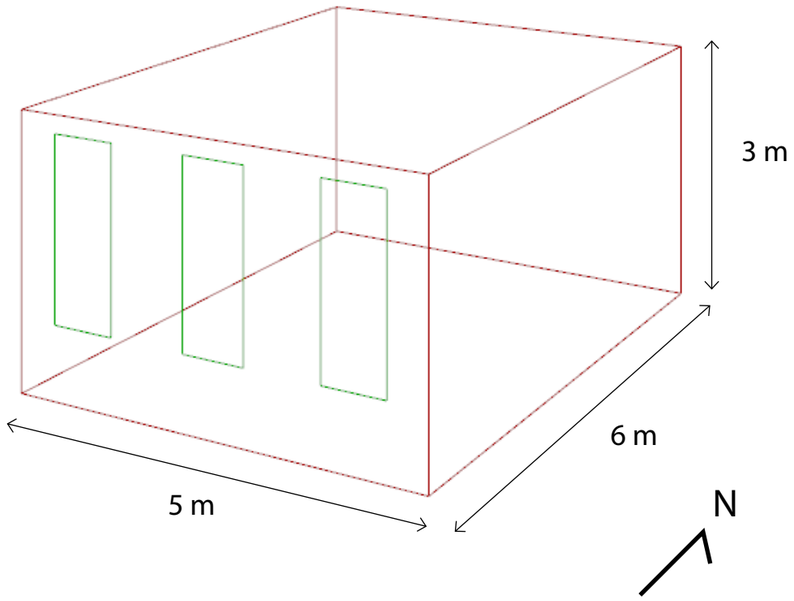
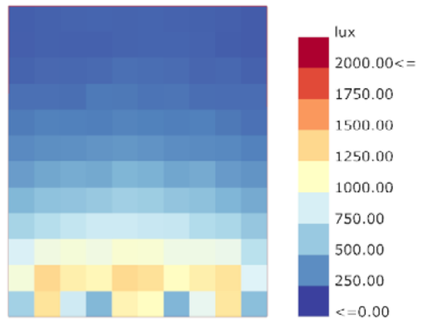
Daylight Simulation

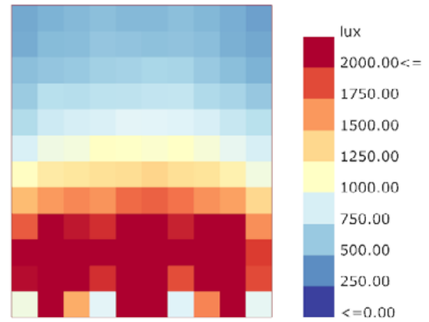
ARCH 753 Building Performance Simulation
Di Fan



Window Ratio (South Facade) : 0.3



0: illuminance
21 March 9:00 am



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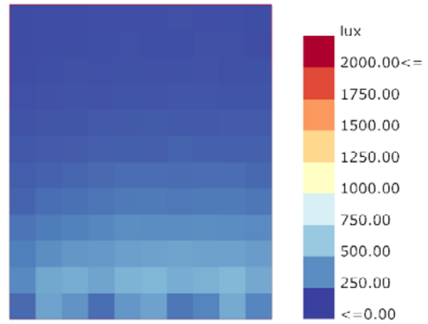

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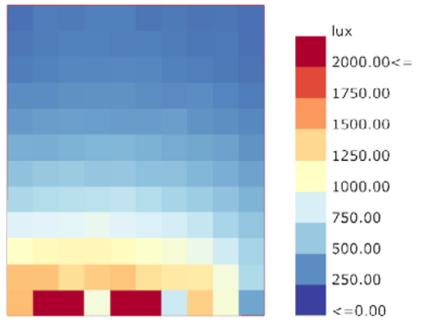

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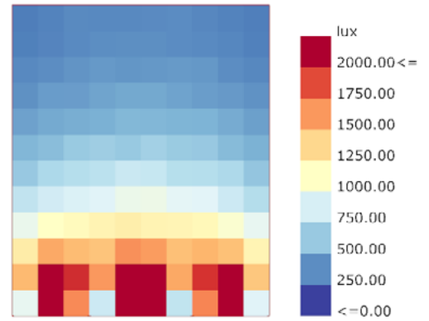

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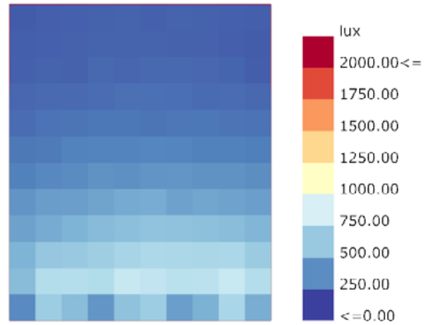

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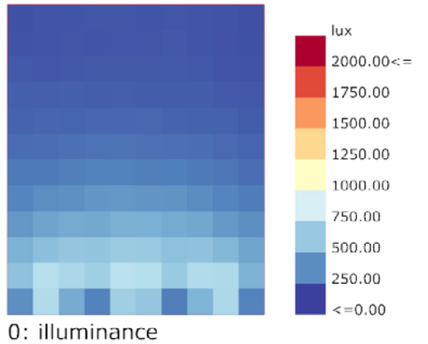

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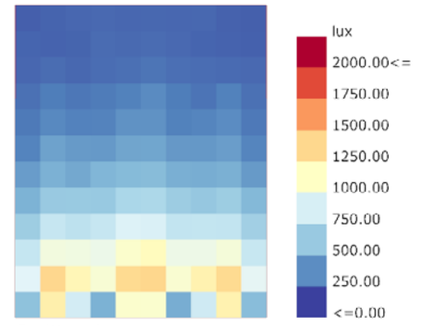

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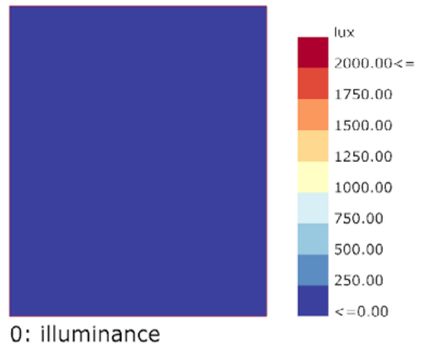

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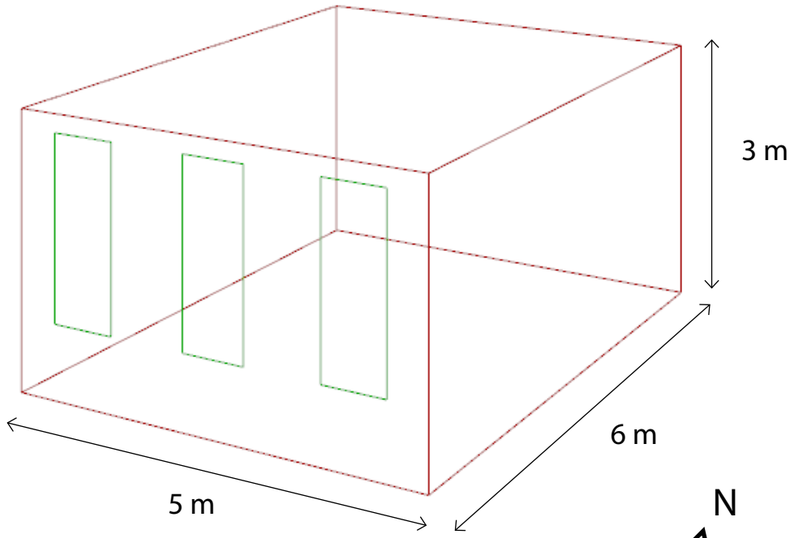
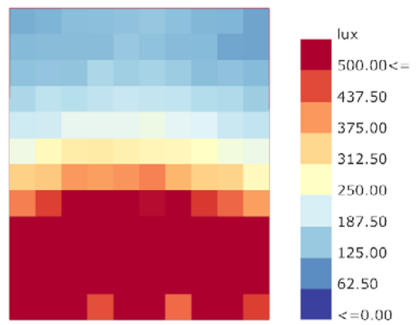


Window Ratio (South Facade) : 0.3



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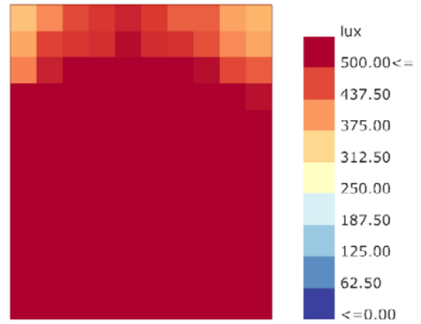

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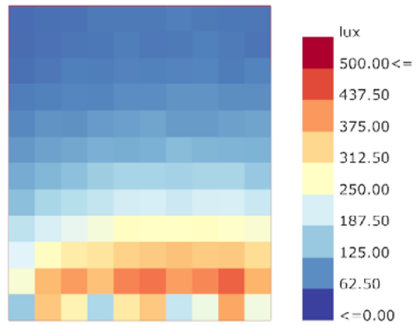

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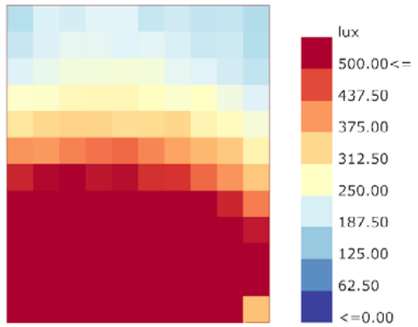

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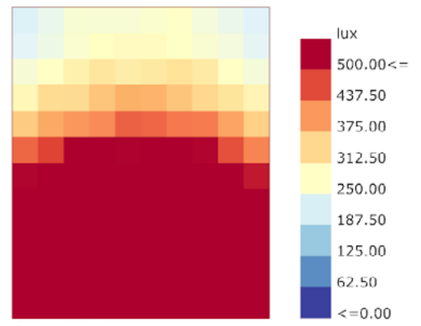
21 June 9:00 am



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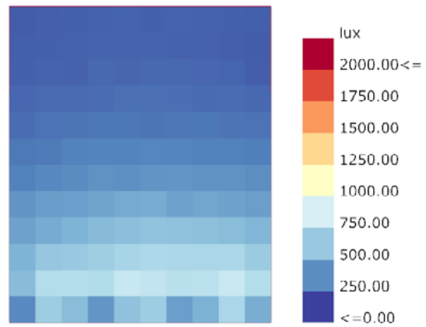
21 June 12:00 pm



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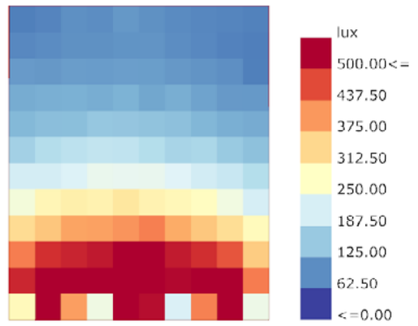

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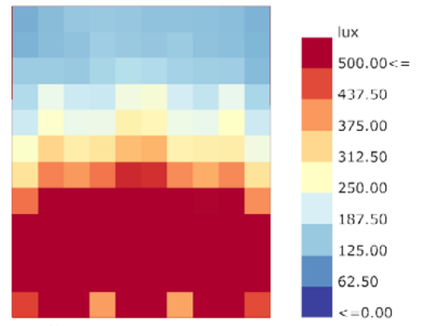

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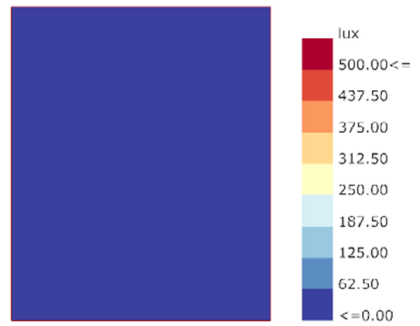

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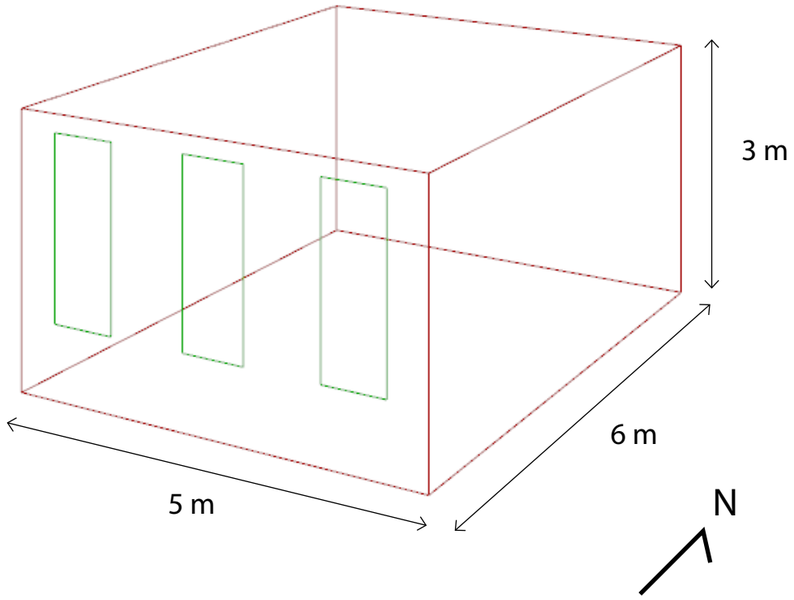
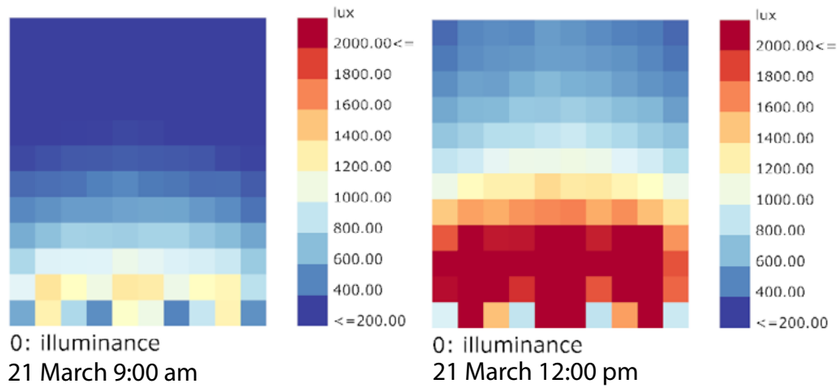
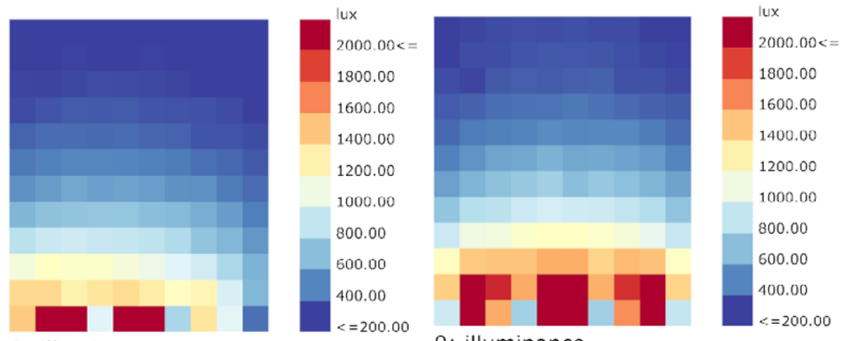


Window Ratio (South Facade) : 0.3



21 March 9:00 am

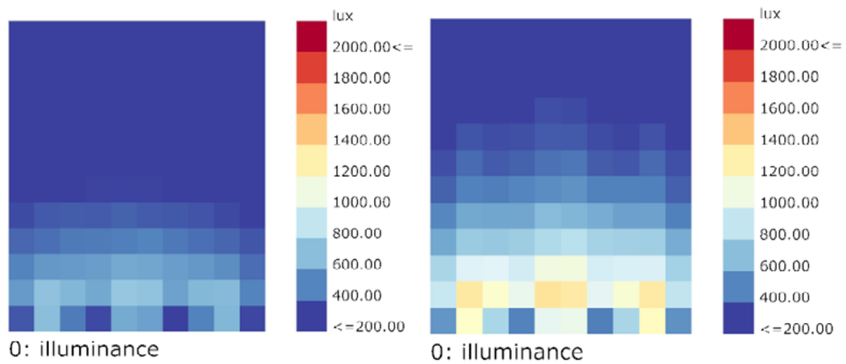
21 March 12:00 pm



21 June 9:00 am

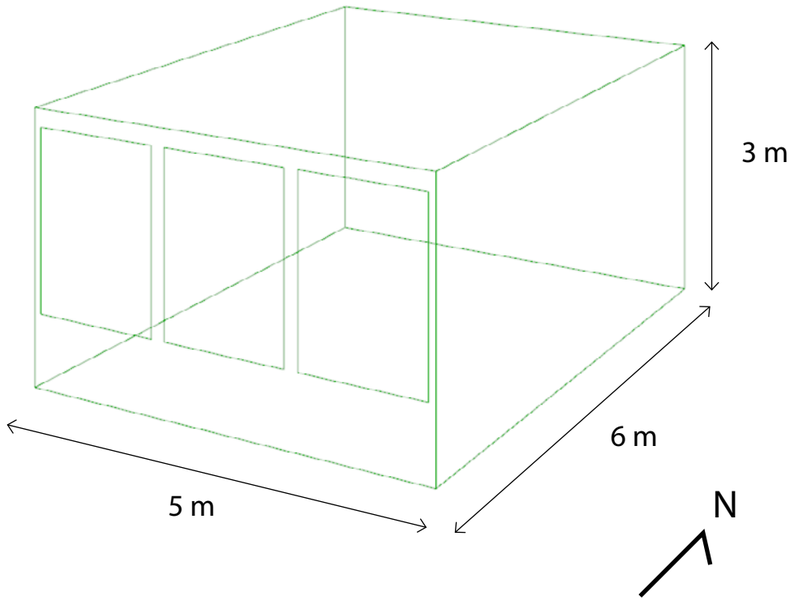
21 June 12:00 pm

According to the daylight simulation chart, we can see that almost 50% percent of the room which generally the northern part of the room can not get enough daylight during the whole year. And there is also a glare problem besides the window area during summer time. So the first step is trying to increase daylight availablility of the northern part by increase the ratio of window on the southern part.

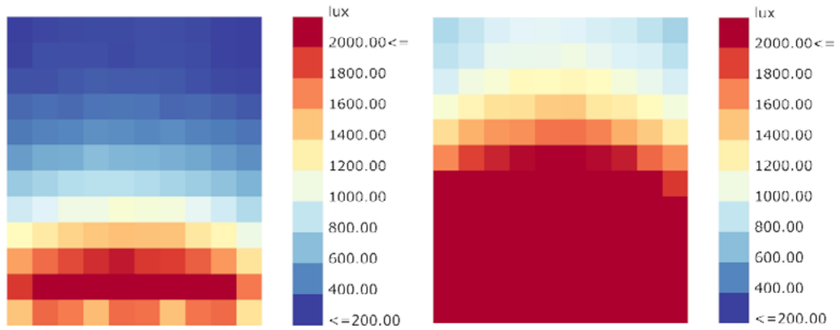


21 December 9:00 am

21 December 12:00 pm



Window Ratio (South Facade) : 0.6



0: illuminance
21 March 9:00 am

0: illuminance
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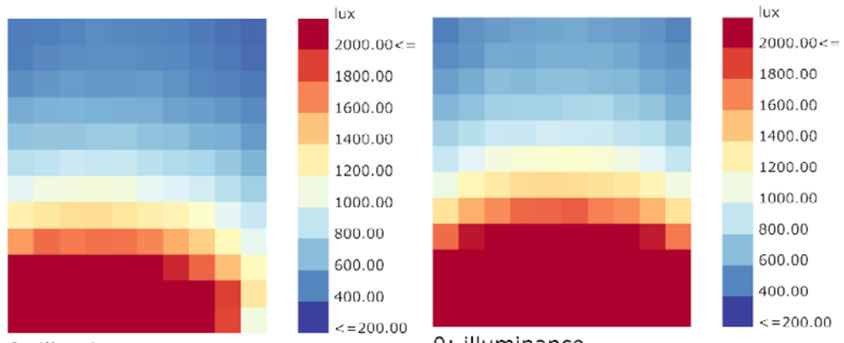
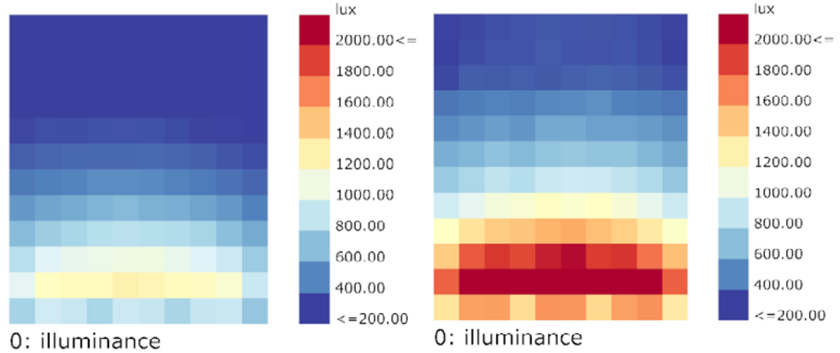


0: illuminance
21 June 9:00 am

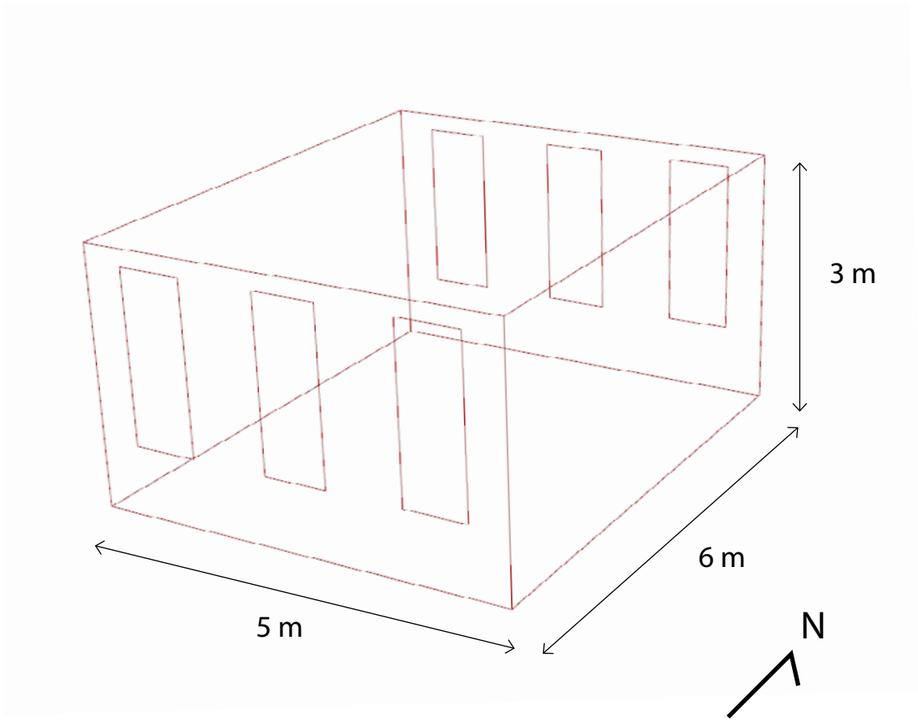
0: illuminance
21 June 12:00 pm

By increasing the window ratio on the south facade to 0.6, daylight of the northern part of the room is relatively improved, however, it also increase the glare problem around the window area on the southern part of the room. Thus, the next step is trying to replace the added open surface to the northern part of the room. The room will have a equally open ration on north part and south part of the room, which is 0.3 on both sides.

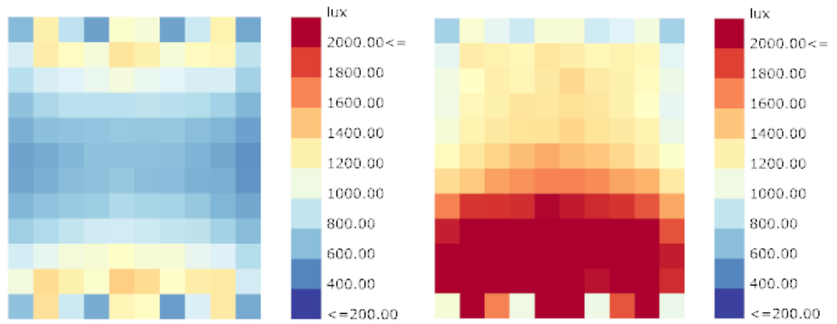


0: illuminance
21 December 9:00 am

0: illuminance
21 December 12:00 pm

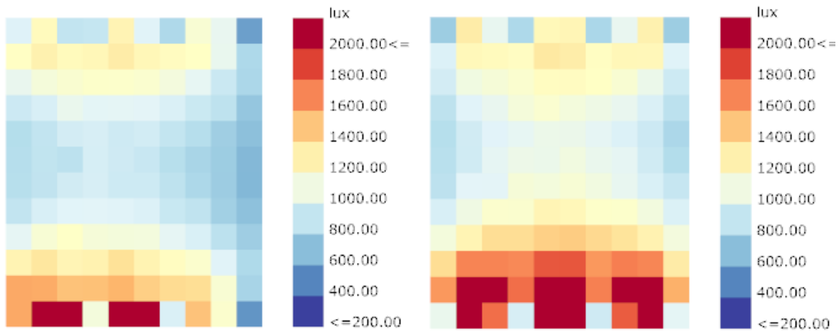


Window Ratio :
South Facade 0.3 North Facade 0.3



0: illuminance
21 March 9:00 am

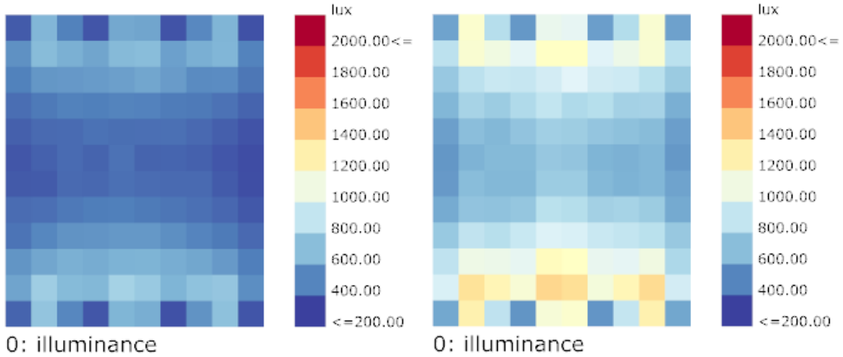
0: illuminance
21 March 12:00 pm



0: illuminance
21 June 9:00 am

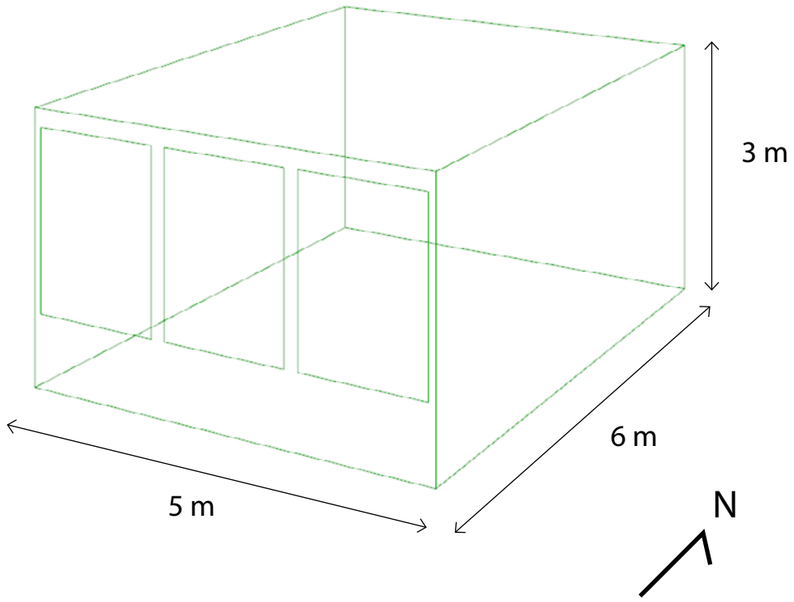
0: illuminance
21 June 12:00 pm

Afer seperating the window ratio equally on southern and northern part of the room, daylight condition in the whole room is greatly improved. Next step I will try to decrease the glare condition on the southern part of the room by adding blinds to the window.

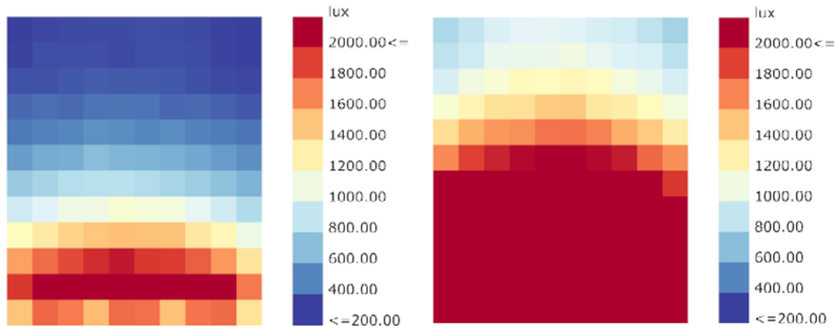


0: illuminance
21 December 9:00 am

0: illuminance
21 December 12:00 pm

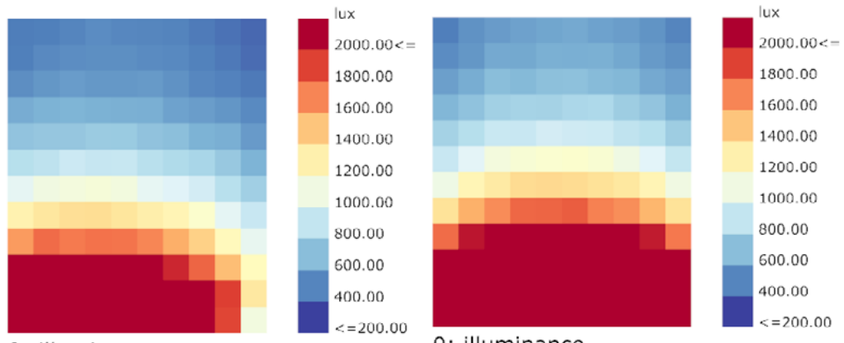


Window Ratio (South Facade) : 0.6



0: illuminance
21 March 9:00 am

0: illuminance
21 March 12:00 pm



0: illuminance
21 June 9:00 am

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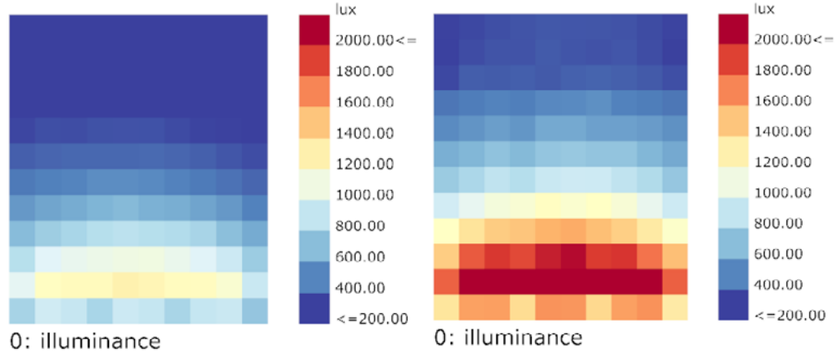
21 June 12:00 pm

By increasing the window ratio on the south facade to 0.6, daylight of the northern part of the room is relatively improved, however, it also increase the glare problem around the window area on the southern part of the room. Thus, the next step is trying to replace the added open surface to the northern part of the room. The room will have a equally open ration on north part and south part of the room, which is 0.3 on both sides.



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21 December 9:00 am

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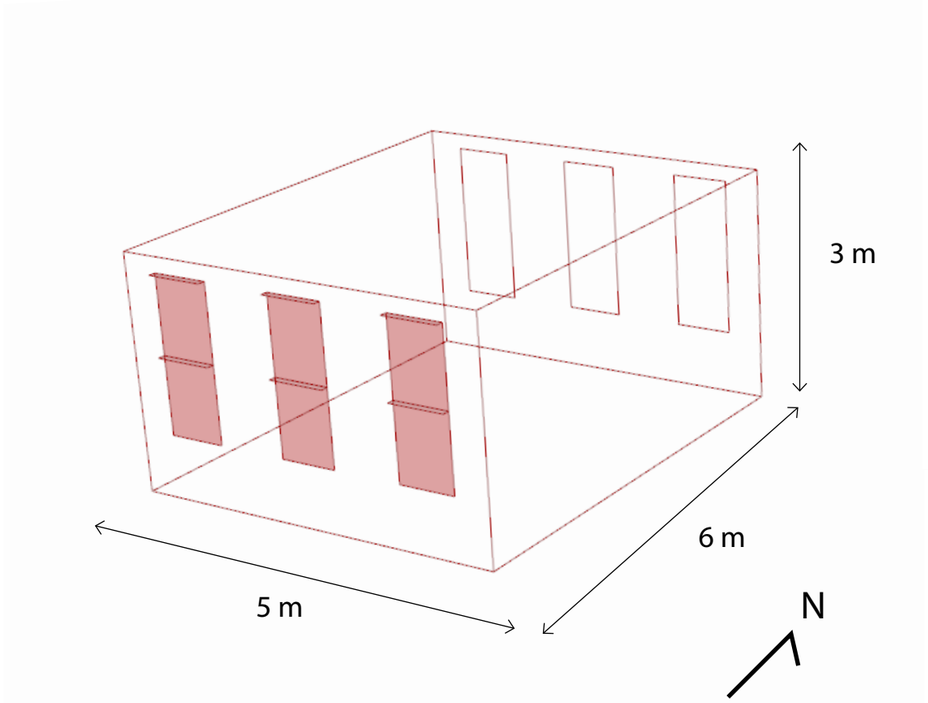
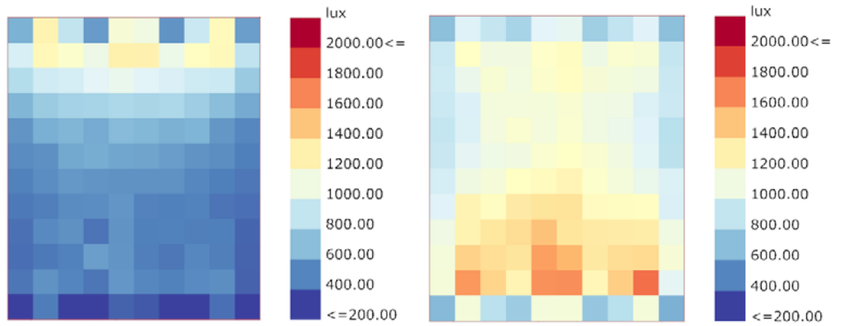
21 December 12:00 pm



Window Ratio :
South Facade 0.3 North Facade 0.3
Shades: North



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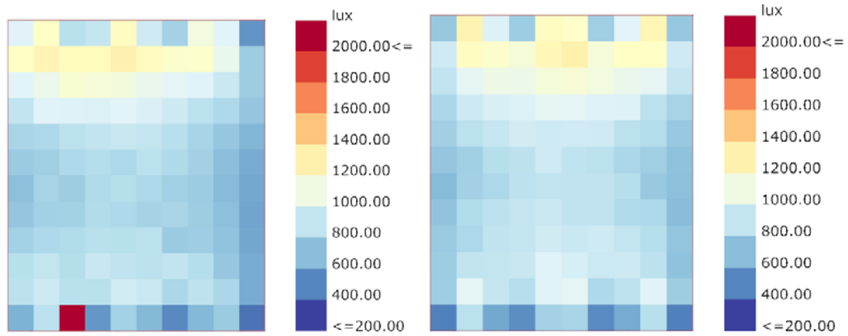
21 March 9:00 am

0: illuminance
21 March 12:00 pm



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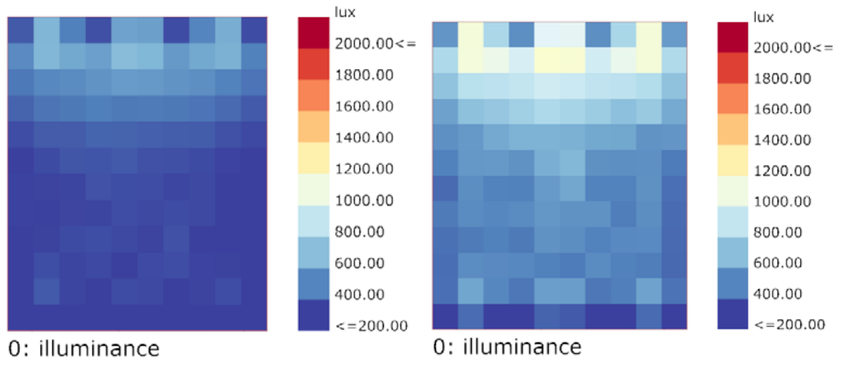
21 June 9:00 am

0: illuminance
21 June 12:00 pm

Afer adding the shades on northern part of the room, the glare problem is greatly solved. There might be some problems during the winter time, as the sunlight is not strong, and the shades may block the desirable daylight in the early morning. Thus, selevtively using the shades at different time of the season would be the best solution.



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21 December 9:00 am

0: illuminance
21 December 12:00 pm