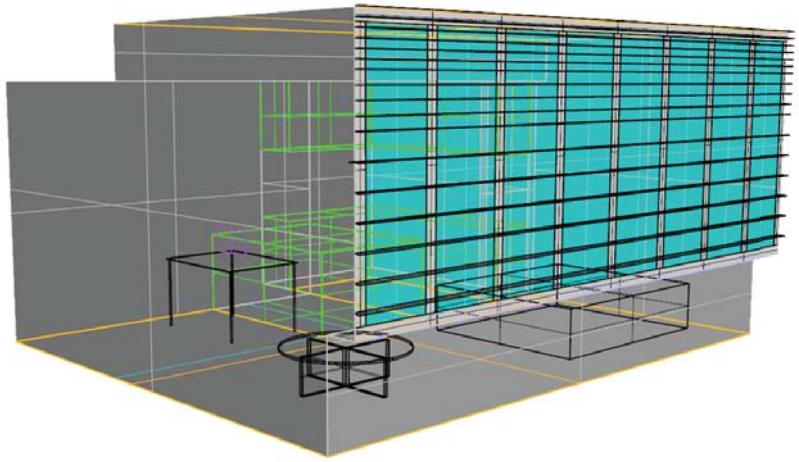
PASSIVE SOLAR HEATING

Psychrometric Chart

Location: MEXICO CITY, MEX
Frequency: 1st January to 31st December
Weekday Times: 00:00-24:00 Hrs
Weekend Times: 00:00-24:00 Hrs
Barometric Pressure: 101.36 kPa
?Weather Tool

COMFORT: Passive Solar Heating

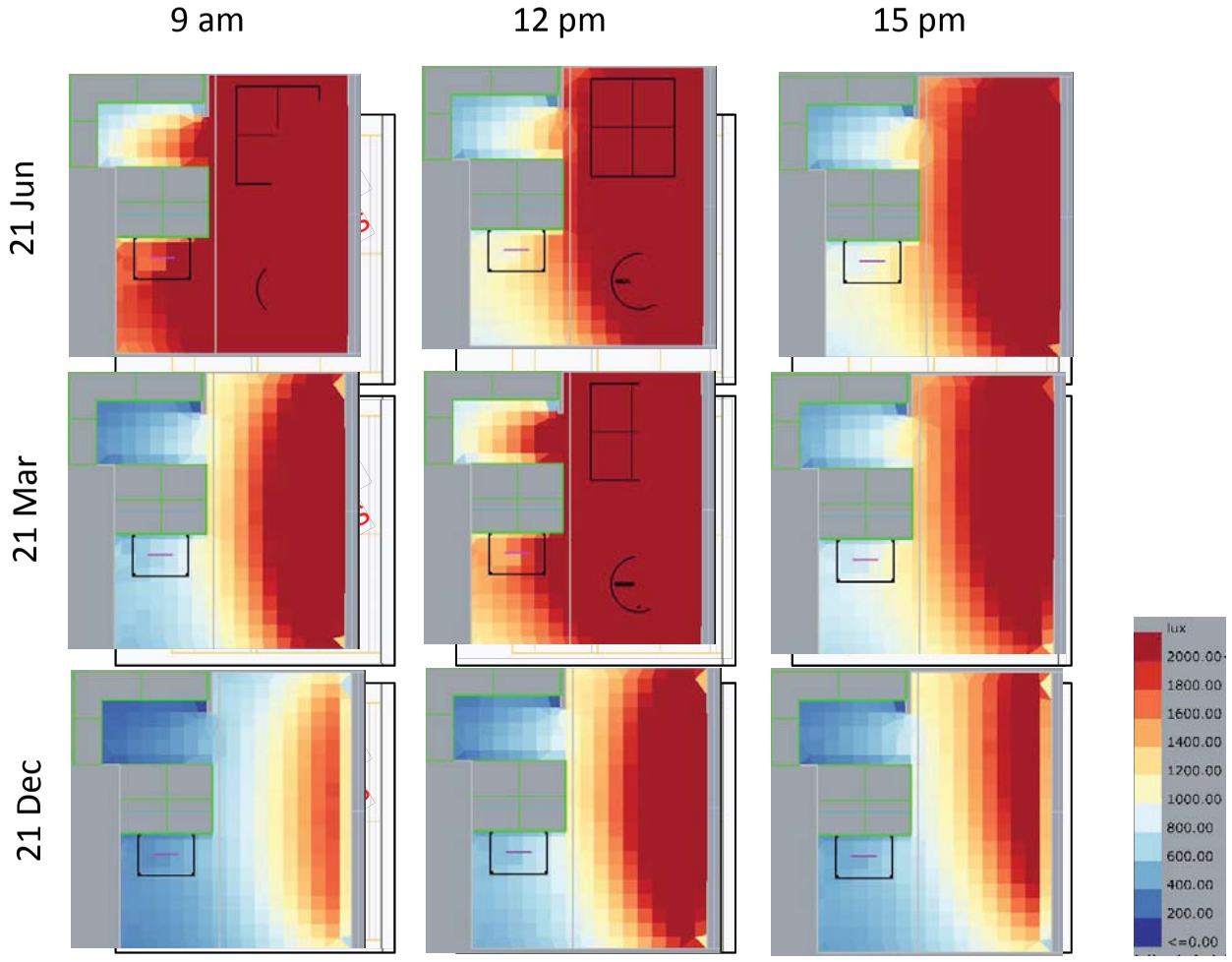


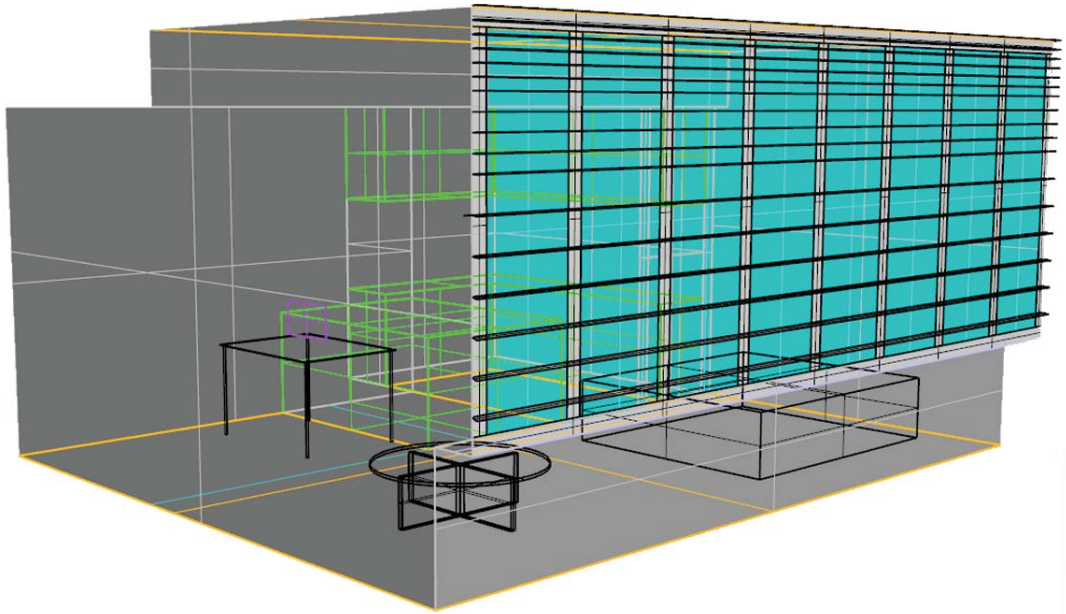


Base Model Running
Original Daylight Result

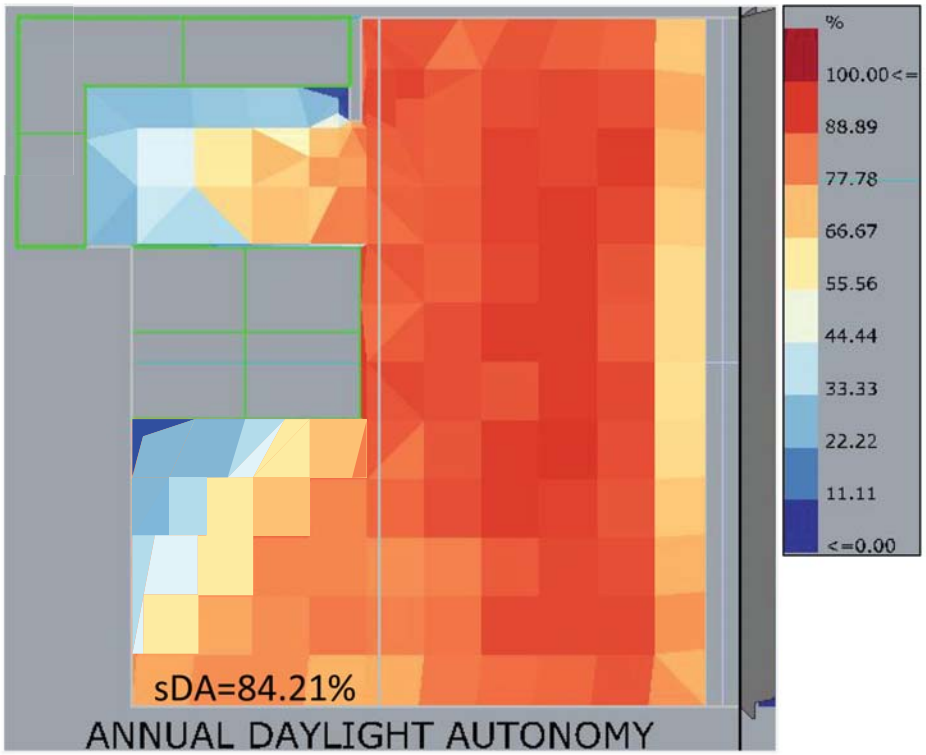
Image-based rendering for 21-Jun 12pm

Image-based rendering for 21-Dec 12pm



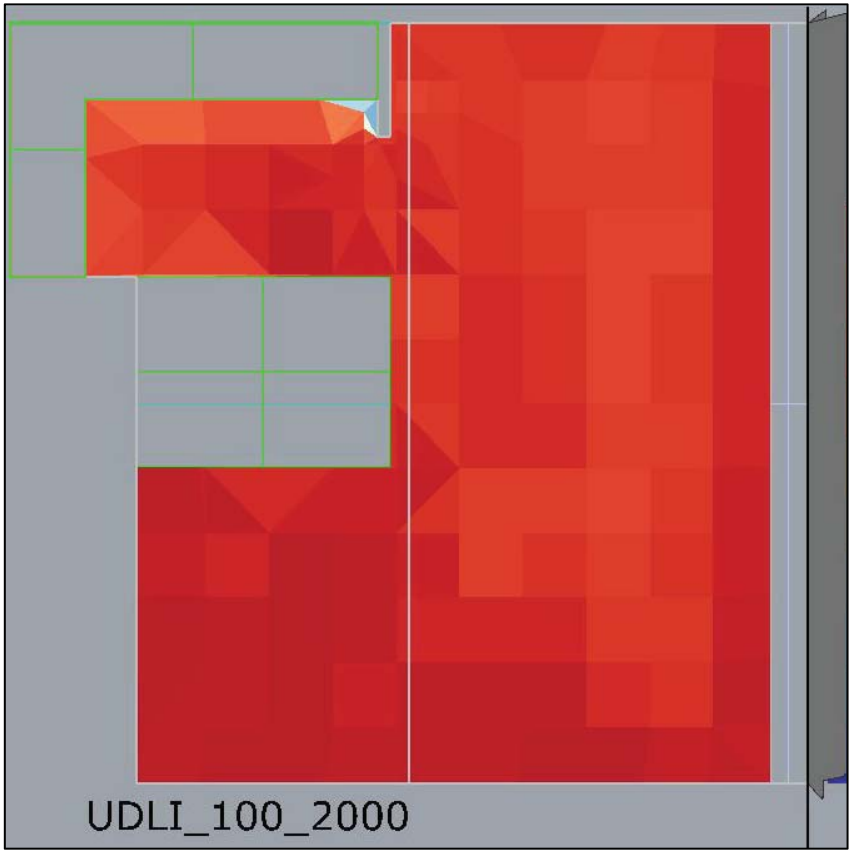


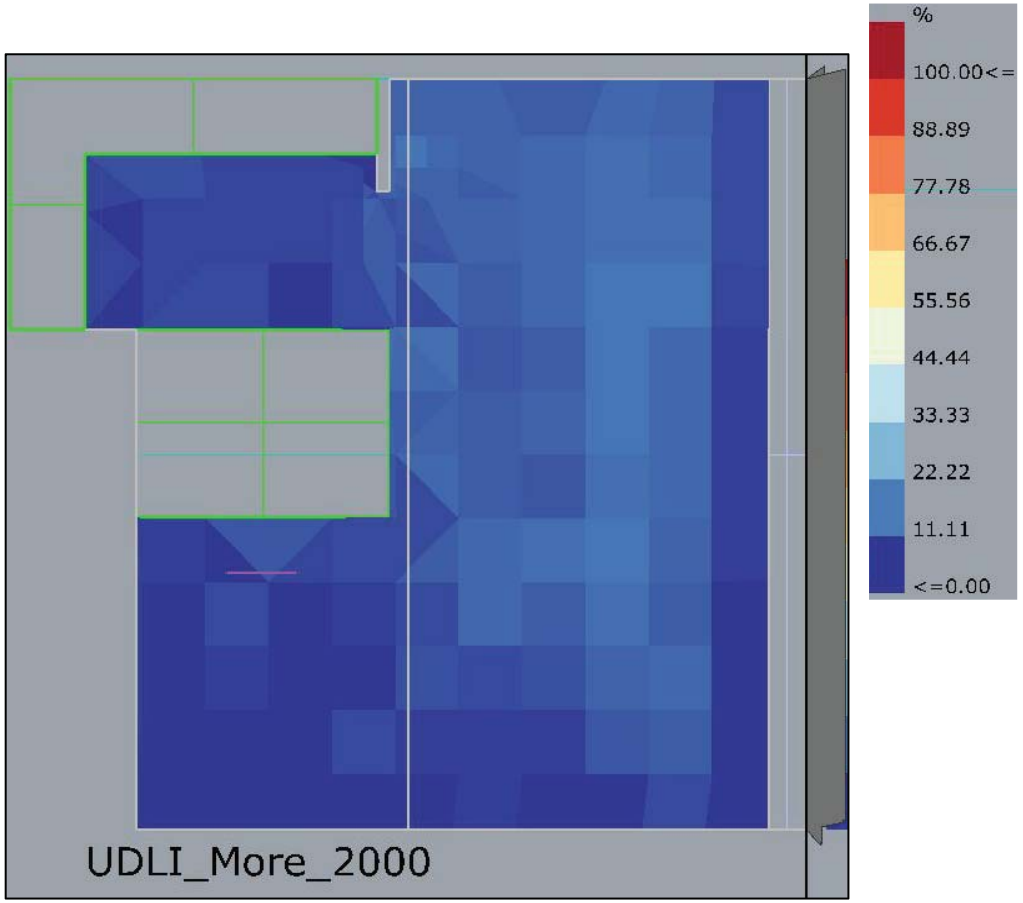
Annuak Daylight Autonomy



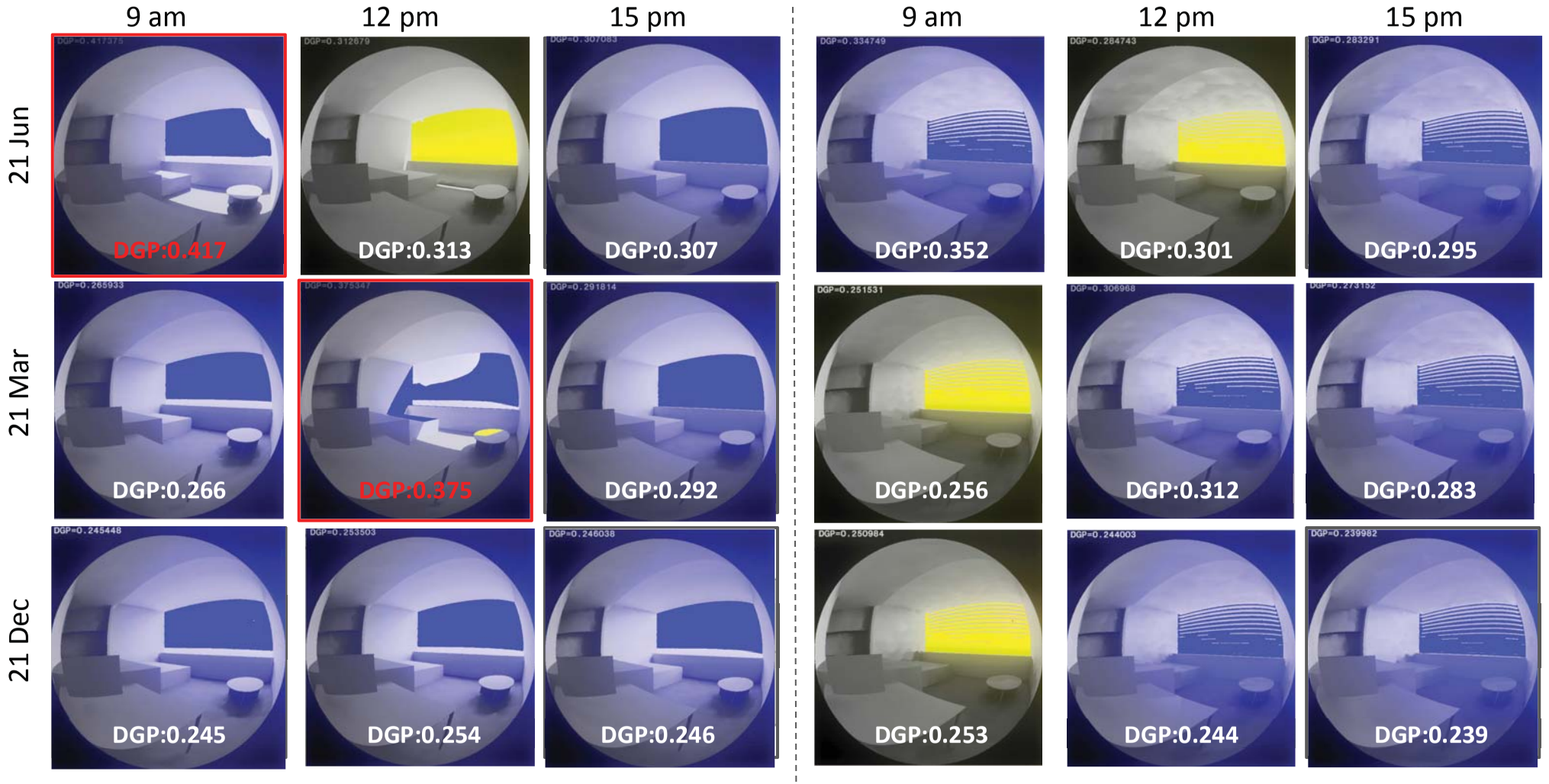
The shading design is generated by Shading designer in Ladybug which reflects to specific climate data from mexico city. The main aim for the device is to decrese the intense sunlight and visual glare from summer from June to Nov. A part from that adittional gradient shapes tries to blur the direct daylight bertter. I proposed double glazing which provides air gap in between, natural ventilation has been analyzed and good for indoor comfort which reletive to adptive comfort condition.

Useful Daylight Illuminance

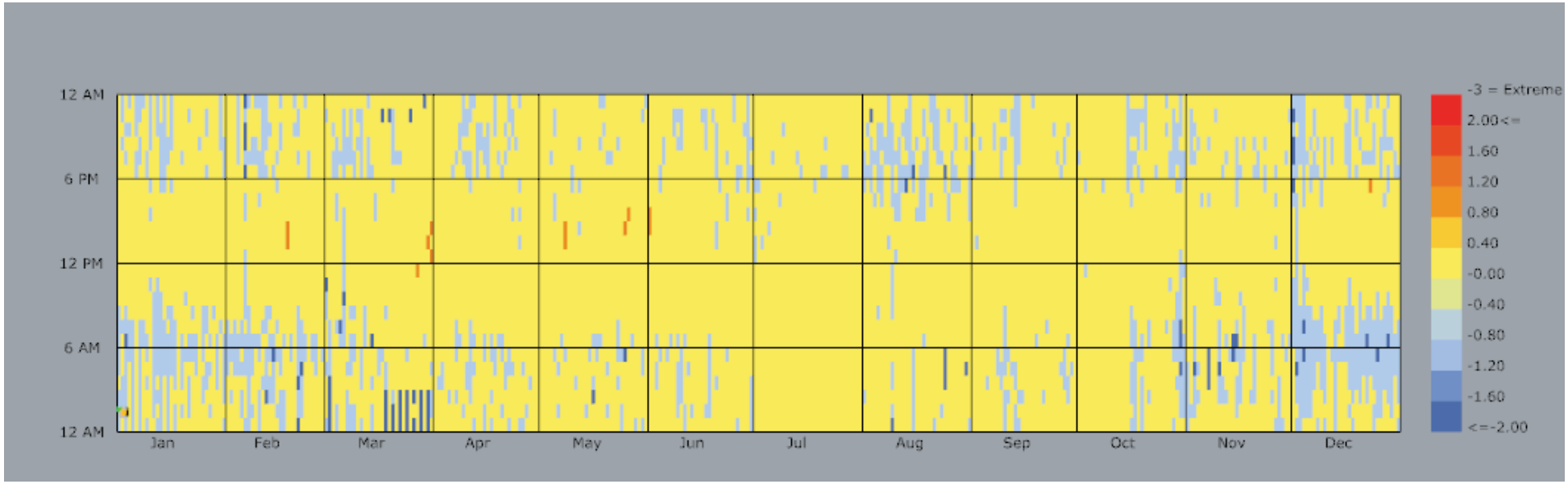




Daylight Glare Potential [GDP] Before and After

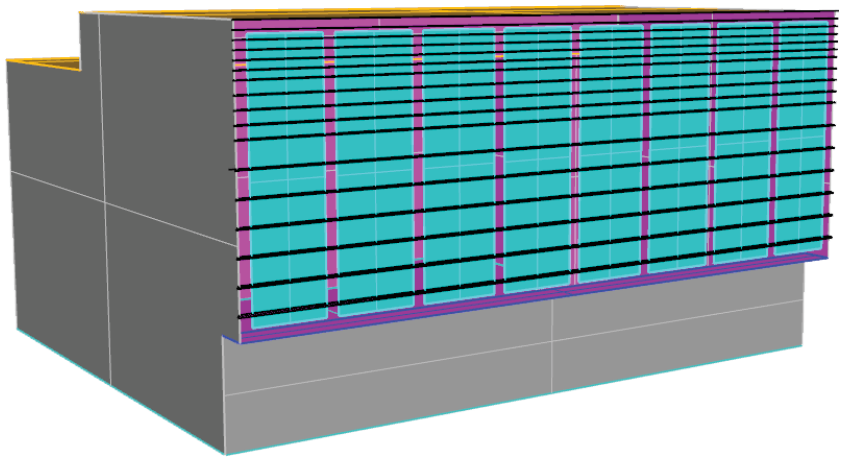


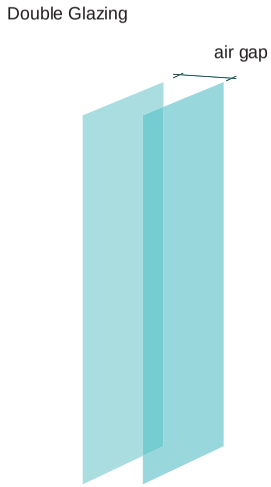
Outdoor Comfort

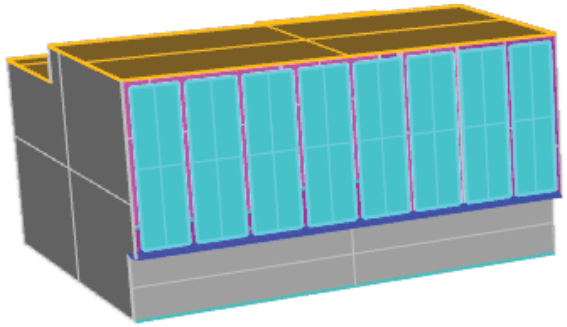


The Design Strategy

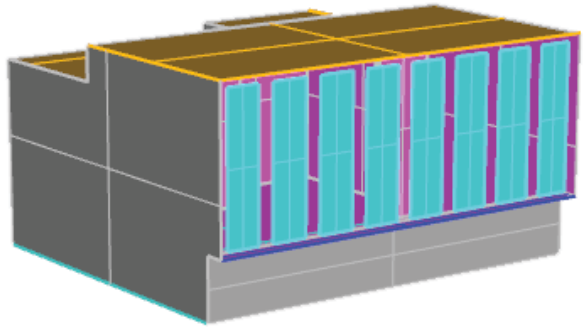
The shading divice is deisgned by ladybug and performces good, so the idea is to change the size of glass openning to check the comfort condition. And another change aspect is to change the paramenter of glass, double glazing air gap distance, and reflection, conductive numbers. In this case by changing both the size and materiality of the glass to performance better



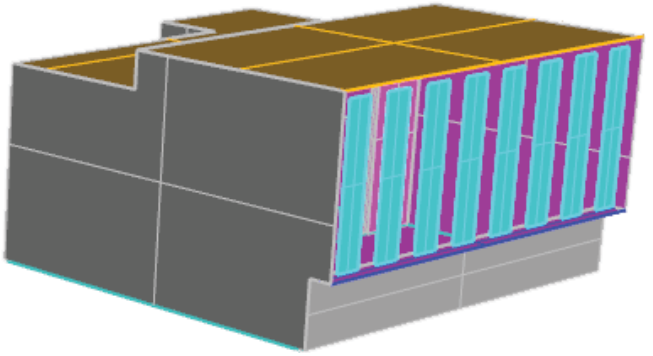




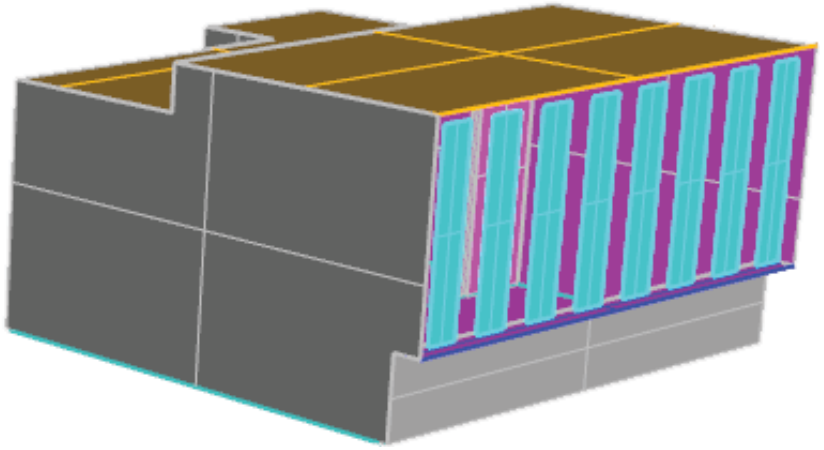
90%



72%



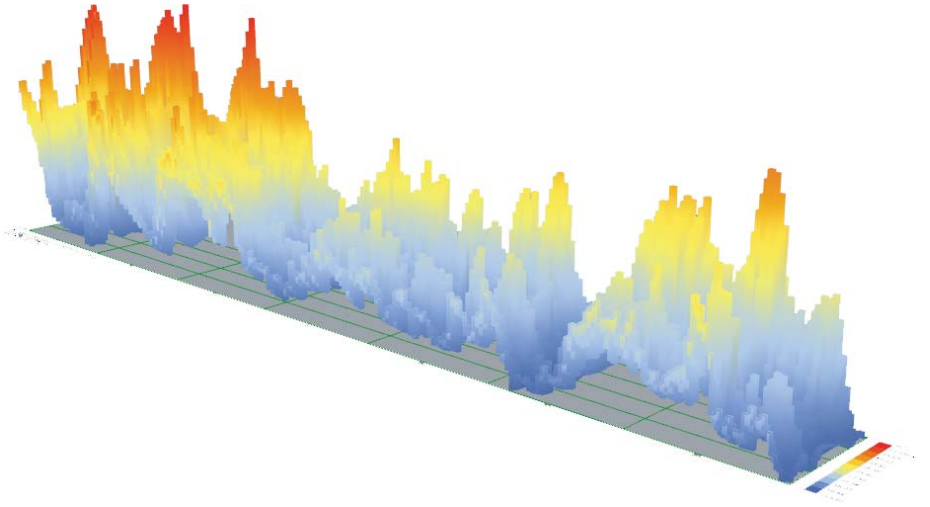
57%

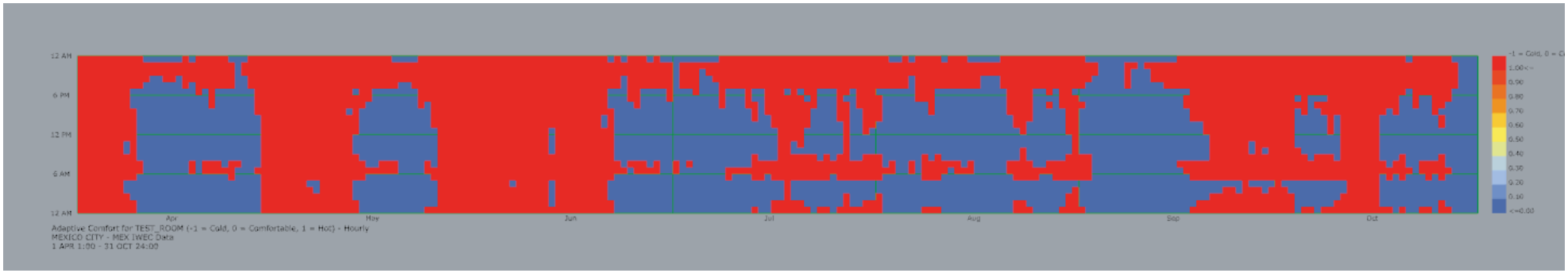


Air gap 0.5

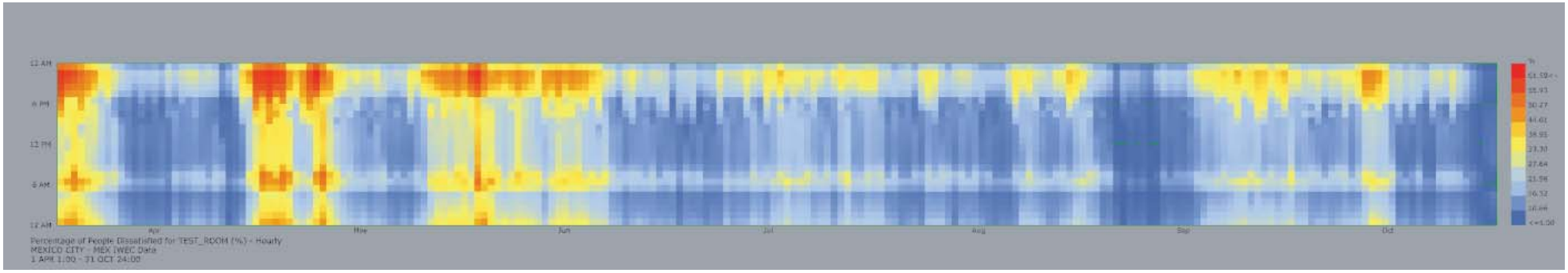
April-October

56% size

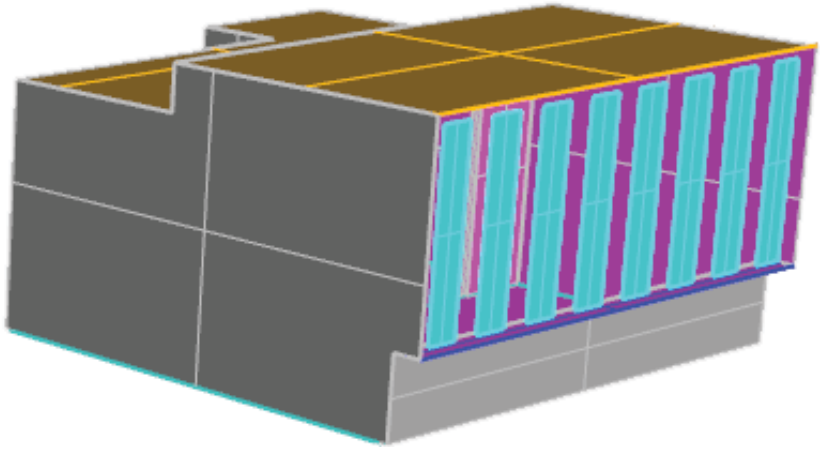




comfort percentage 46.1%
(without humidity)



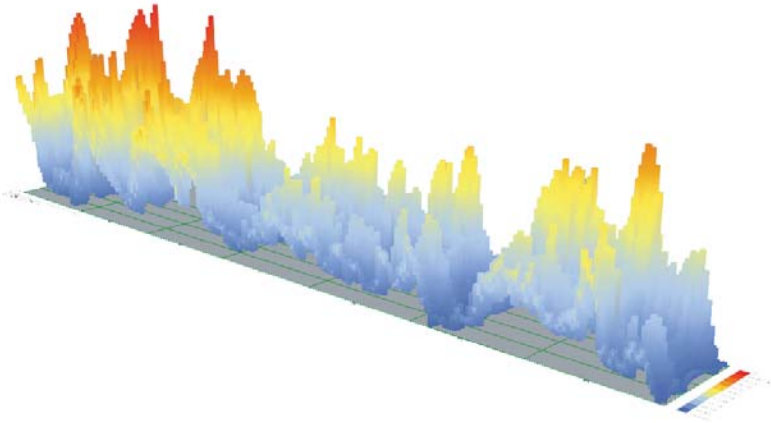
comfort percentage 16.8%
(relative humidity)

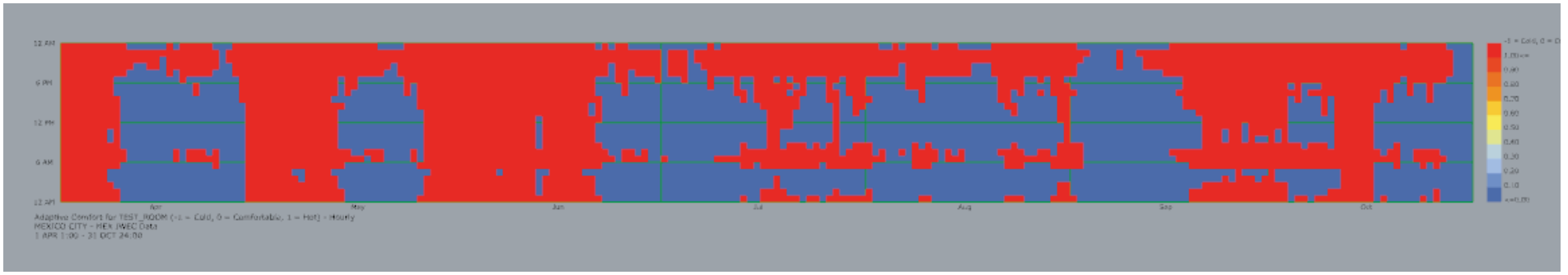


Air gap 0.7

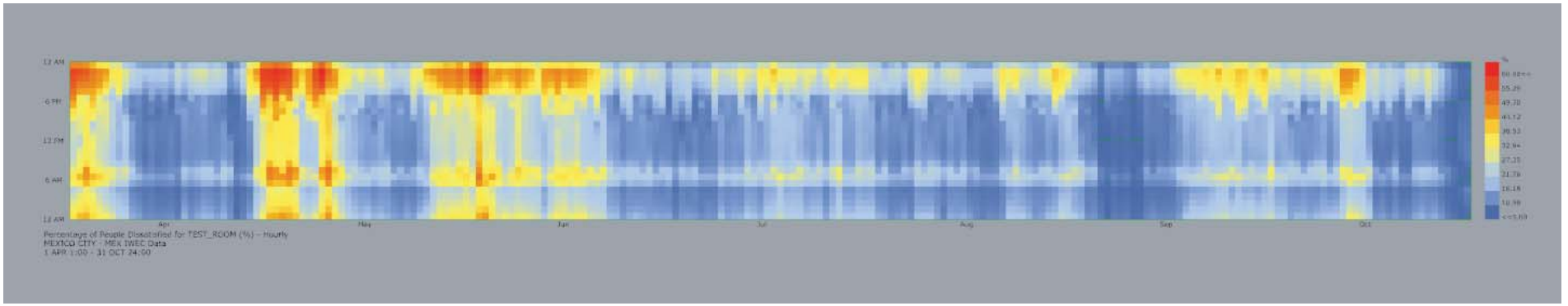
April-Octobe

56% size

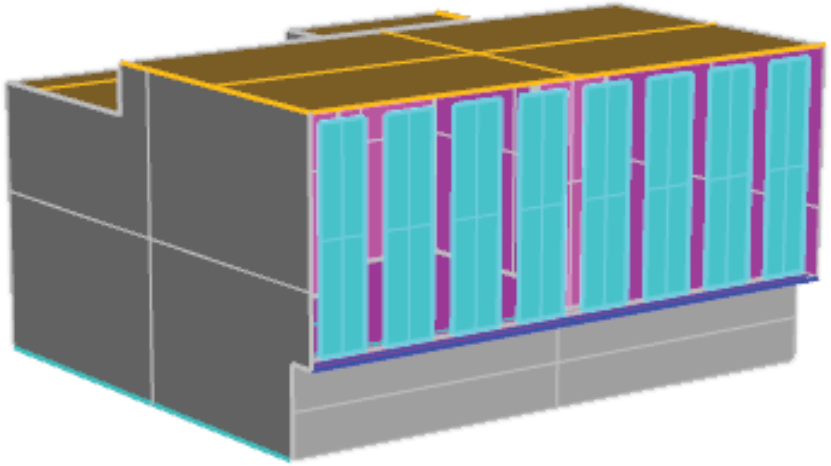


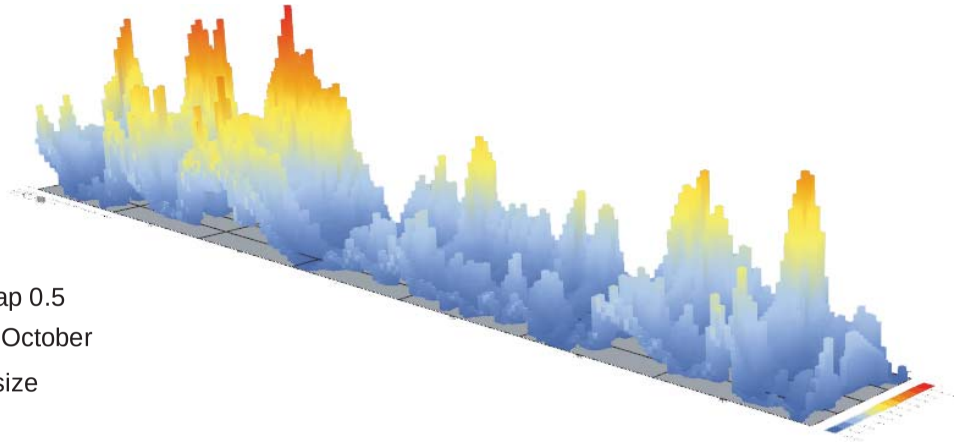


comfort percentage 48.2%
(without humidity)



comfort percentage 18.5%
(relative humidity)

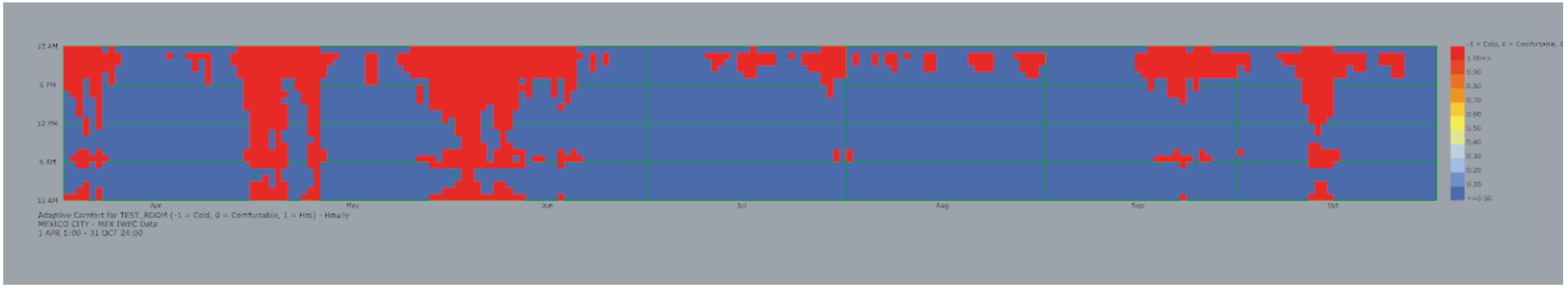




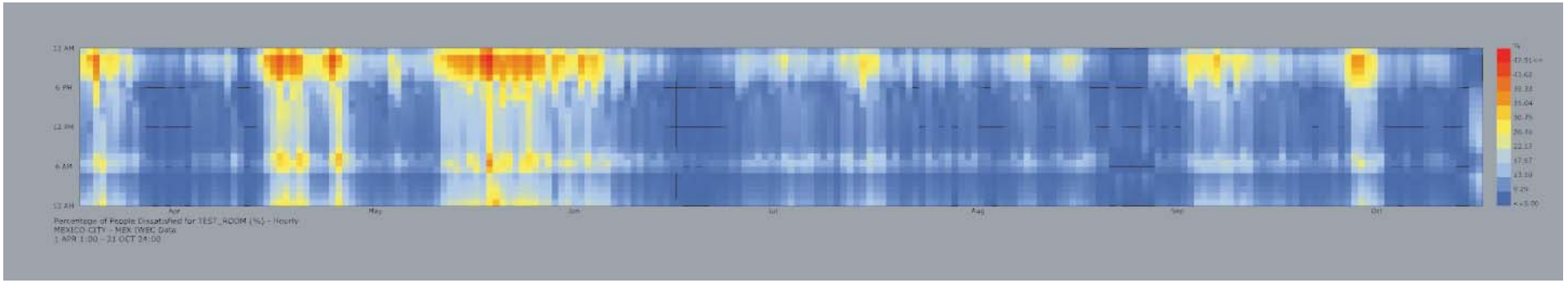
Air gap 0.5

April-October

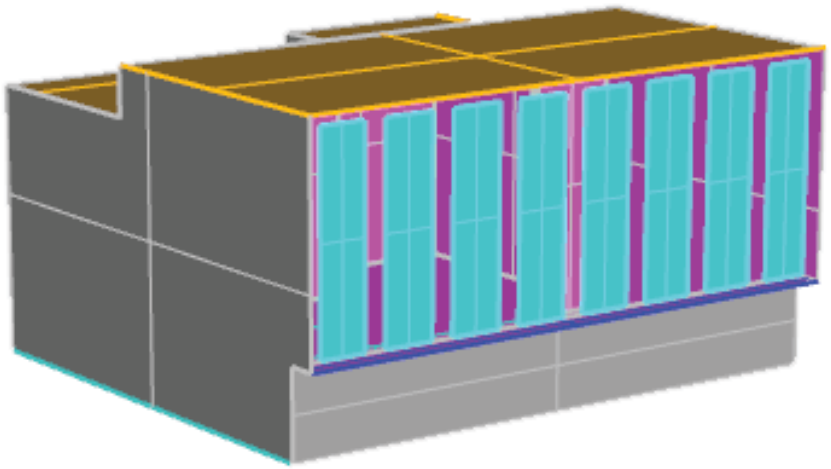
72%size



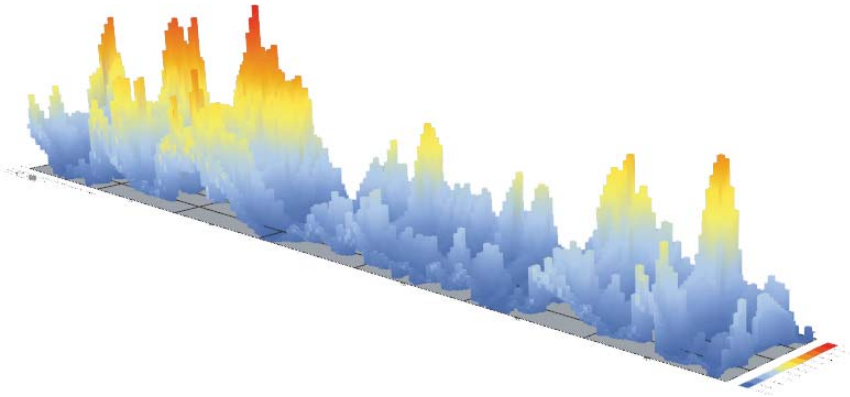
comfort percentage 80.4%
(without humidity)

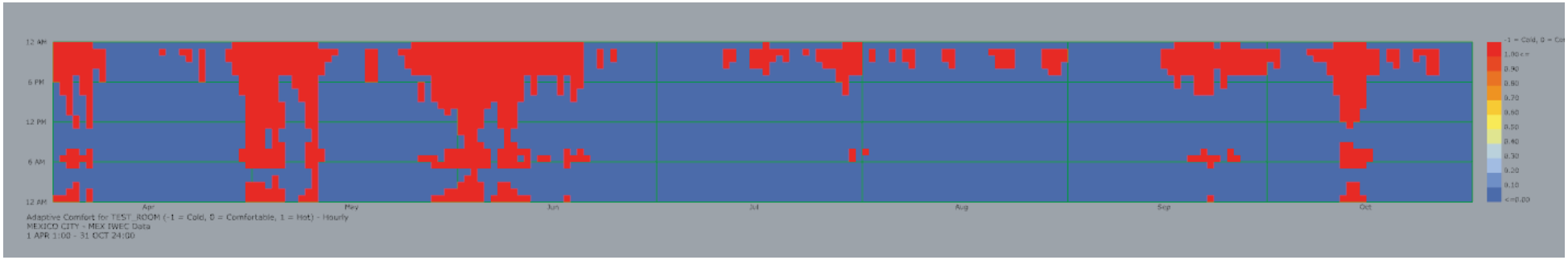


comfort percentage 55.6%
(relative humidity)

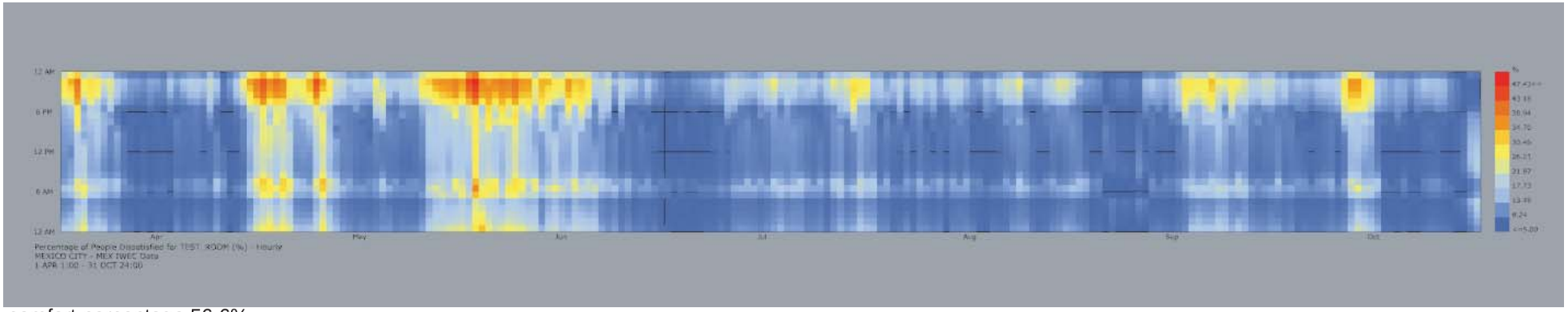


Air gap 0.7
April-Octob
72%size

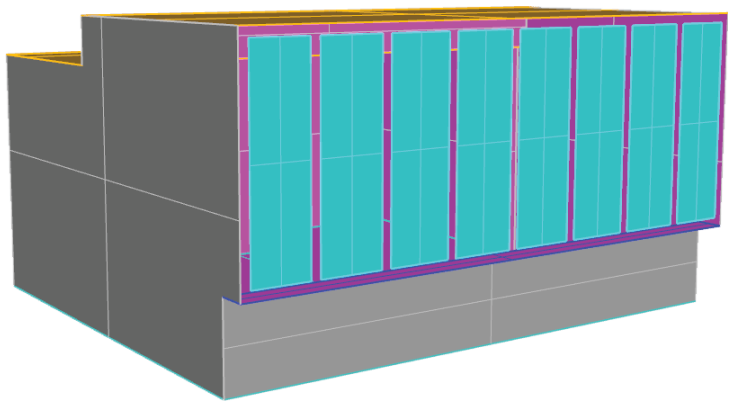




comfort percentage 81.4%
(without humidity)



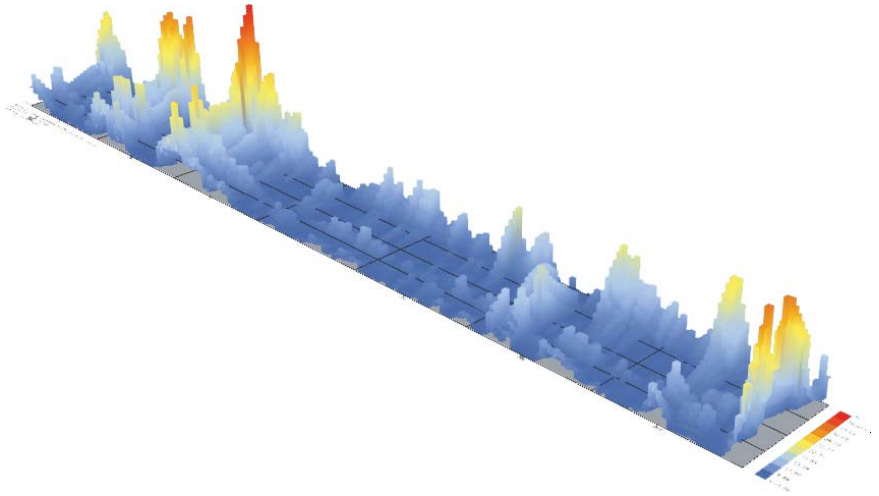
comfort percentage 56.6%
(relative humidity)

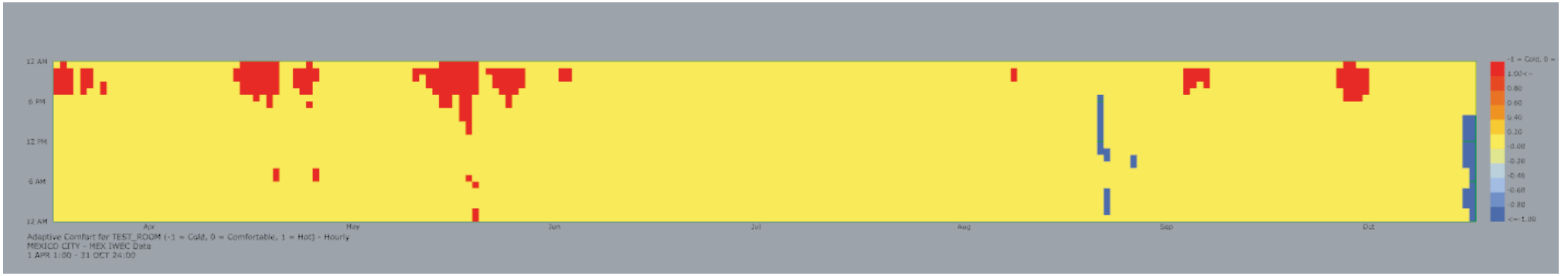


Air gap 0.5

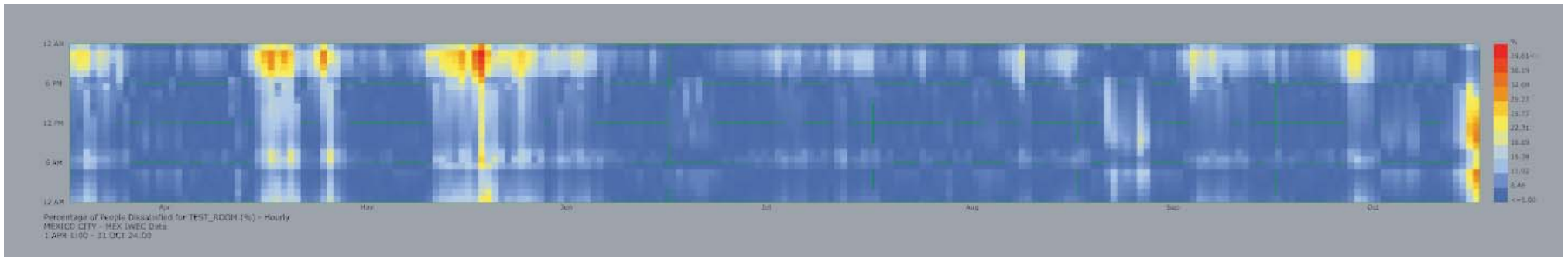
April-October

90% size

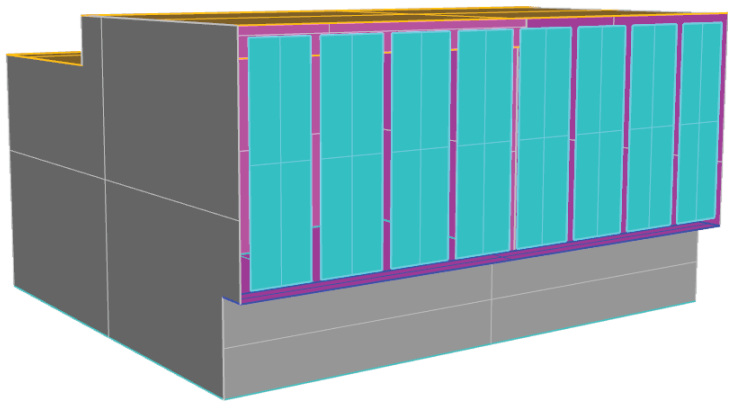




comfort percentage 95.3%
(without humidity)



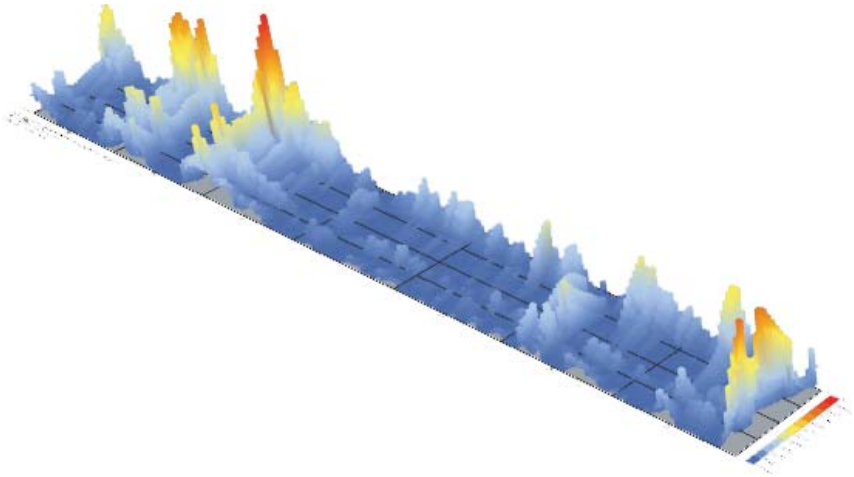
comfort percentage 83.6%
(relative humidity)



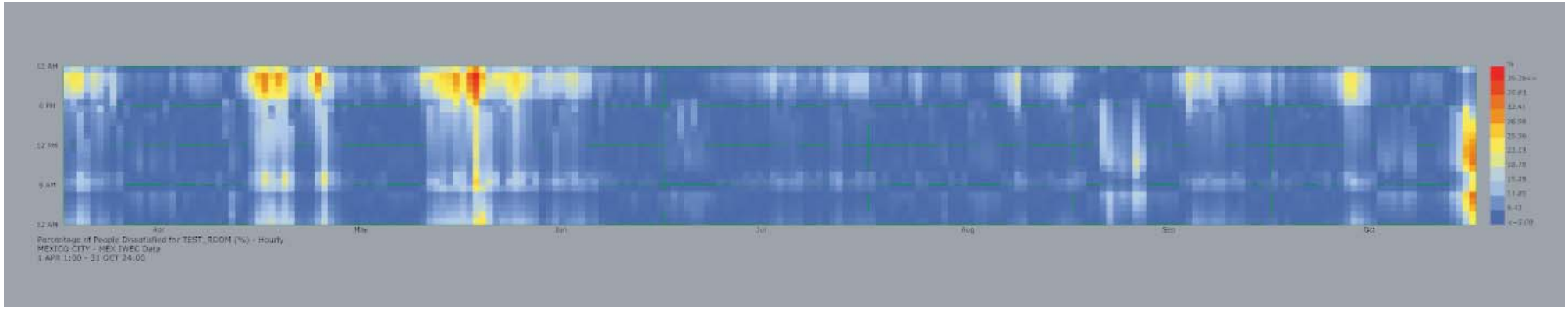
Air gap 0.7

April-October

90% size



comfort percentage 95.4%
(without humidity)



comfort percentage 84.2%
(relative humidity)