

Building Simulation Week 6 Assignment

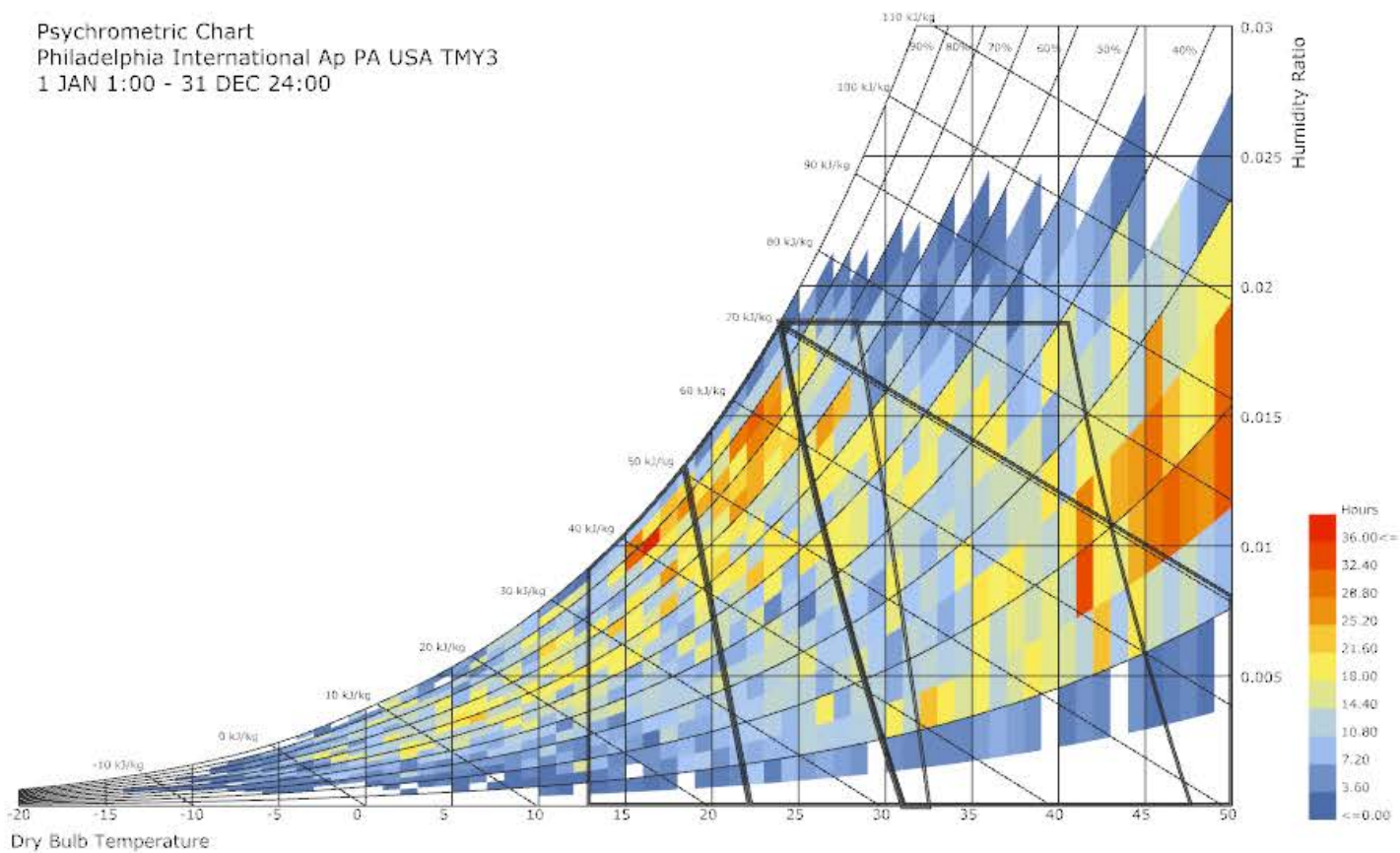
Energy Simulation

Jiyuan Liu 2016Fall

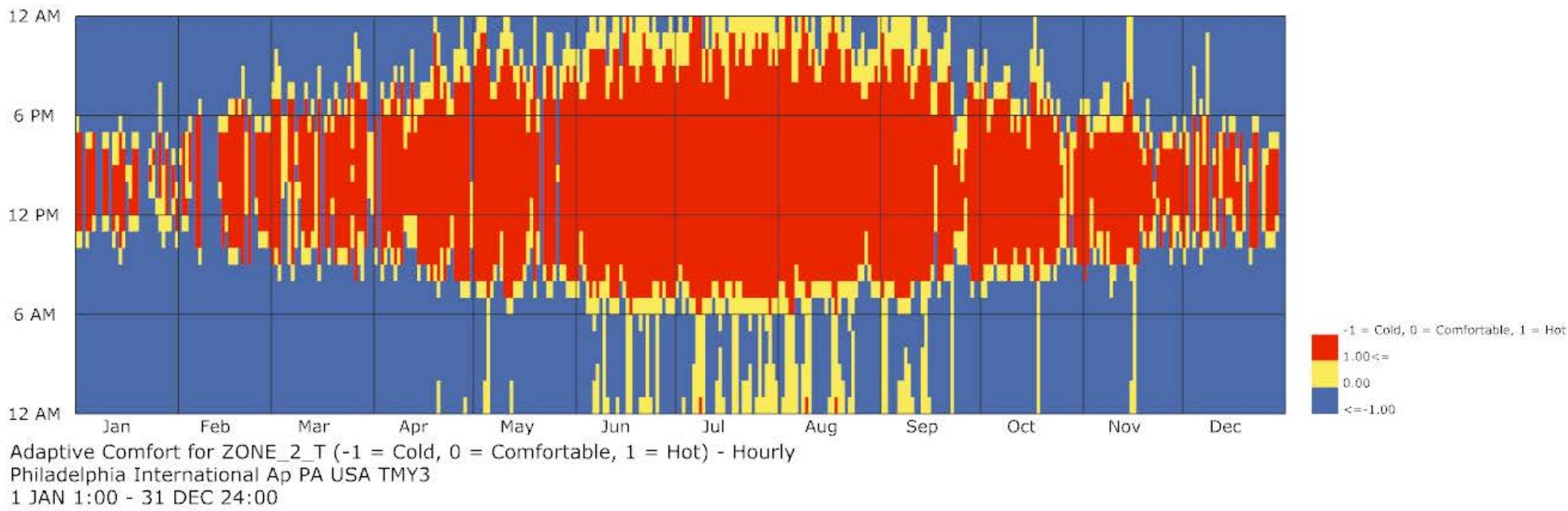
Parameters:

Rotation: 0
Window Glazing:
N: 0.5 W: 0.5 S: 0.5 E:0.5
Blinds: 0
Constrction:
Exterior Wall: R5.5 Roof: 9.2
Exterior WIndow: R1.0 SHGC:0.39
Airchagehour: 2.00
Termal Mass: N/A
The comfort time is 13.53% of the whole time.

I start with the default parameters and the diagram shows that there are a lot of hot moments in the afternoon during the summer. And cold moments appears in the morning and evening during spring and winter.



Comfortable (%): 13.53
hot (%): 36.08
cold (%): 50.39



Parameters:

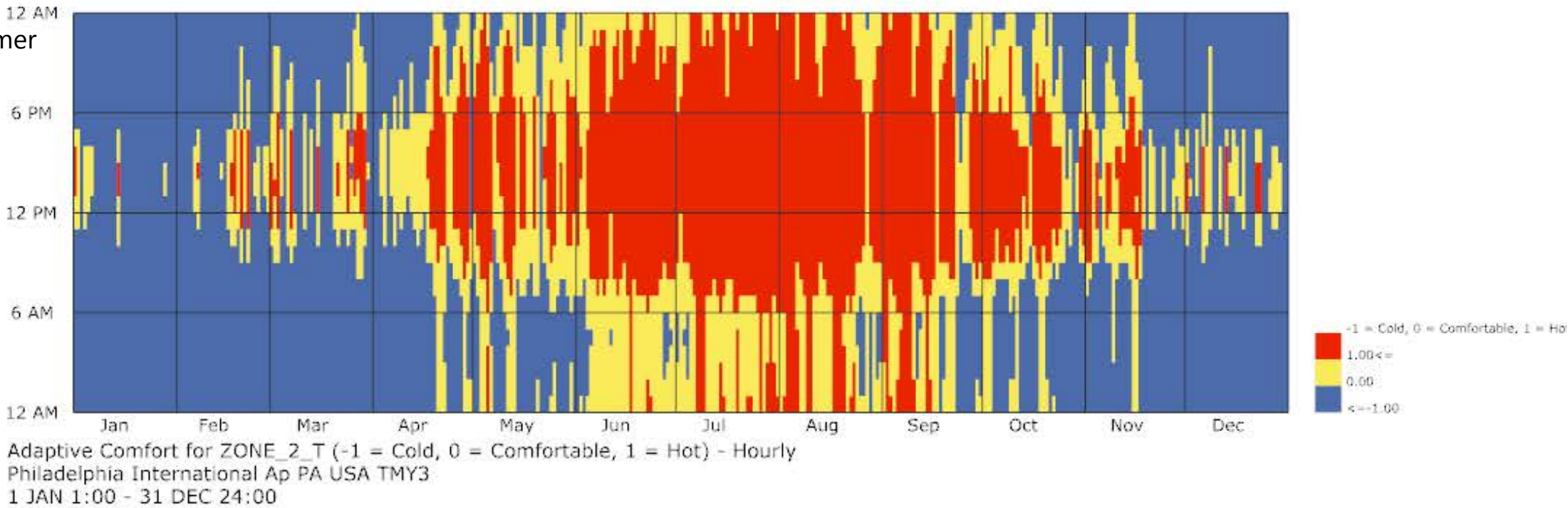
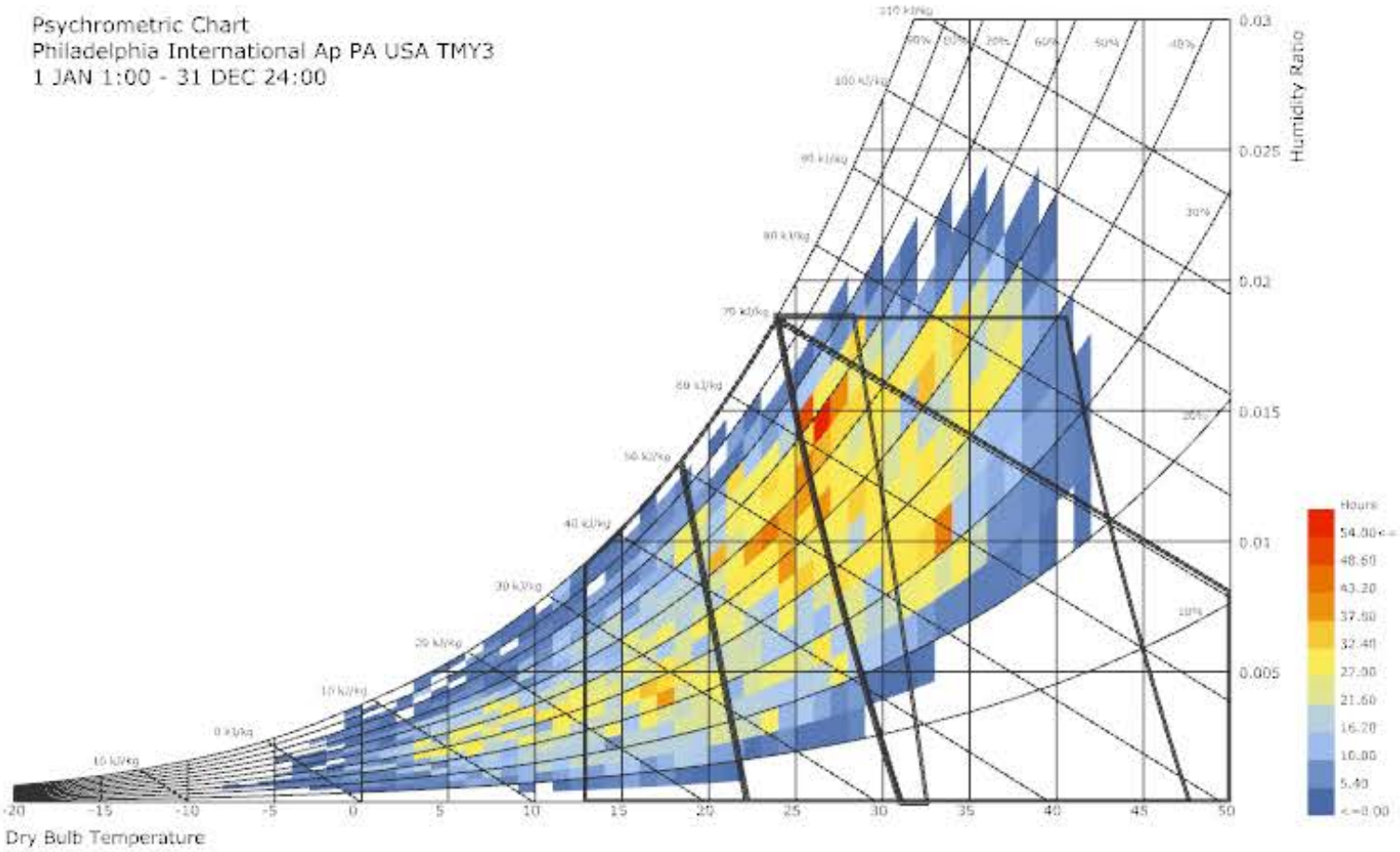
Rotation: 0
Window Glazing:
N: 0.1 W: 0.1 S: 0.6 E:0.1
Blinds: 0
Constrction:
Exterior Wall: R34.4 Roof: 34.4
Exterior WIndow: R1.9 SHGC:0.5
Airchagehour: 5.00
Thermal Mass: +8 inches

After adjustment, the comfort time increases to 23.92%.
First I increase the glazing area at the south side but reduce the glazing area at the other sides to keep more heat in the room during the night.

Because there are a alot of cold moments at night then I hope to keep as much heat as possible in the construction system to increase the inner temperature during. I increase the R value of exterior construction and apply +8" thermal mass. It seems to work well but increases the hot time during summer evening. To improve that problem, I increase the air changing time to 5 hours to give more comfort time.

The remained problem is still too hot moments in summer afternoon and winter night.

Comfortable (%): 23.92
hot (%): 29.18
cold (%): 46.91

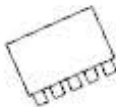


Parameters:

Rotation: 24°
Window Glazing:
N: 0 W: 0 S: 0.4 E:0
Blinds: 0.7m * 4
Constrction:
Exterior Wall: R34.4 Roof: 34.4
Exterior WIndow: R1.9 SHGC:0.5
Airchagehour: 3.00
Thermal Mass: +8 inches
The comfort time here increases to 25.05%.

First I apply shading system to shelter the room from so much daylight in summer afternoon and close off the west\ east and north side and reduce the changing air time to 3 hours to try to give more comfort time during winter nigth. And I rotate the room to the east to have more daylight in the winter morning. However, during spring, most of the day are still under cold stress and the summer afternoon also has remained hot problem.

Comfortable (%): 25.05
hot (%): 19.71
cold (%): 55.24



Psychrometric Chart
Philadelphia International Ap PA USA TMY3
1 JAN 1:00 - 31 DEC 24:00

