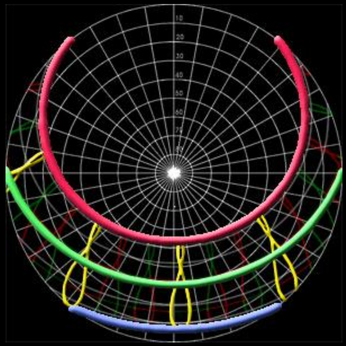
Majid Miri, October 2014

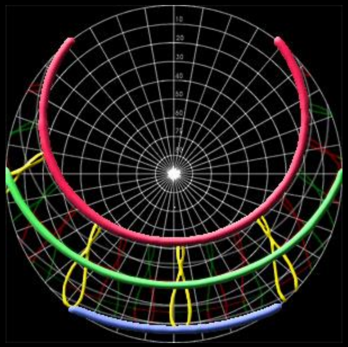
Static Analysis versus **Dynamic Analysis**

Static daylight simulation:



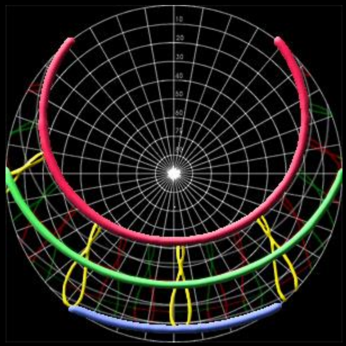
- photo-realistic images or illuminance/Irradiace values at certain points of interest in a building under a specific sky condition
- based on a specific date and time
- usually relevant to some kinds of visual considerations

Static daylight simulation:

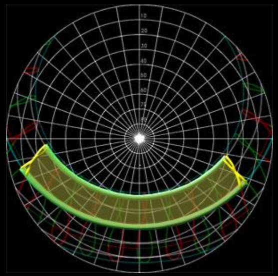


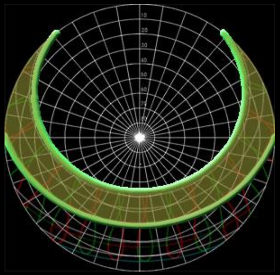
- Illuminance (lux),
- Irradiance (w/m^2),
- Luminance ($lum/m^2.str$),
- Radiance ($w/m^2.str$),
- etc.

Static daylight simulation:



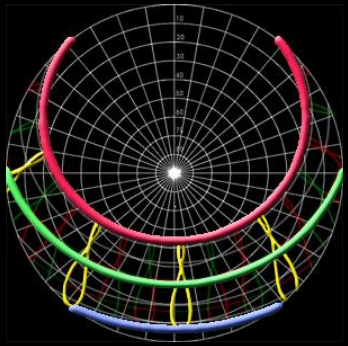
Dynamic daylight simulation:



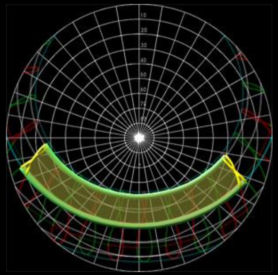


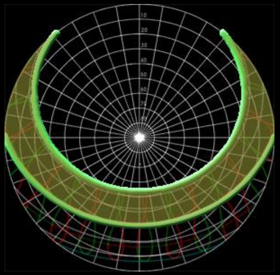
- natural daylight is extremely dynamic
- yield the time development of indoor illuminances / Irradiances under multiple sky conditions
- based on a specific period of a year
- usually relevant to some kinds energy consumption analysis

Static daylight simulation:



Dynamic daylight simulation:





- Daylight Autonomy (DA),
- Useful Daylight Illuminance (UDI),
- Continuous Daylight Autonomy (DA_{con}),
- Maximum Daylight Autonomy (DA_{max}),
- Spatial Dailight Autonomy (sDA),
- etc.

Dynamic daylight simulation:

Climate-based daylight modelling (CBDM):

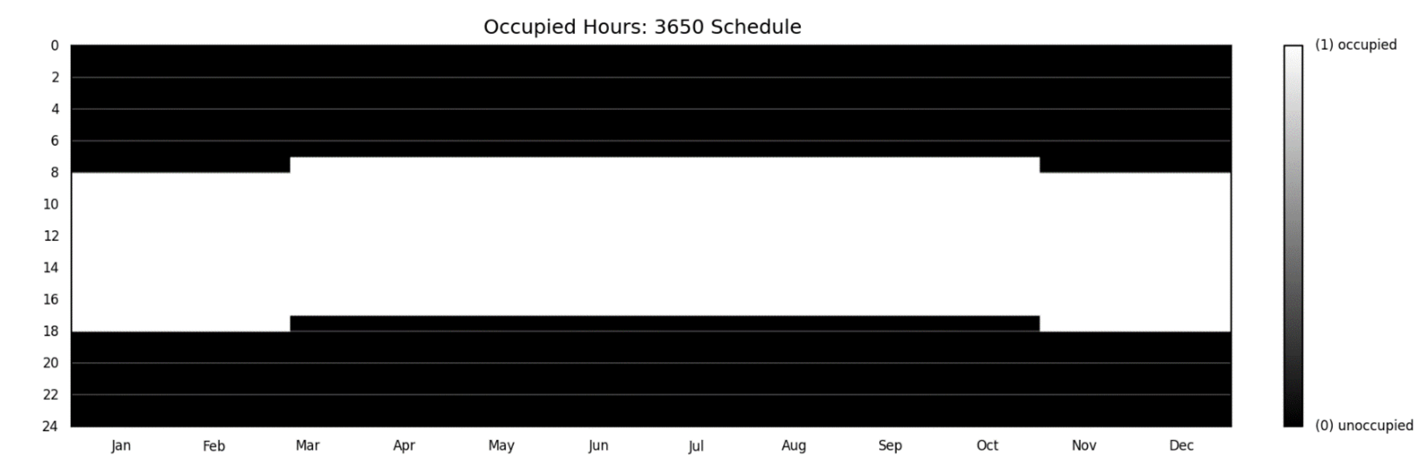
CBDM is a dynamic analysis that of the prediction of various radiant or luminous quantities (e.g. irradiance, illuminance, radiance and luminance) using sun and sky conditions that are derived from standard meteorological datasets.

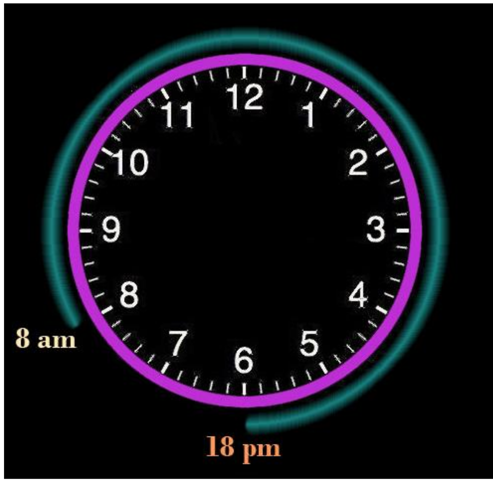
Dynamic daylight simulation:

Climate-based daylight modelling (CBDM):

Daylight Autonomy

The **Daylight Autonomy (DA)** at a point in a building is defined as the percentage of occupied hours per year,





Illuminating ENGINEERING SOCIETY

LEED v4

100-2006

California title 24

Dynamic daylight simulation:

Climate-based daylight modelling (CBDM):

Daylight Autonomy

The **Daylight Autonomy (DA)** at a point in a building is defined as the percentage of occupied hours per year, when the minimum illuminance level can be maintained by daylight alone.

Illuminating Engineering Society → LEED v4 | ASHRAE 100-2006 | California title 24

Climate-based daylight modelling (CBDM):

Daylight Autonomy

The **Daylight Autonomy (DA)** at a point in a building is defined as the percentage of occupied hours per year, when the minimum illuminance level can be maintained by daylight alone.

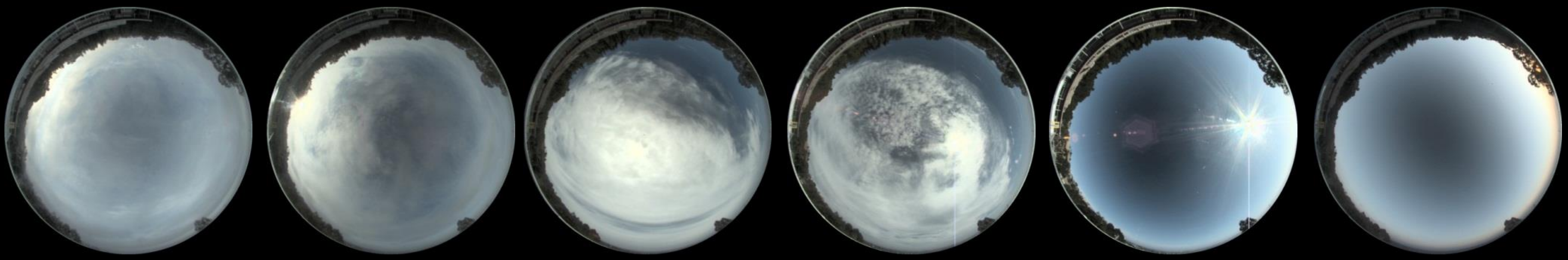
Minimum illuminance levels of 300 lux implies that the occupant can -in principle- work **DA%** of the year by daylight alone.

Dynamic daylight simulation:

Climate-based daylight modelling (CBDM):

Daylight Autonomy

The **Daylight Autonomy (DA)** at a point in a building is defined as the percentage of occupied hours per year, when the minimum illuminance level can be maintained by daylight alone. In contrast to the more commonly used daylight factor, the daylight autonomy considers all sky conditions throughout the year.



Climate-based daylight modelling (CBDM):

Daylight Autonomy

The **Daylight Autonomy (DA)** at a point in a building is defined as the percentage of occupied hours per year, when the minimum illuminance level can be maintained by daylight alone. In contrast to the more commonly used daylight factor, the daylight autonomy considers all sky conditions throughout the year.

The minimum illuminance level corresponds to the minimum physical lighting requirement which has to be maintained at all times so that a certain task can be carried out safely and without tiring the working occupant.

Dynamic daylight simulation:

Climate-based daylight modelling (CBDM):

Daylight Autonomy

The **Daylight Autonomy (DA)** at a point in a building is defined as the percentage of occupied hours per year, when the minimum illuminance level can be maintained by daylight alone. In contrast to the more commonly used daylight factor, the daylight autonomy considers all sky conditions throughout the year.

DA analysis can be used to determine the number of hours per year that electrical lights should be switched on

Dynamic daylight simulation:

Climate-based daylight modelling (CBDM):

Useful Daylight Autonomy

Useful Daylight Illuminances (UDI) is a dynamic daylight performance measure that is also based on work plane illuminances.

Dynamic daylight simulation:

Climate-based daylight modelling (CBDM):

Useful Daylight Illuminance

Useful Daylight Illuminances (UDI) is a dynamic daylight performance measure that is also based on work plane illuminances. As its name suggests, it aims to determine when daylight levels are 'useful' for the occupant, i.e. neither too dark (<100 lux) nor too bright (>2000 lux).

Less than 100 lux:	**Fell short**	(or UDI-f)
100-2000 lux:	**Useful**	(or UDI-s)
more than 2000 lux:	**Exceed**	(or UDI-e)

Dynamic daylight simulation:

Climate-based daylight modelling (CBDM):

Useful Daylight Autonomy

Useful Daylight Illuminances (UDI) is a dynamic daylight performance measure that is also based on work plane illuminances. As its name suggests, it aims to determine when daylight levels are 'useful' for the occupant, i.e. neither too dark (<100 lux) nor too bright (>2000 lux). The upper threshold is meant to detect times when an oversupply of daylight might lead to visual and/or thermal discomfort.

Dynamic daylight simulation:

Climate-based daylight modelling (CBDM):

Continuous Daylight Autonomy

Continuous Daylight Autonomy (DAcon) is another set of metrics that resulted from research on. In contrast to conventional daylight autonomy, partial credit is attributed to time steps when the daylight illuminance lies below the minimum illuminance level.

Dynamic daylight simulation:

Climate-based daylight modelling (CBDM):

Continuous Daylight Autonomy

Continuous Daylight Autonomy (DAcon) is another set of metrics that resulted from research on. In contrast to conventional daylight autonomy, partial credit is attributed to time steps when the daylight illuminance lies below the minimum illuminance level. For example, in the case where 500 lux are required and 400 lux are provided by daylight at a given time step, a partial credit of 400lux/500lux=0.8 is given for that time step.

The minimum illuminance level: 500 lux

If 400 lux for one time step → 400 lux / 500 lux = 0.8 on a sensor point

Dynamic daylight simulation:

Climate-based daylight modelling (CBDM):

Continuous Daylight Autonomy

Continuous Daylight Autonomy (DAcon) is another set of metrics that resulted from research on. In contrast to conventional daylight autonomy, partial credit is attributed to time steps when the daylight illuminance lies below the minimum illuminance level. For example, in the case where 500 lux are required and 400 lux are provided by daylight at a given time step, a partial credit of 400lux/500lux=0.8 is given for that time step.

This change to the metric can be justified by field studies that indicate that illumination preferences vary between individuals and that many office occupants tend to work at lower daylight levels than the commonly referred 300 or 500 lux. Essentially, the metric acknowledges that even a partial contribution of daylight to illuminate a space is still beneficial.

Dynamic daylight simulation:

Climate-based daylight modelling (CBDM):

Maximum Daylight Autonomy

To synchronously consider the likely appearance of glare, a second quantity, **maximum Daylight Autonomy (DA_{max})**, is to indicate the percentage of the occupied hours when direct sunlight or exceedingly high daylight conditions are present.

Climate-based daylight modelling (CBDM):

Maximum Daylight Autonomy

To synchronously consider the likely appearance of glare, a second quantity, **maximum Daylight Autonomy (DA_{max})**, is to indicate the percentage of the occupied hours when direct sunlight or exceedingly high daylight conditions are present. Assuming that the threshold of potentially glary conditions depends on the space type, DA_{max} was defined to be a sliding level equal to ten times the design illuminance of a space. E.g. for a computer lab with a design illuminance of 150 lux DA_{max} corresponds to 1500 lux.

The minimum illuminance level: 150 lux for a computer lab

DA_{max} = 150 lux X 10 = 1500 lux

Climate-based daylight modelling (CBDM):

Maximum Daylight Autonomy

To synchronously consider the likely appearance of glare, a second quantity, **maximum Daylight Autonomy (DAmax),** is to indicate the percentage of the occupied hours when direct sunlight or exceedingly high daylight conditions are present. Assuming that the threshold of potentially glary conditions depends on the space type, DAmax was defined to be a sliding level equal to ten times the design illuminance of a space. E.g. for a computer lab with a design illuminance of 150 lux DAmax corresponds to 1500 lux.

This upper threshold criteria is essentially a measure of the occurrence of direct sunlight or other potentially glary conditions and can give an indication of how often and where large illuminance contrasts appear in a space.

Dynamic daylight simulation:

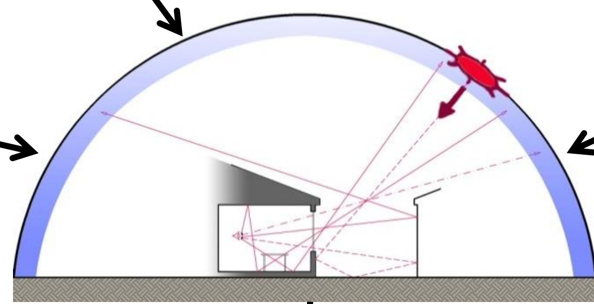
CBDM Simulation Program:

scene
- scene geometry
- surrounding landscape
- ground reflectance
- optical material properties
- status of electrical lighting
- status of shading devices

area of interest
- viewpoint
- grid of sensor points

space usage
- space type (office, …)
- lighting requirements
- schedule (occupancy, lighting, …)

Sky condition
- date, time
- latitude, longitude
- sky condition (overcast, clear, …)
- weather data



Daylight simulation engine
(raytracing, radiosity, …)

Intermediate results
illuminances
luminances

Results processor

Simulation outcome
Performance metrics
visualizations

Elements needed for a daylight simulation*

* Reinhart CF, Daylighting course lectures, MIT, 2012

Dynamic daylight simulation:

Climate-based daylight modelling (CBDM):

Requiring more calculation times

⬇

3D model preparation → the most time consuming

⬇

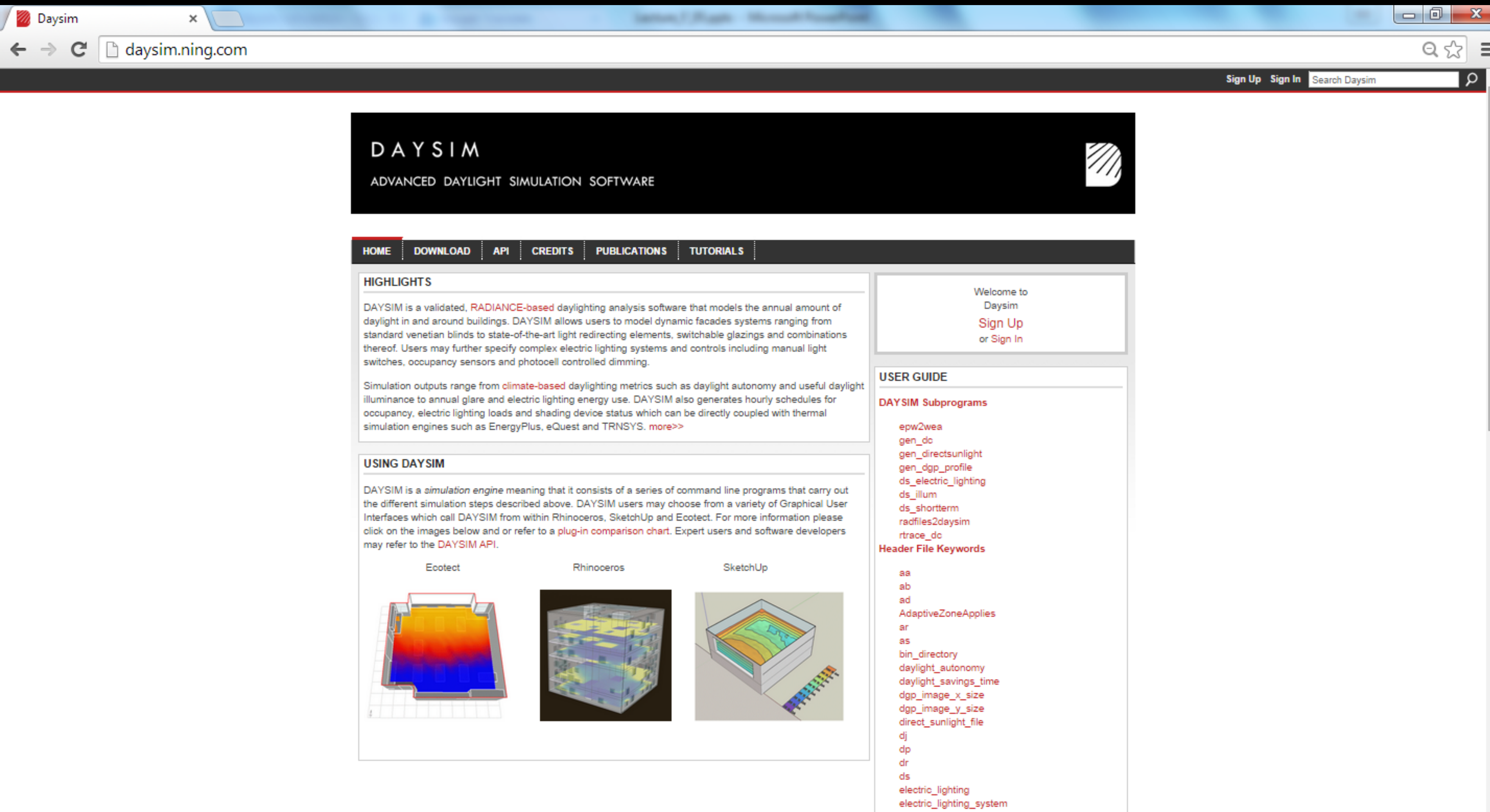
Only provide the geometric detail that your analysis requires

⬇

Only simulate what you have to

Dynamic daylight simulation:

Daysim


Daysim

daysim.ning.com

Sign Up Sign In Search Daysim

DAYSIM

ADVANCED DAYLIGHT SIMULATION SOFTWARE

HOME | DOWNLOAD | API | CREDITS | PUBLICATIONS | TUTORIALS

HIGHLIGHTS

DAYSIM is a validated, RADIANCE-based daylighting analysis software that models the annual amount of daylight in and around buildings. DAYSIM allows users to model dynamic facades systems ranging from standard venetian blinds to state-of-the-art light redirecting elements, switchable glazings and combinations thereof. Users may further specify complex electric lighting systems and controls including manual light switches, occupancy sensors and photocell controlled dimming.

Simulation outputs range from climate-based daylighting metrics such as daylight autonomy and useful daylight illuminance to annual glare and electric lighting energy use. DAYSIM also generates hourly schedules for occupancy, electric lighting loads and shading device status which can be directly coupled with thermal simulation engines such as EnergyPlus, eQuest and TRNSYS. more>>

USING DAYSIM

DAYSIM is a *simulation engine* meaning that it consists of a series of command line programs that carry out the different simulation steps described above. DAYSIM users may choose from a variety of Graphical User Interfaces which call DAYSIM from within Rhinoceros, SketchUp and Ecotect. For more information please click on the images below and or refer to a plug-in comparison chart. Expert users and software developers may refer to the DAYSIM API.

Ecotect | Rhinoceros | SketchUp

Welcome to Daysim

Sign Up

or Sign In

USER GUIDE

DAYSIM Subprograms

- epw2wea
- gen_dc
- gen_directsunlight
- gen_dgp_profile
- ds_electric_lighting
- ds_illum
- ds_shortterm
- radfiles2daysim
- rtrace_dc

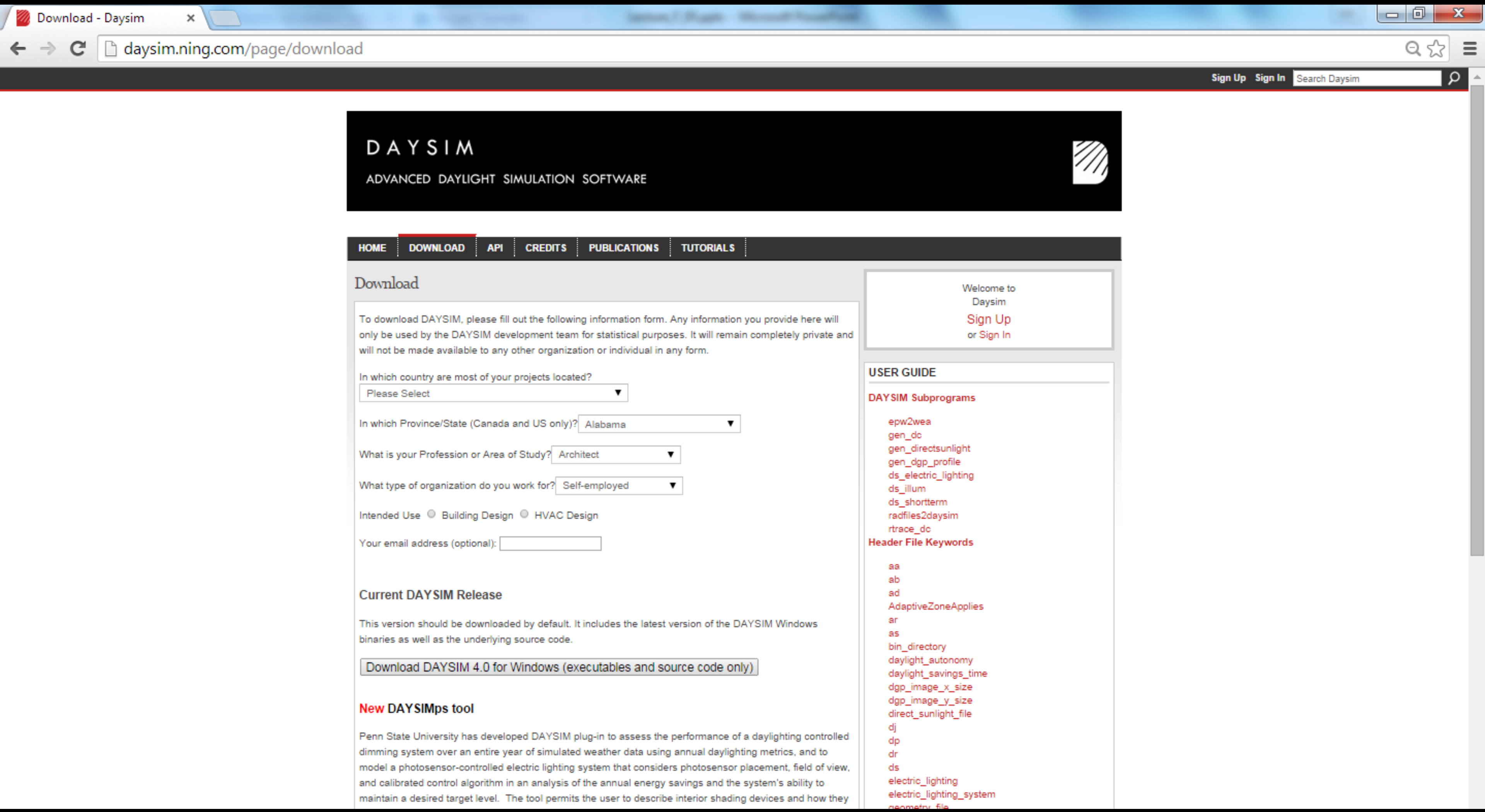
Header File Keywords

- aa
- ab
- ad
- AdaptiveZoneApplies
- ar
- as
- bin_directory
- daylight_autonomy
- daylight_savings_time
- dgp_image_x_size
- dgp_image_y_size
- direct_sunlight_file
- dj
- dp
- dr
- ds
- electric_lighting
- electric_lighting_system
- geometry_file

http://daysim.ning.com/

Dynamic daylight simulation:

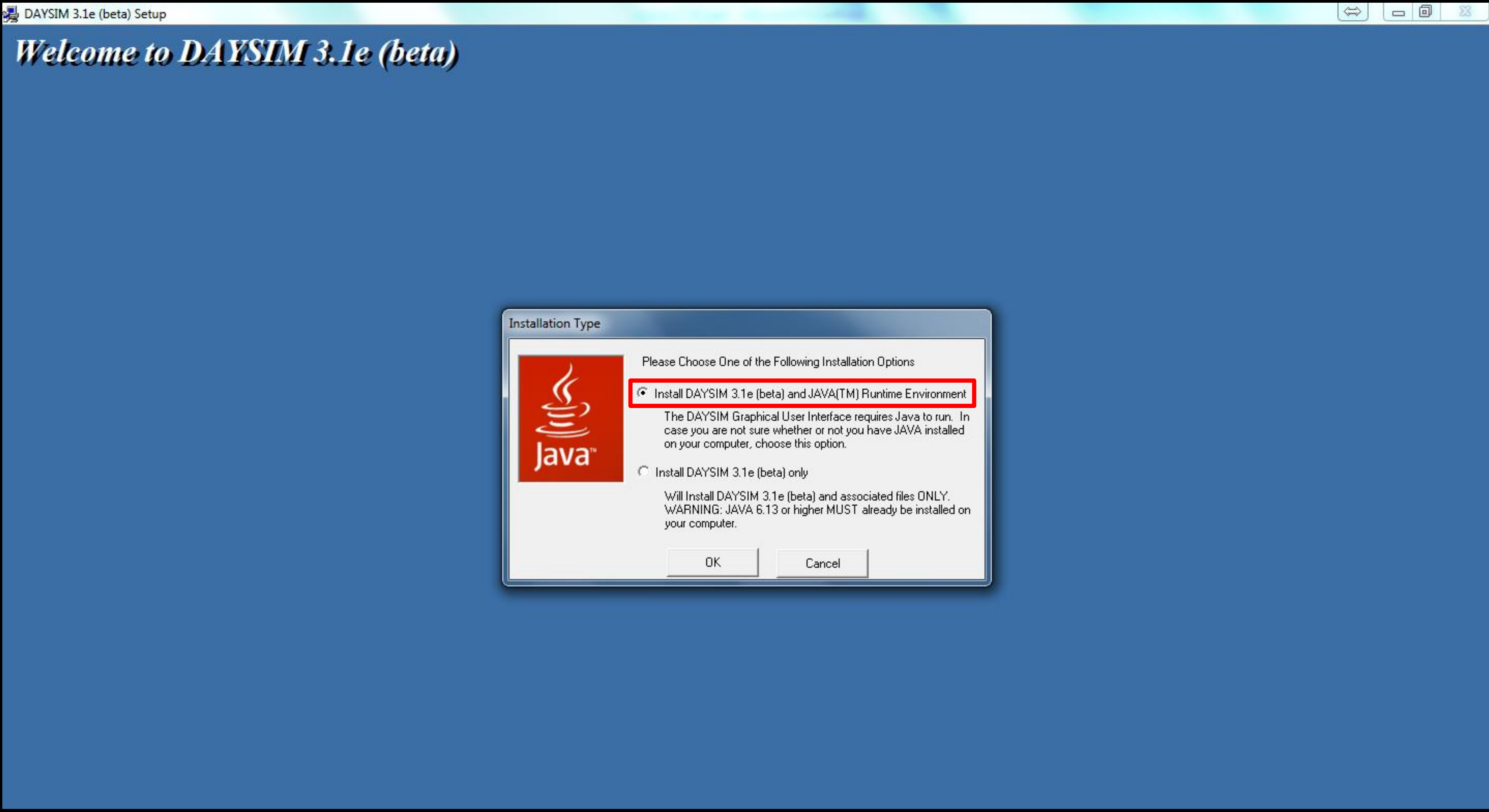
Daysim → Download and install "**Daysim 3.1e for Windows (includes old JAVA GUI)**"



http://daysim.ning.com/page/download

Dynamic daylight simulation:

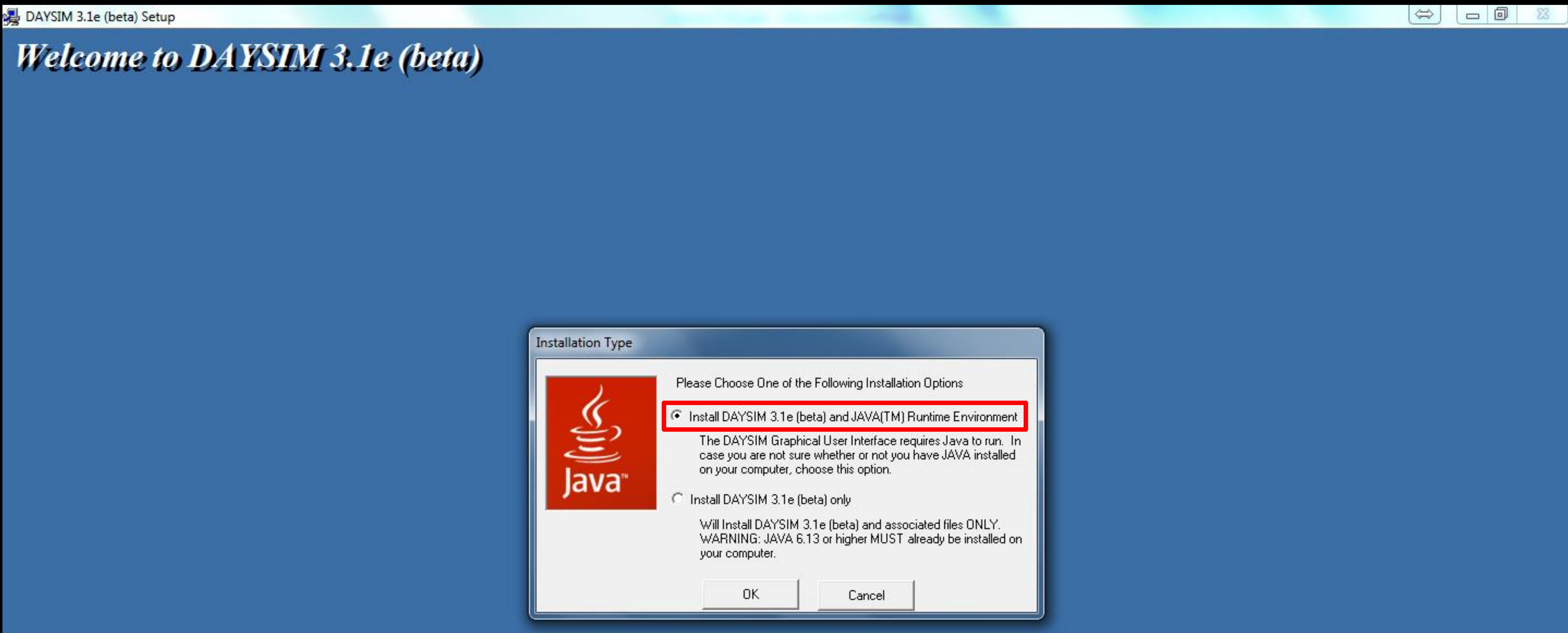
Daysim



Install Daysim 3.1e (beta) and JAVA (TM) Runtime Environment

Dynamic daylight simulation:

Daysim

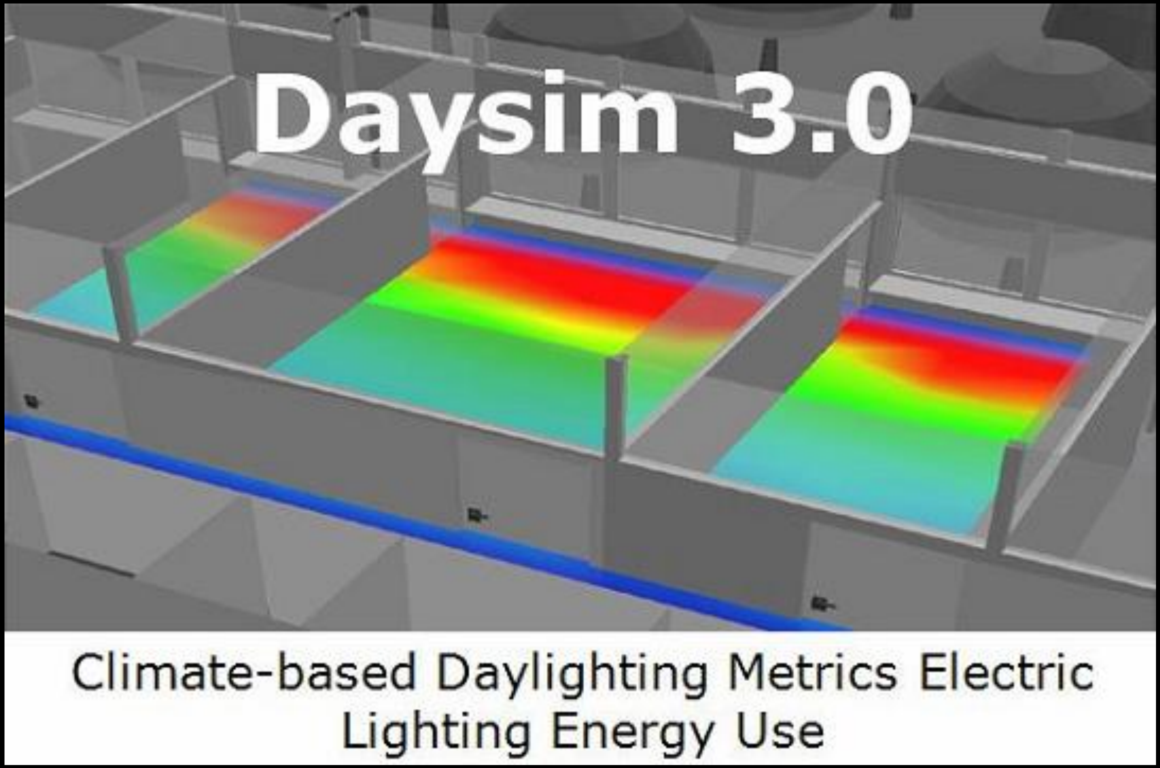


If it fails to download and install the latest **Java Runtime Environment**, you can manually go to https://www.java.com/en/download/ and download and install the latest version.

Install Daysim 3.1e (beta) and JAVA (TM) Runtime Environment

Dynamic daylight simulation:

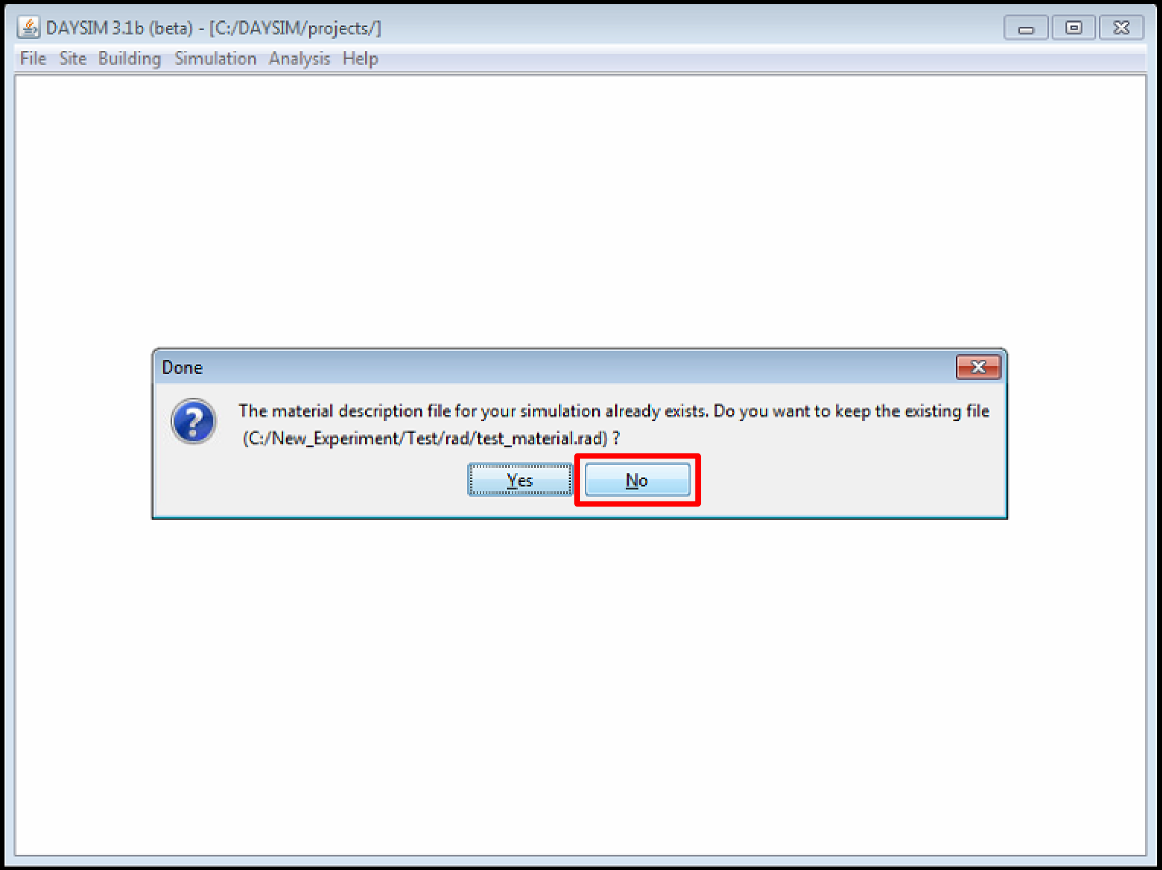
Export page in Ecotect:



http://daysim.ning.com

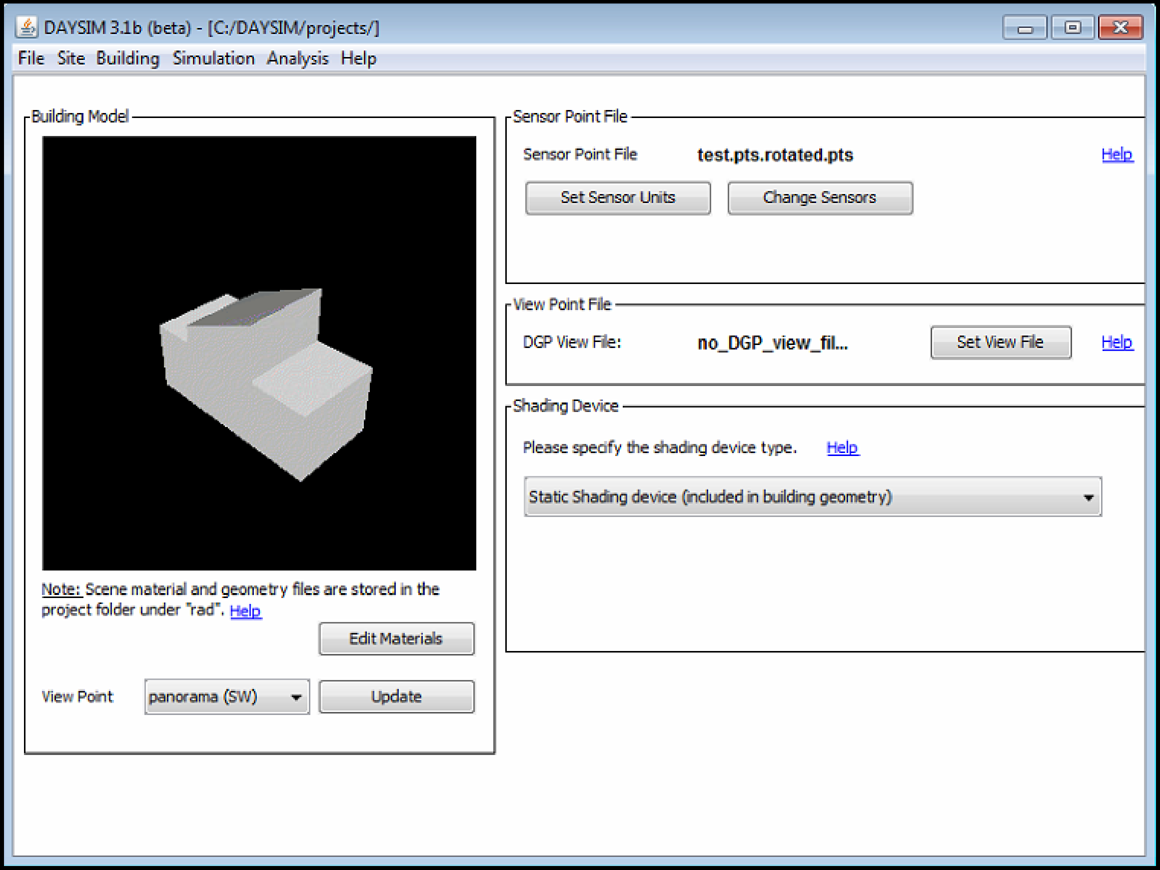
Dynamic daylight simulation:

Automatic importing file in Daysim:



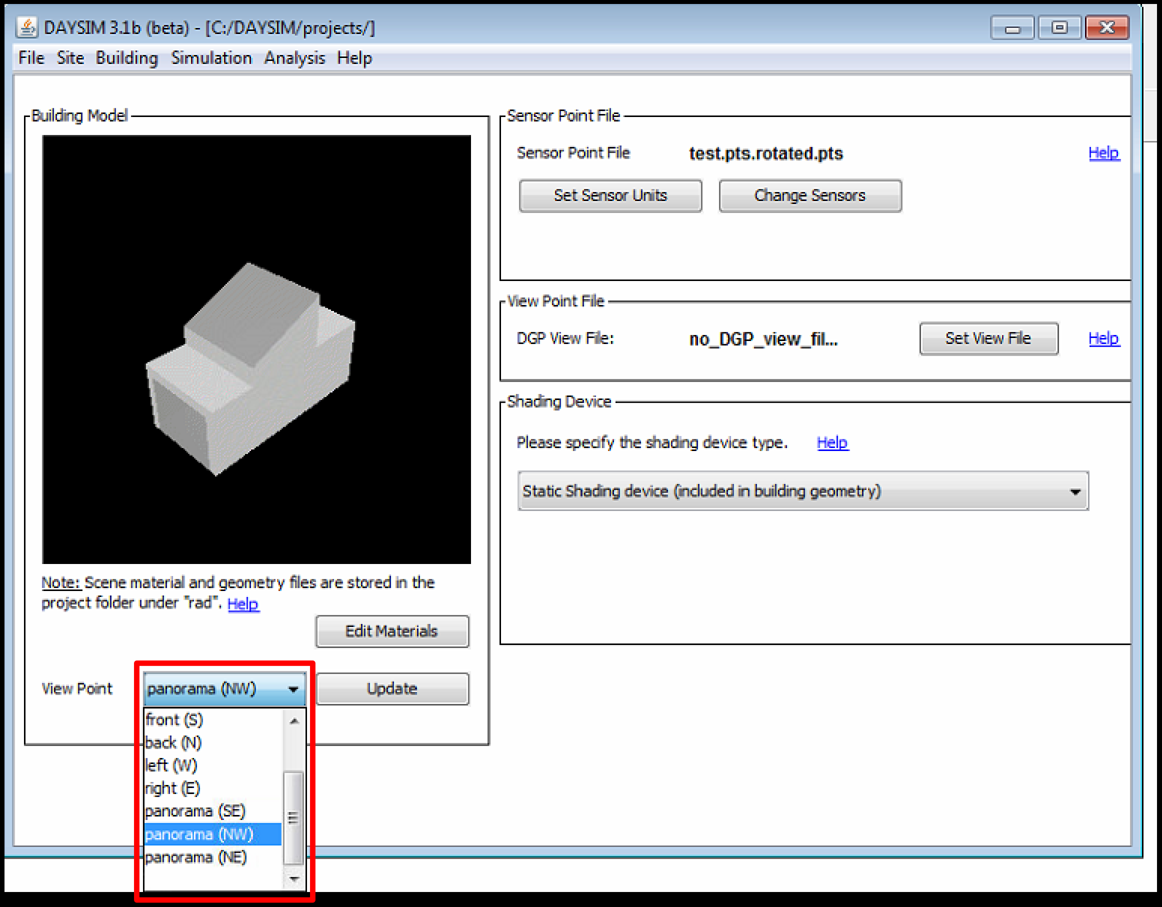
Dynamic daylight simulation:

Daysim:



Dynamic daylight simulation:

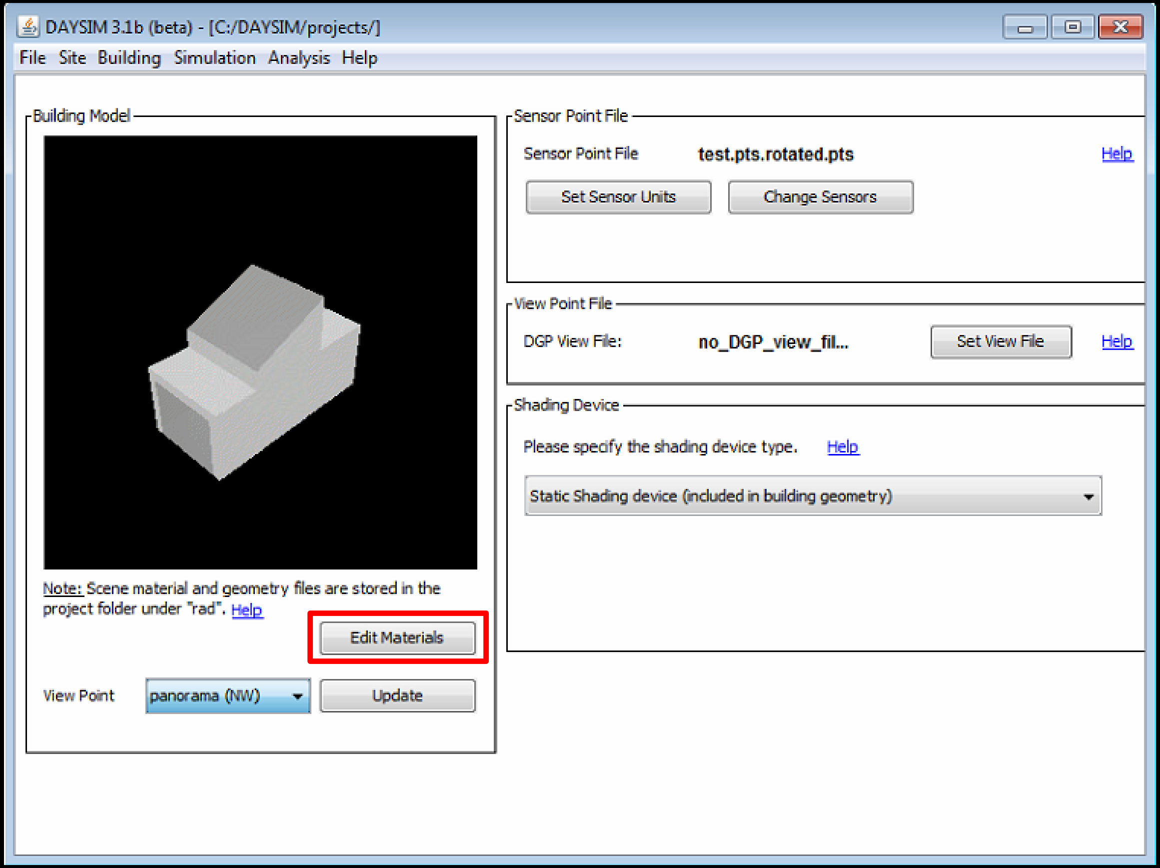
Daysim:



Change View

Dynamic daylight simulation:

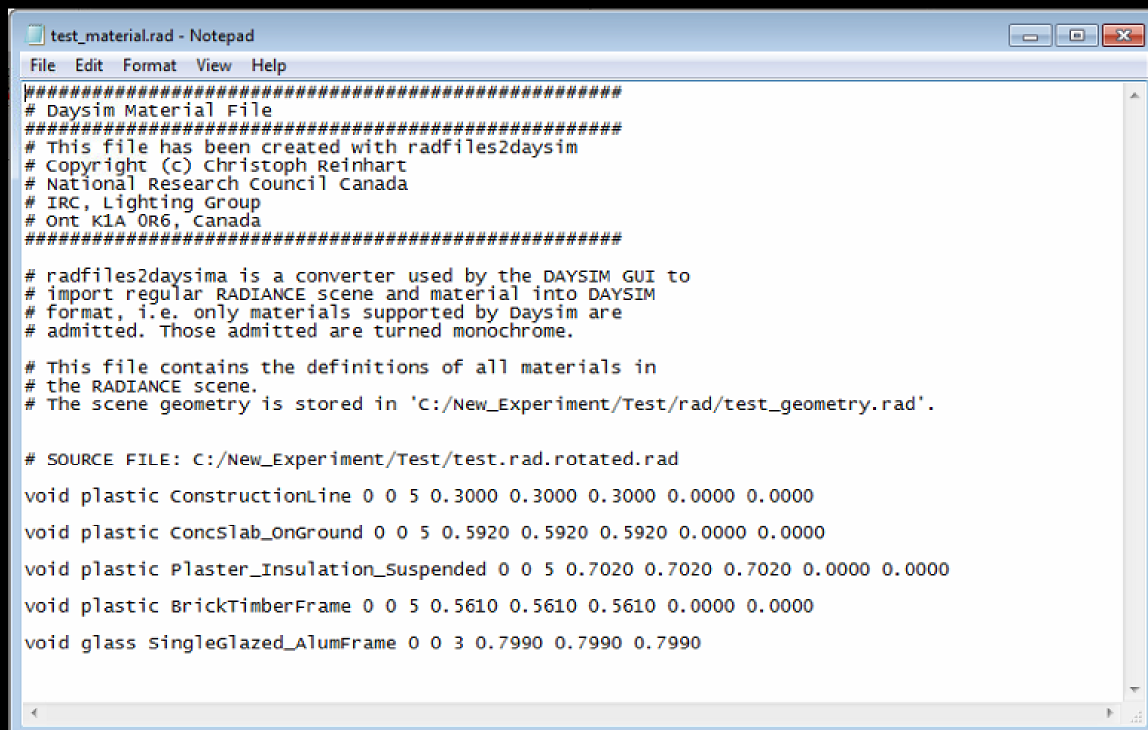
Daysim:



Edit Material

Dynamic daylight simulation:

Daysim:



test_material.rad - Notepad

File Edit Format View Help

```
#####################################################
# Daysim Material File
#####################################################
# This file has been created with radfiles2daysim
# Copyright (c) Christoph Reinhart
# National Research Council Canada
# IRC, Lighting Group
# Ont K1A 0R6, Canada
#####################################################

# radfiles2daysima is a converter used by the DAYSIM GUI to
# import regular RADIANCE scene and material into DAYSIM
# format, i.e. only materials supported by Daysim are
# admitted. Those admitted are turned monochrome.

# This file contains the definitions of all materials in
# the RADIANCE scene.
# The scene geometry is stored in 'C:/New_Experiment/Test/rad/test_geometry.rad'.


# SOURCE FILE: C:/New_Experiment/Test/test.rad.rotated.rad

void plastic ConstructionLine 0 0 5 0.3000 0.3000 0.3000 0.0000 0.0000

void plastic ConcSlab_OnGround 0 0 5 0.5920 0.5920 0.5920 0.0000 0.0000

void plastic Plaster_Insulation_Suspended 0 0 5 0.7020 0.7020 0.7020 0.0000 0.0000

void plastic BrickTimberFrame 0 0 5 0.5610 0.5610 0.5610 0.0000 0.0000

void glass SingleGlazed_AlumFrame 0 0 3 0.7990 0.7990 0.7990
```

Read and Edit the Material File

Dynamic daylight simulation:

Daysim:

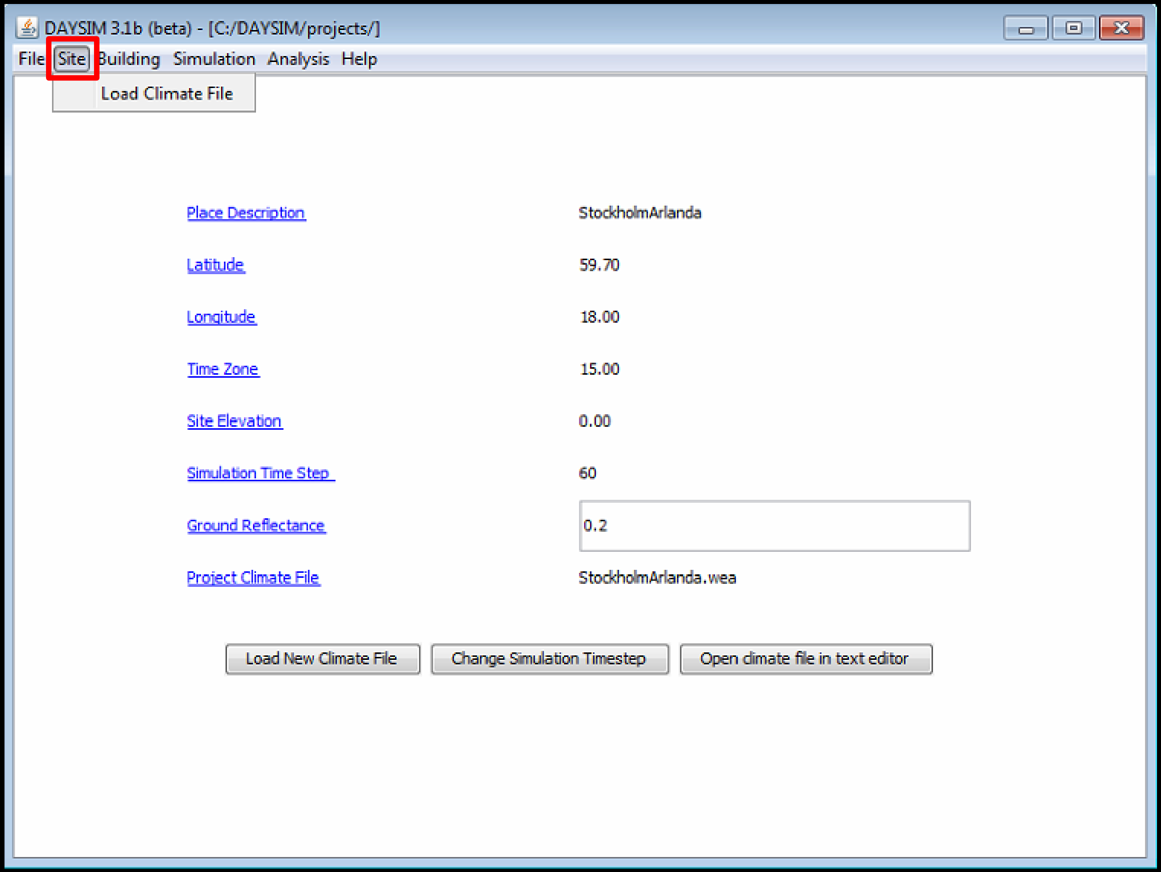
Materials in Daysim:

- If a scene file contains a **light source** (Radiance modifier **light** or **glow**), then these materials are **changed into a black plastic**. This is necessary because the daylight coefficient calculation is corrupted if additional light sources are in the scene.
- If a material has a **color** (*RGB values differ*), then the material is **turned gray** by weighing the RGB channels according to the luminous response curve of the human eye, i.e. Gray = 0.3 x Red + 0.59 x Green + 0.11 x Blue. This process is necessary because the daylight coefficients are calculated by gen_dc using the Red color channel to save memory during runtime.

Please note that advanced Radiance materials referring to function files (*.cal) might not be supported by Daysim depending on the specific material.

Dynamic daylight simulation:

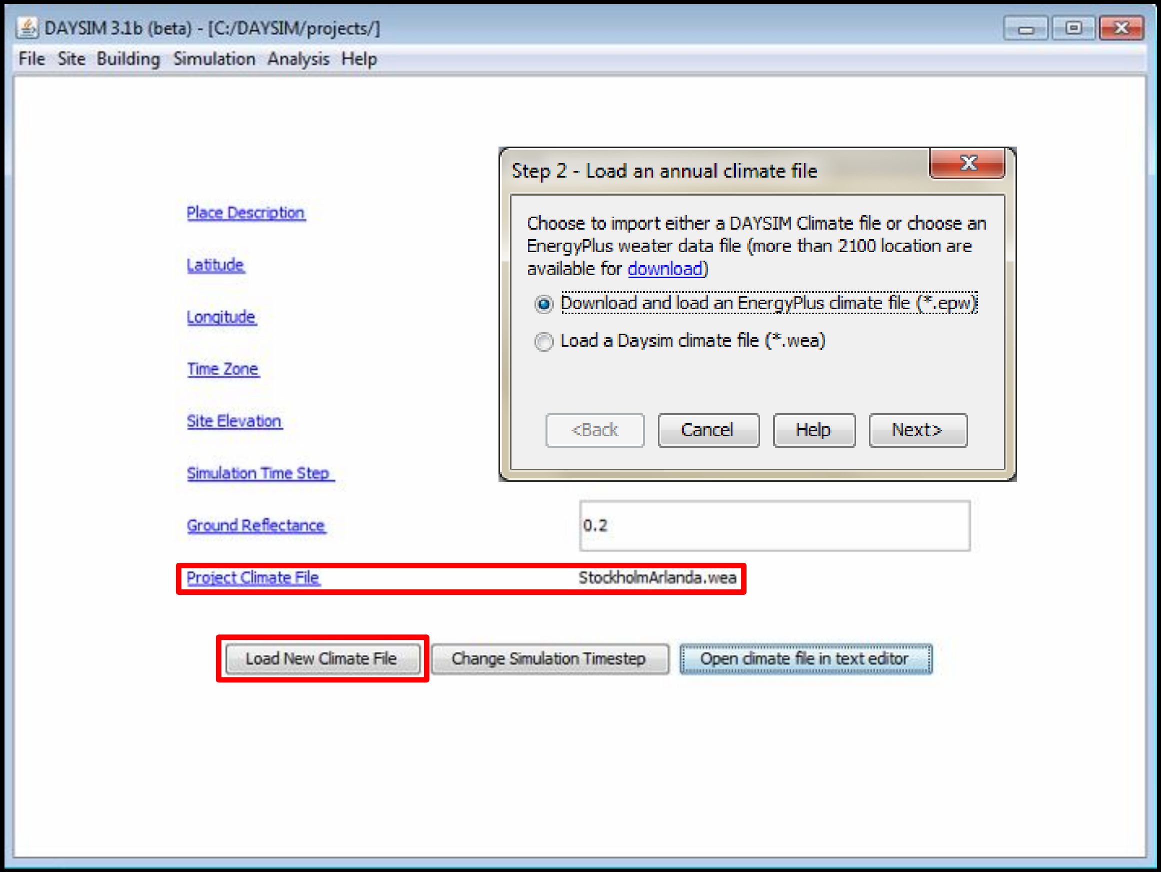
Daysim:



Daysim → Menu → Site

Dynamic daylight simulation:

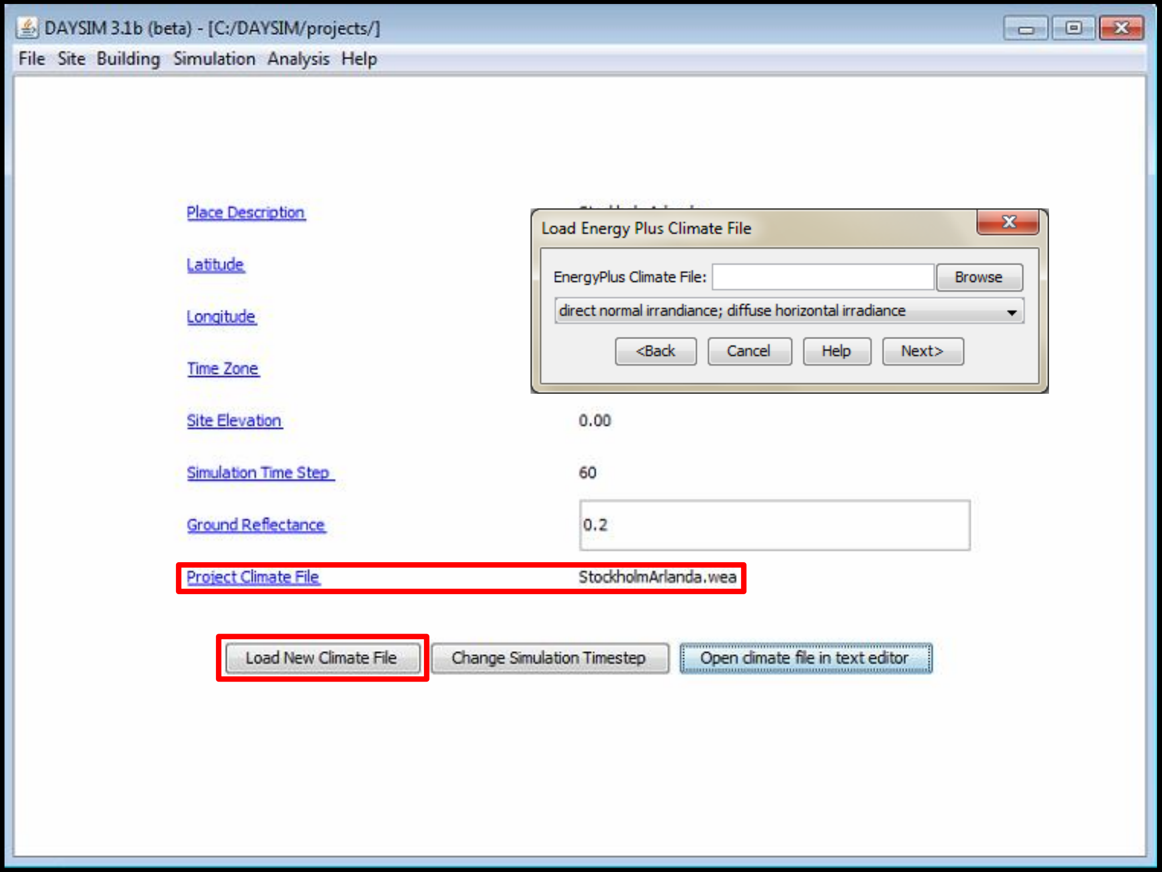
Daysim:



Load New Climate File

Dynamic daylight simulation:

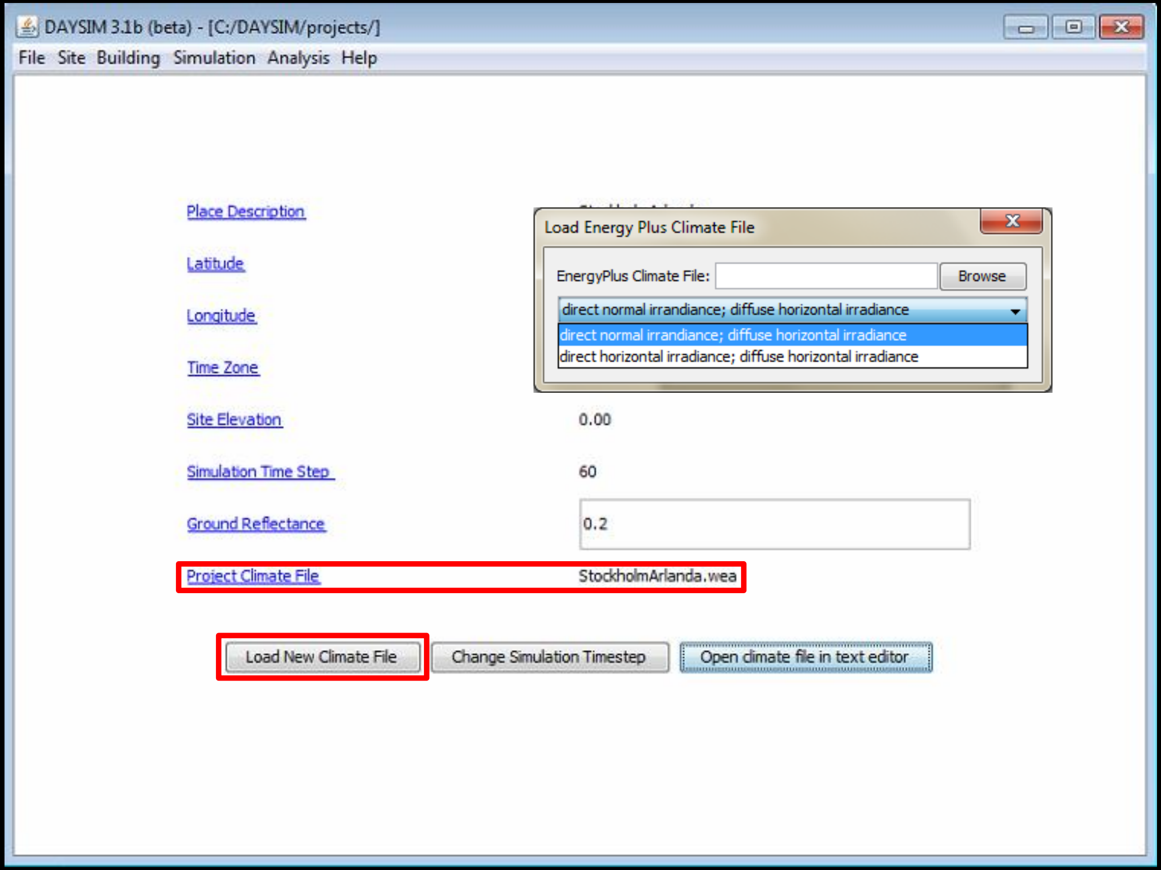
Daysim:



Load New Climate File

Dynamic daylight simulation:

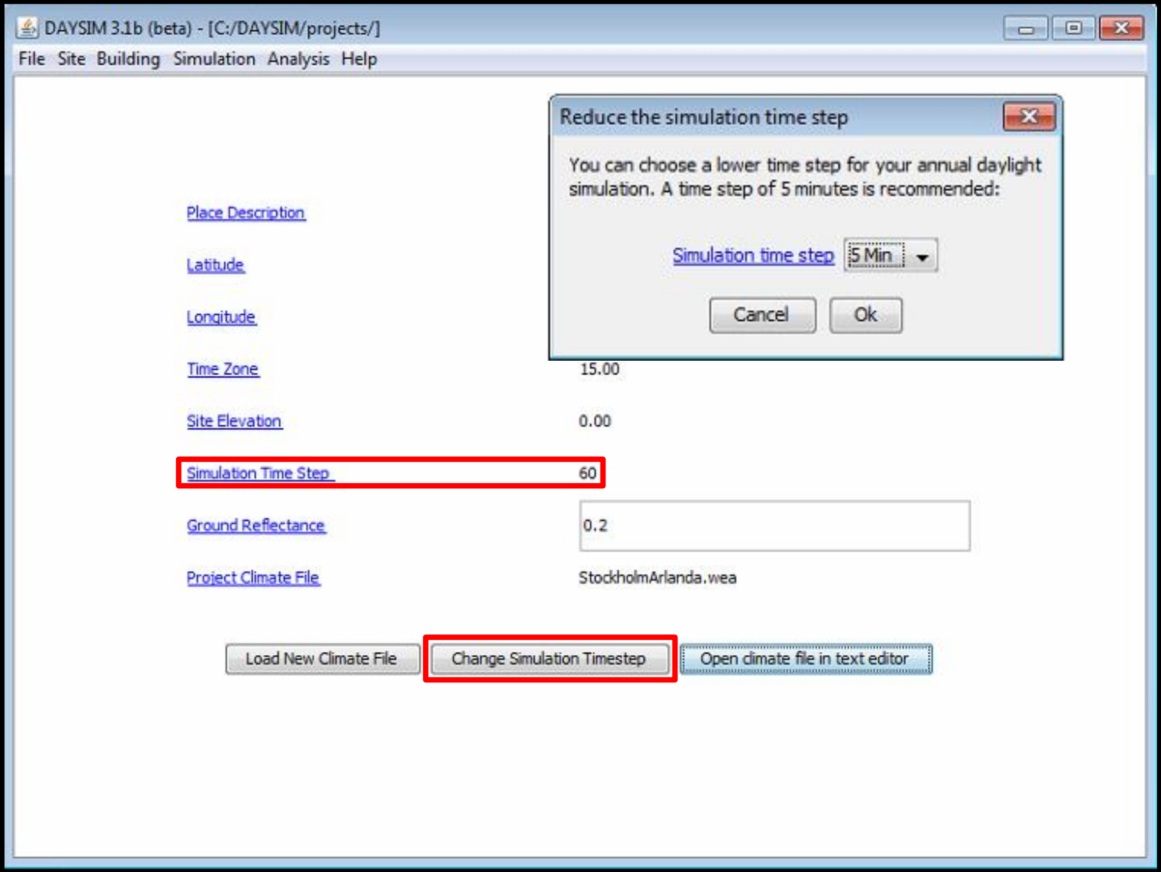
Daysim:



Load New Climate File

Dynamic daylight simulation:

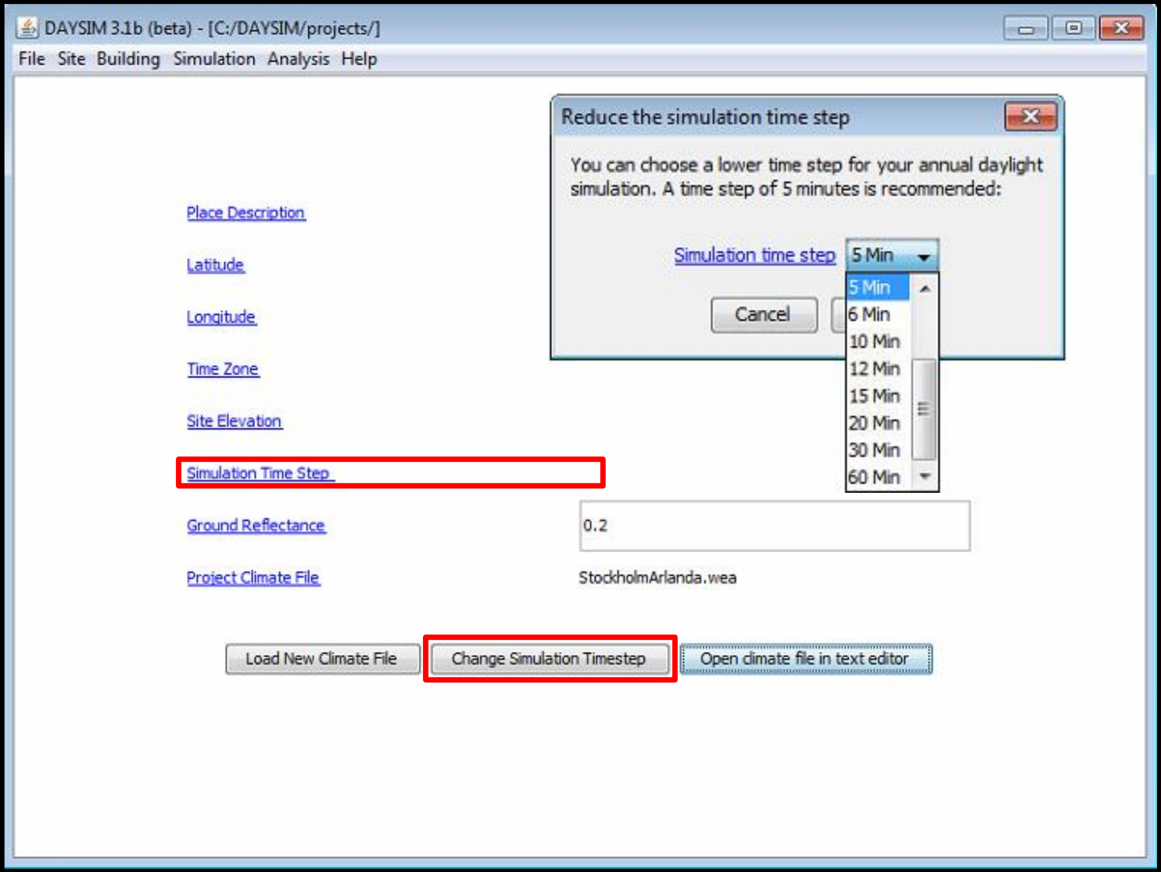
Daysim:



Change Simulation Time-step

Dynamic daylight simulation:

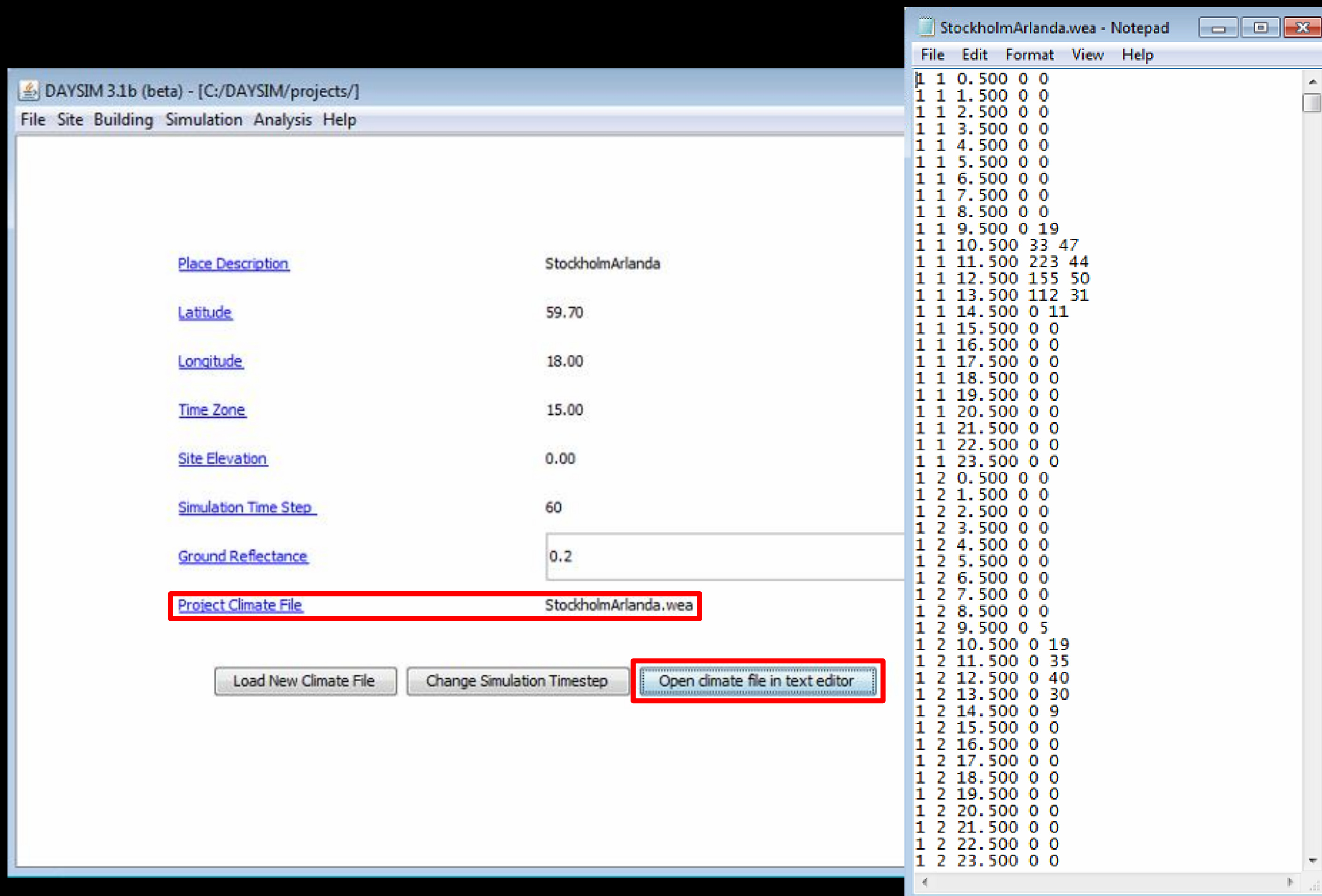
Daysim:



Change Simulation Time-step

Dynamic daylight simulation:

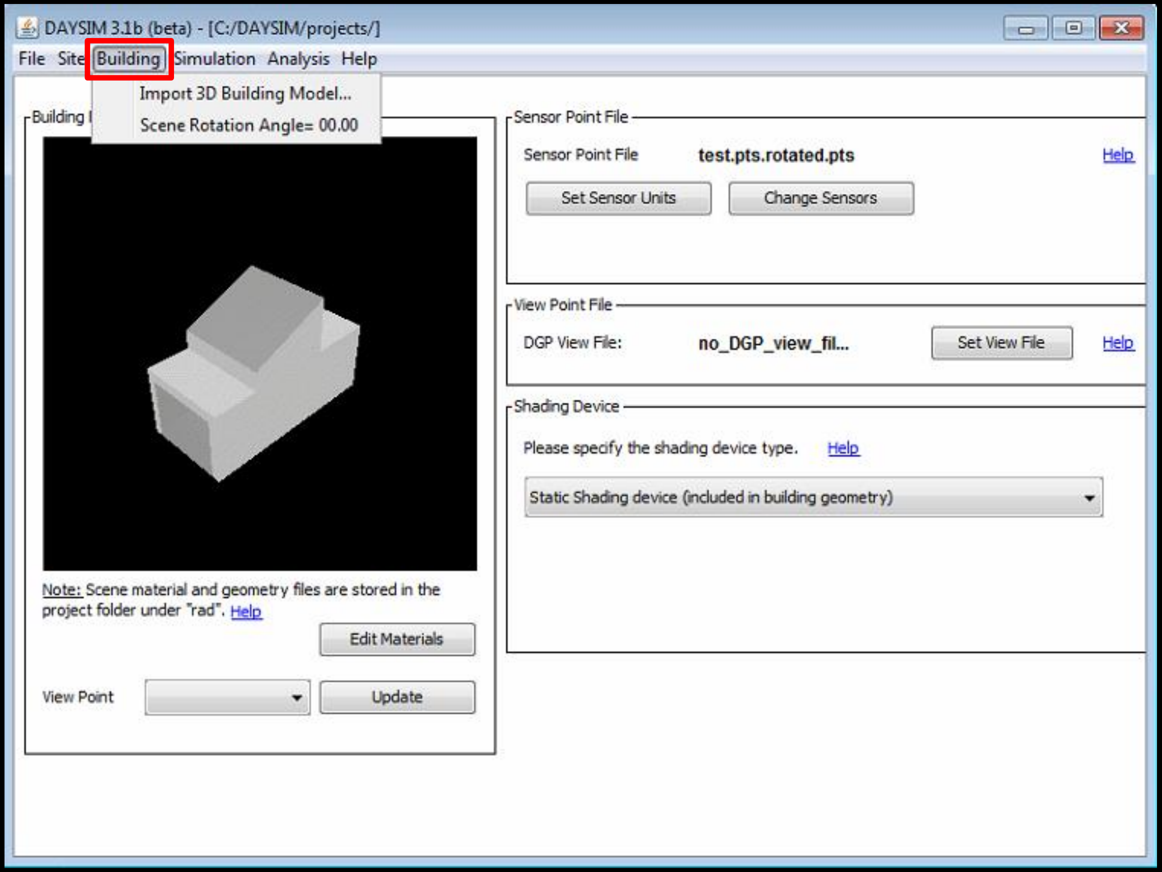
Daysim:



Open climate file in text editor

Dynamic daylight simulation:

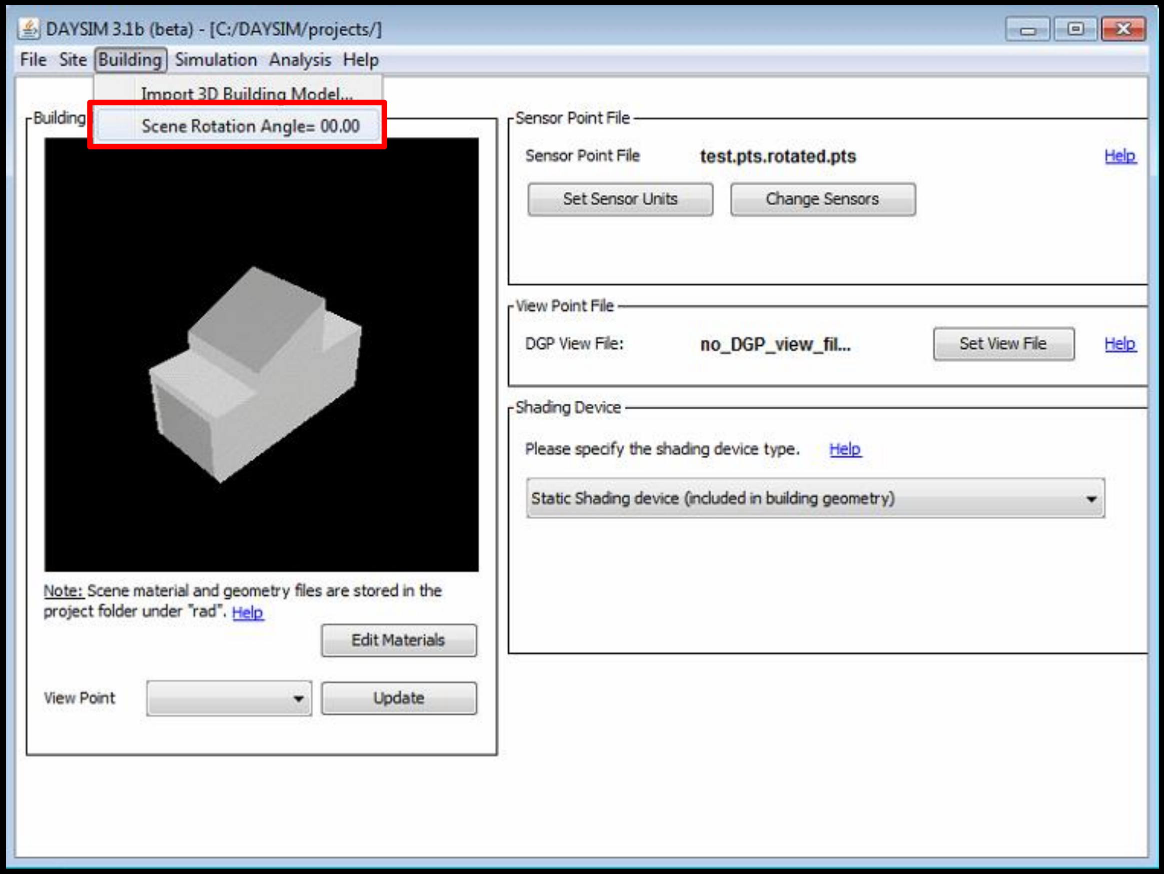
Daysim:



Daysim → Menu → Building

Dynamic daylight simulation:

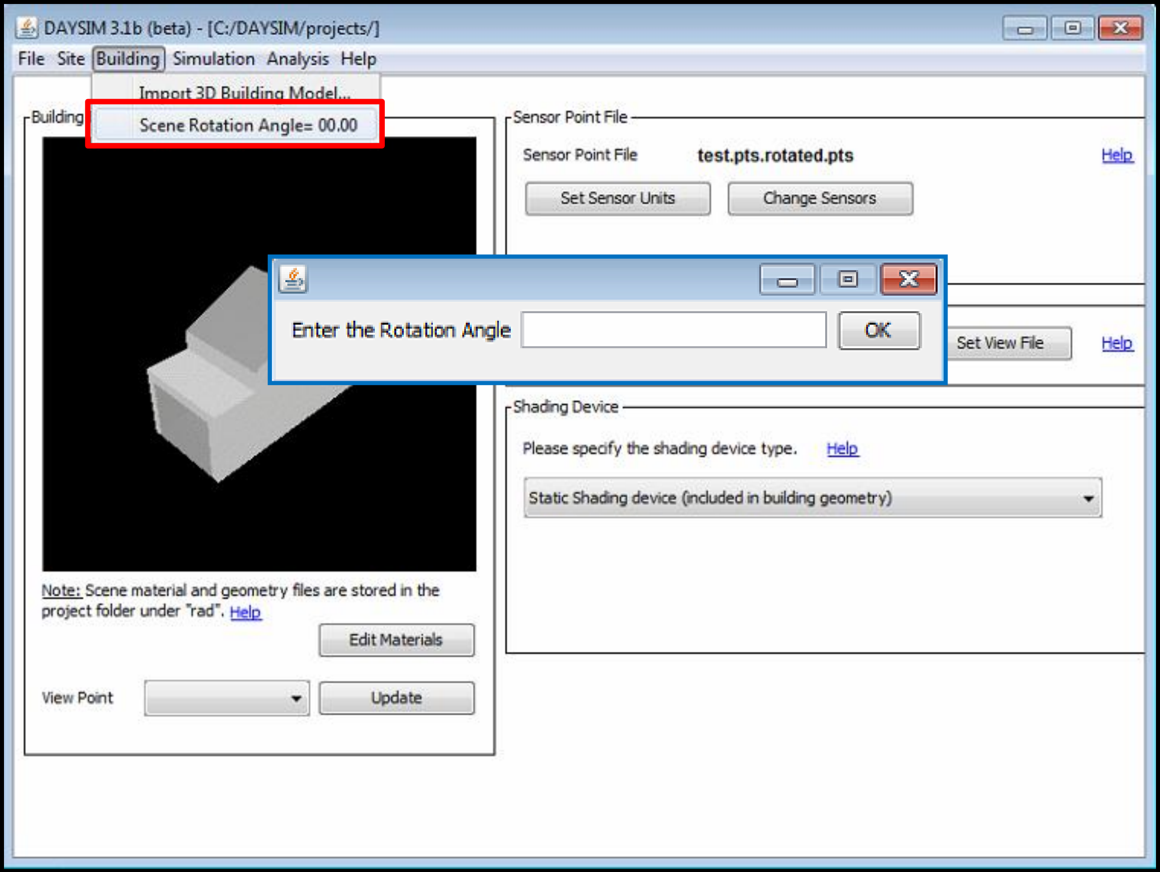
Daysim:



Daysim → Menu → Building → Scene Rotation Angle= --.--

Dynamic daylight simulation:

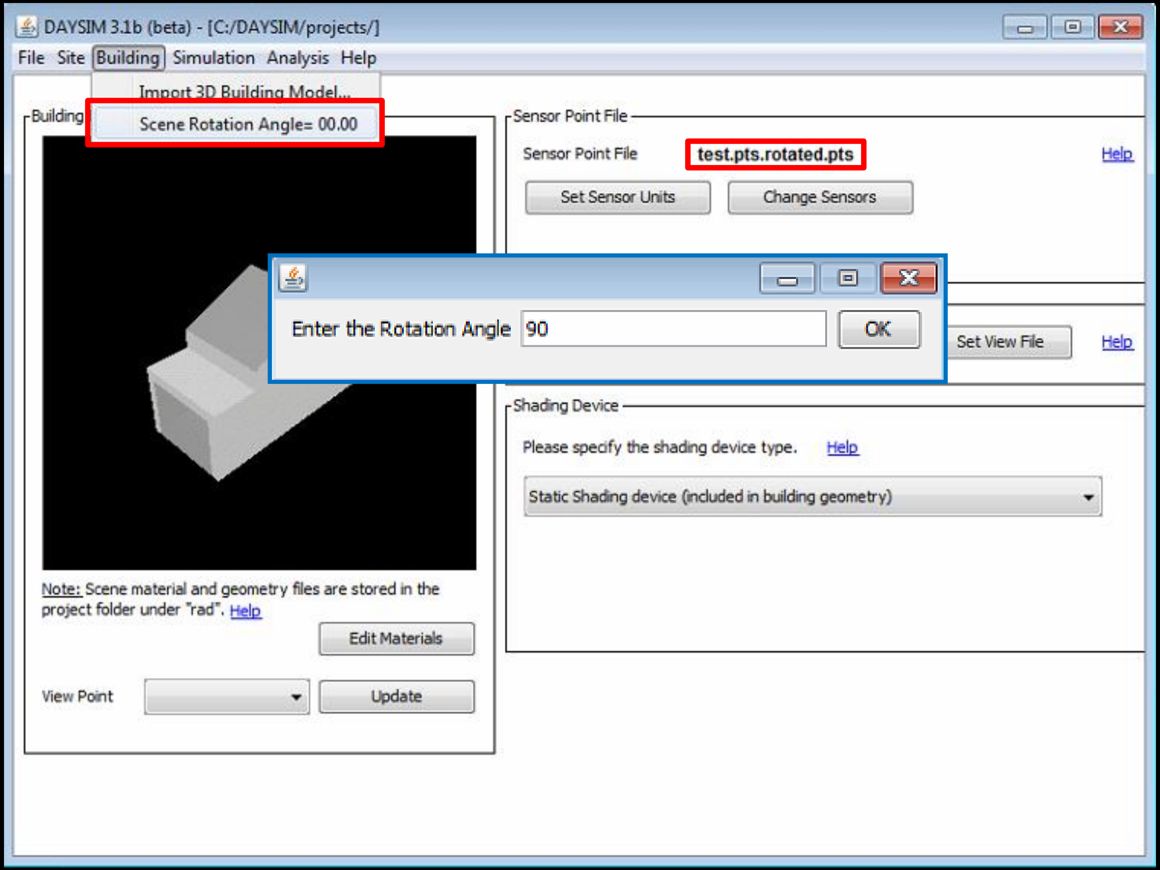
Daysim:



Daysim → Menu → Building → Scene Rotation Angle= --.--

Dynamic daylight simulation:

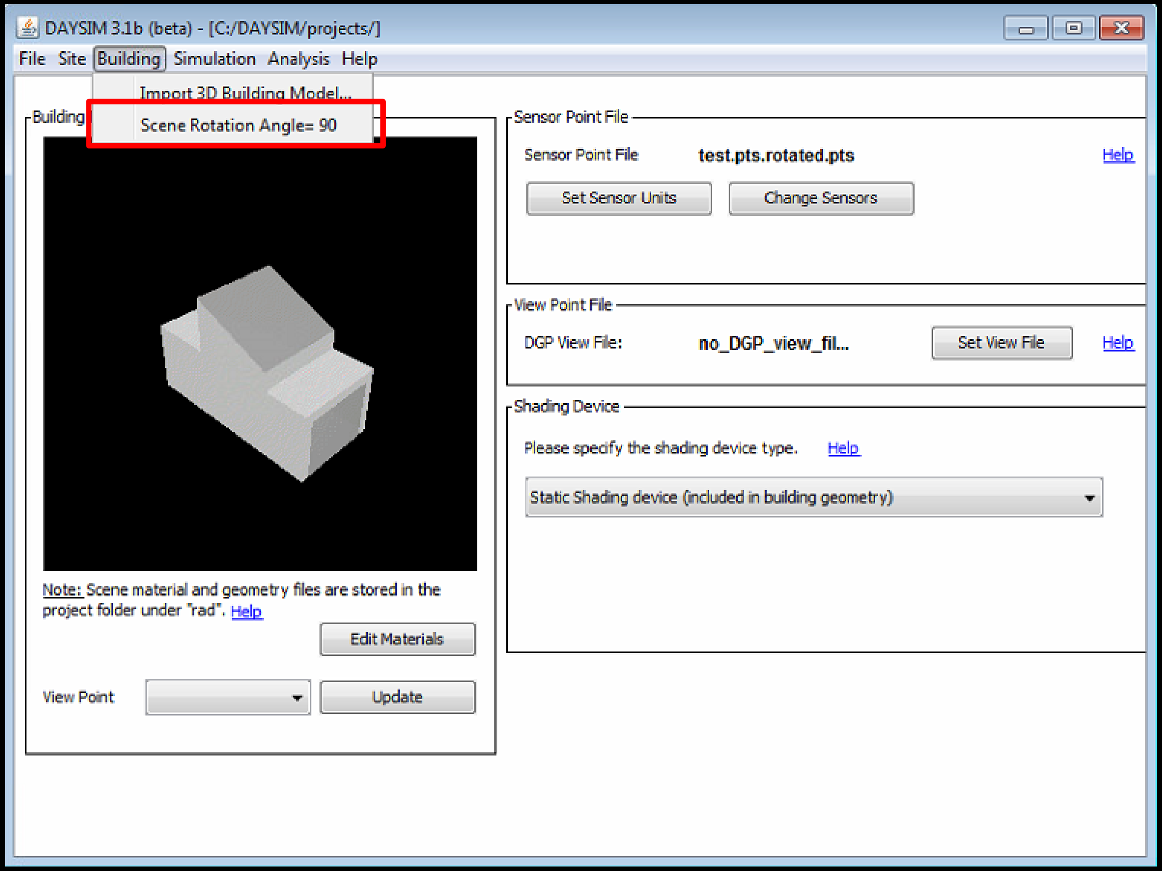
Daysim:



Daysim → Menu → Building → Scene Rotation Angle= 90.00

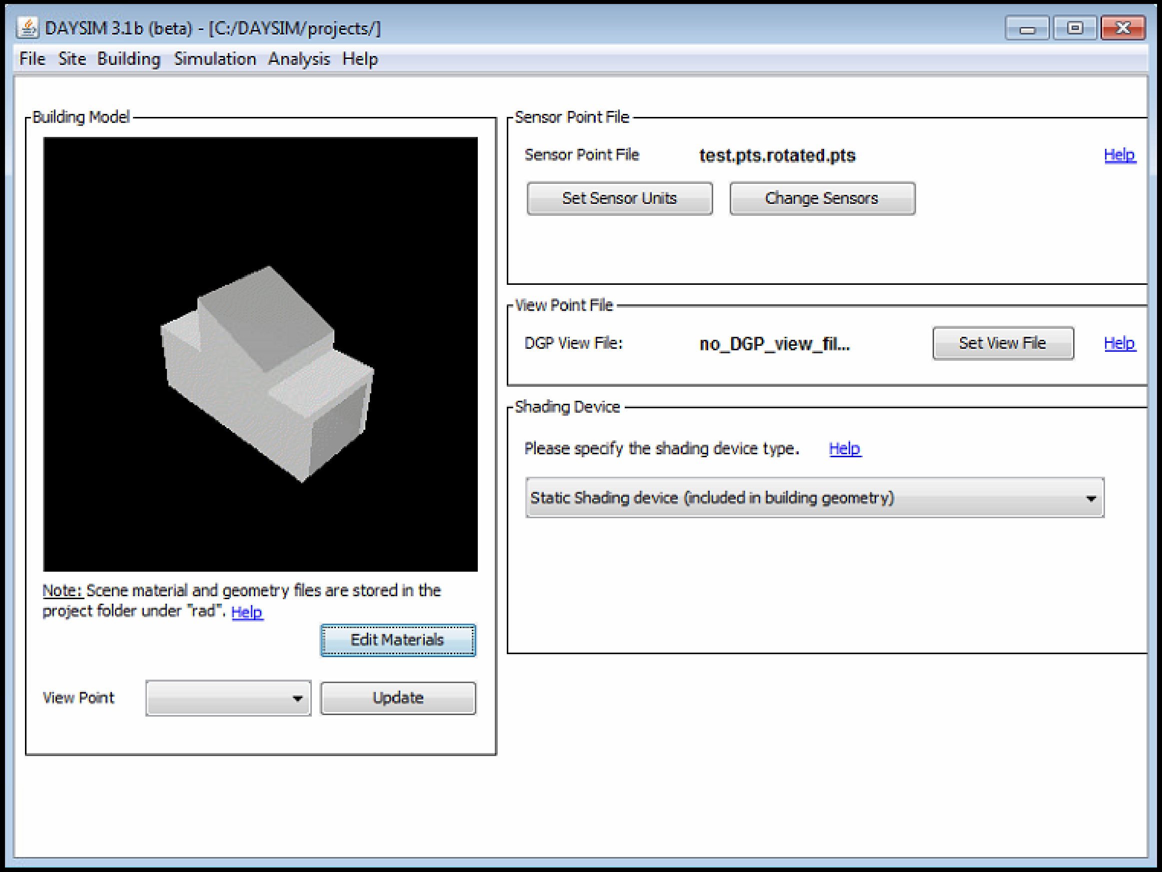
Dynamic daylight simulation:

Daysim:



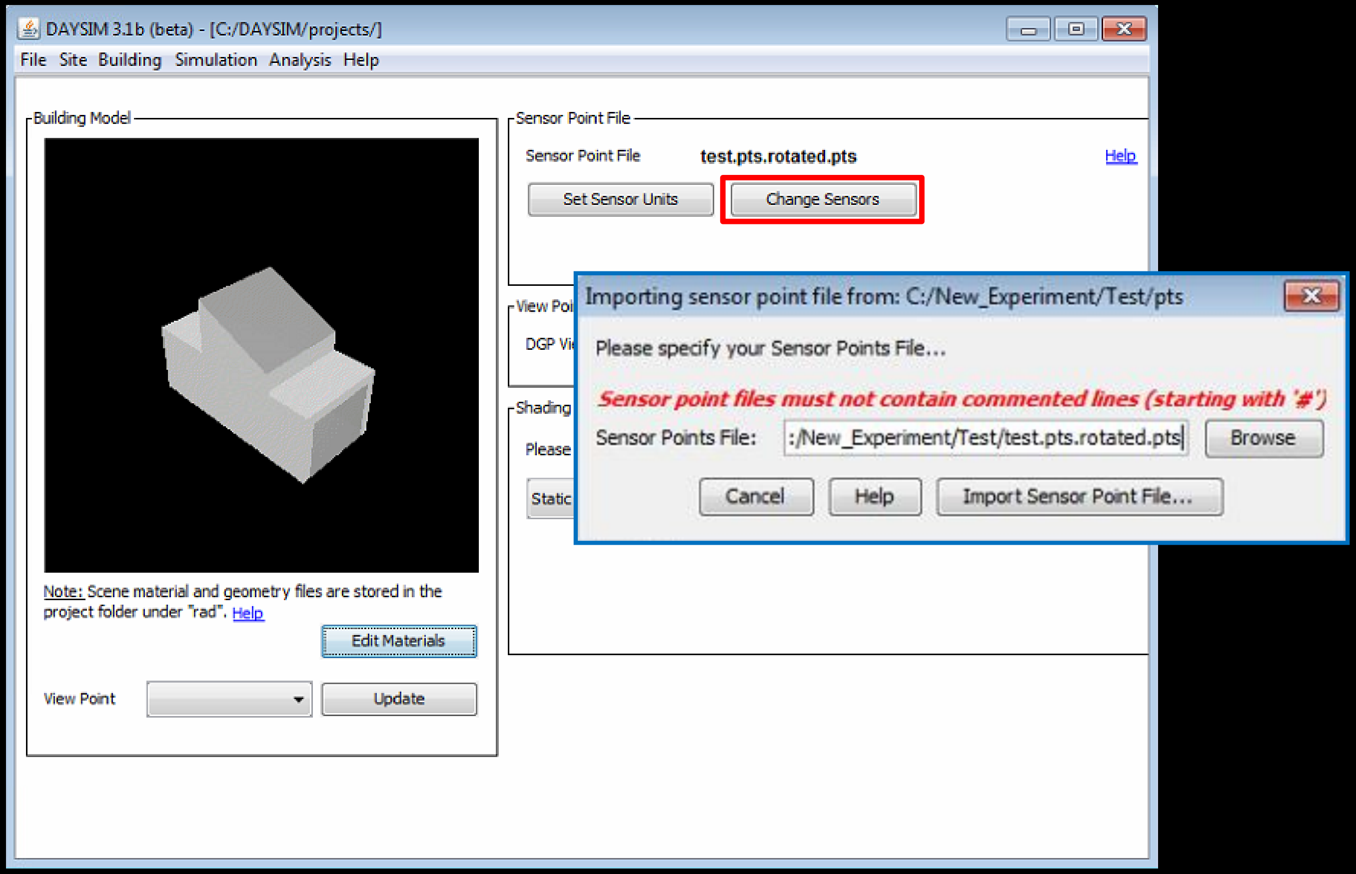
Dynamic daylight simulation:

Daysim:



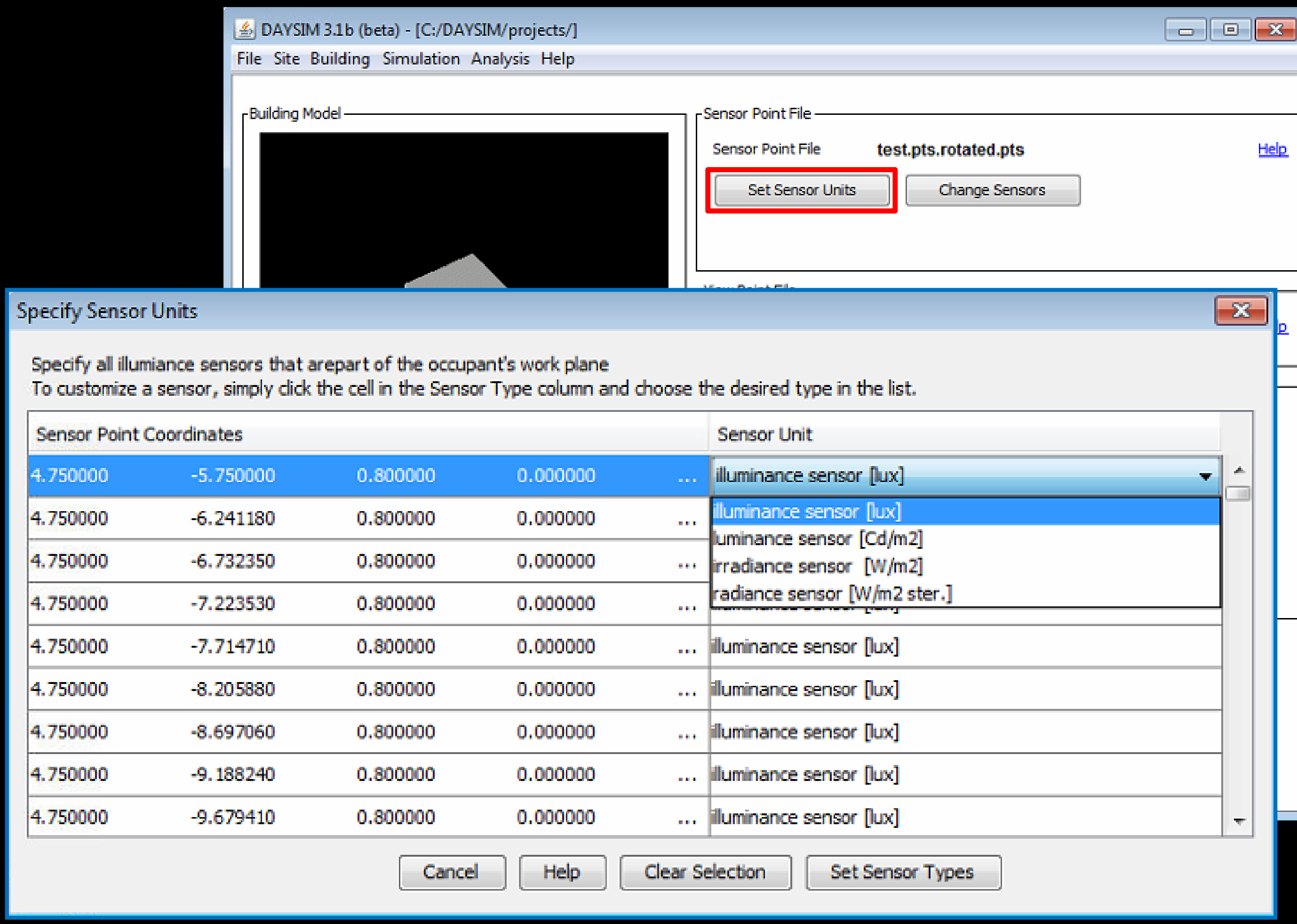
Dynamic daylight simulation:

Daysim:



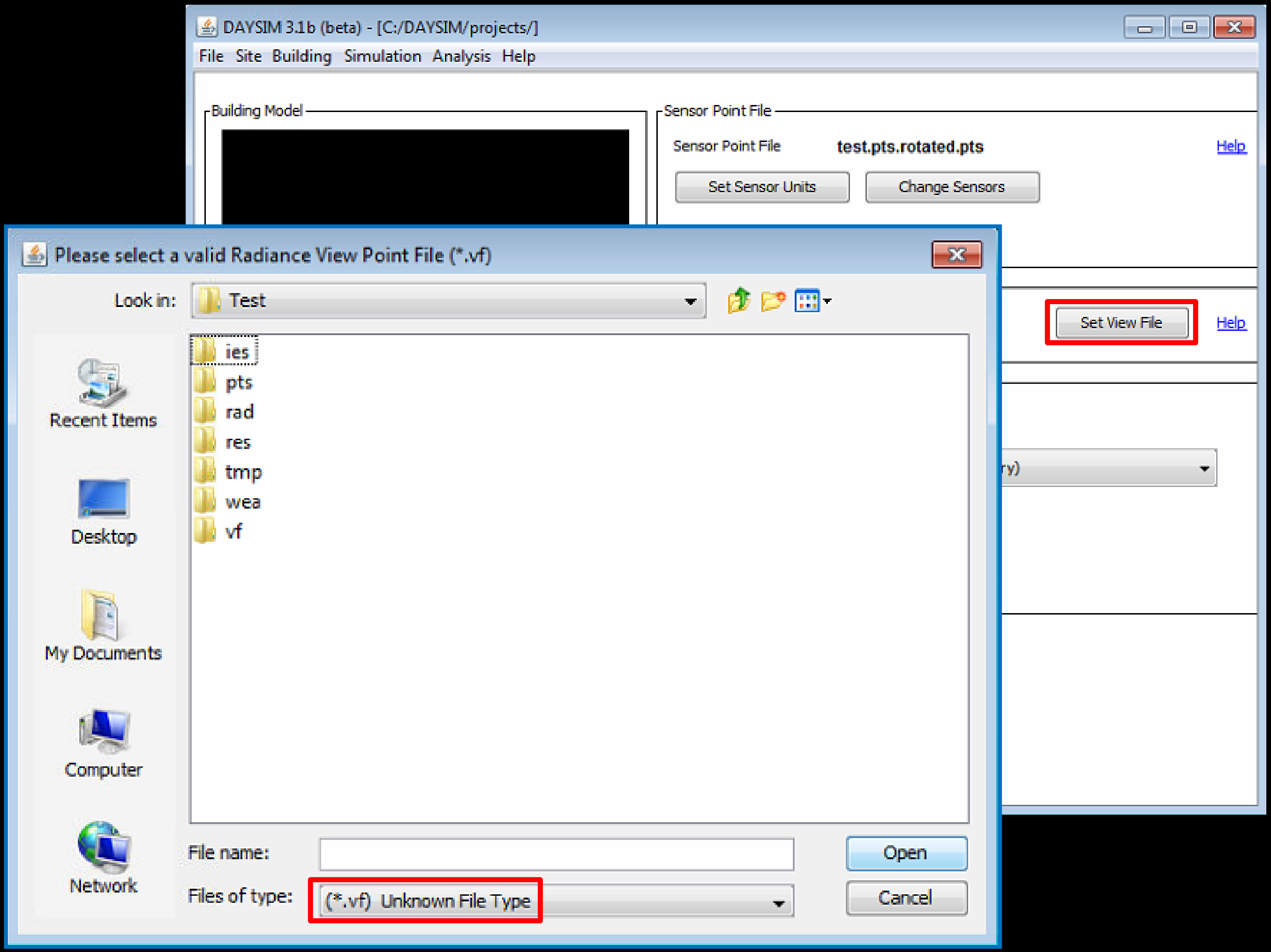
Dynamic daylight simulation:

Daysim:



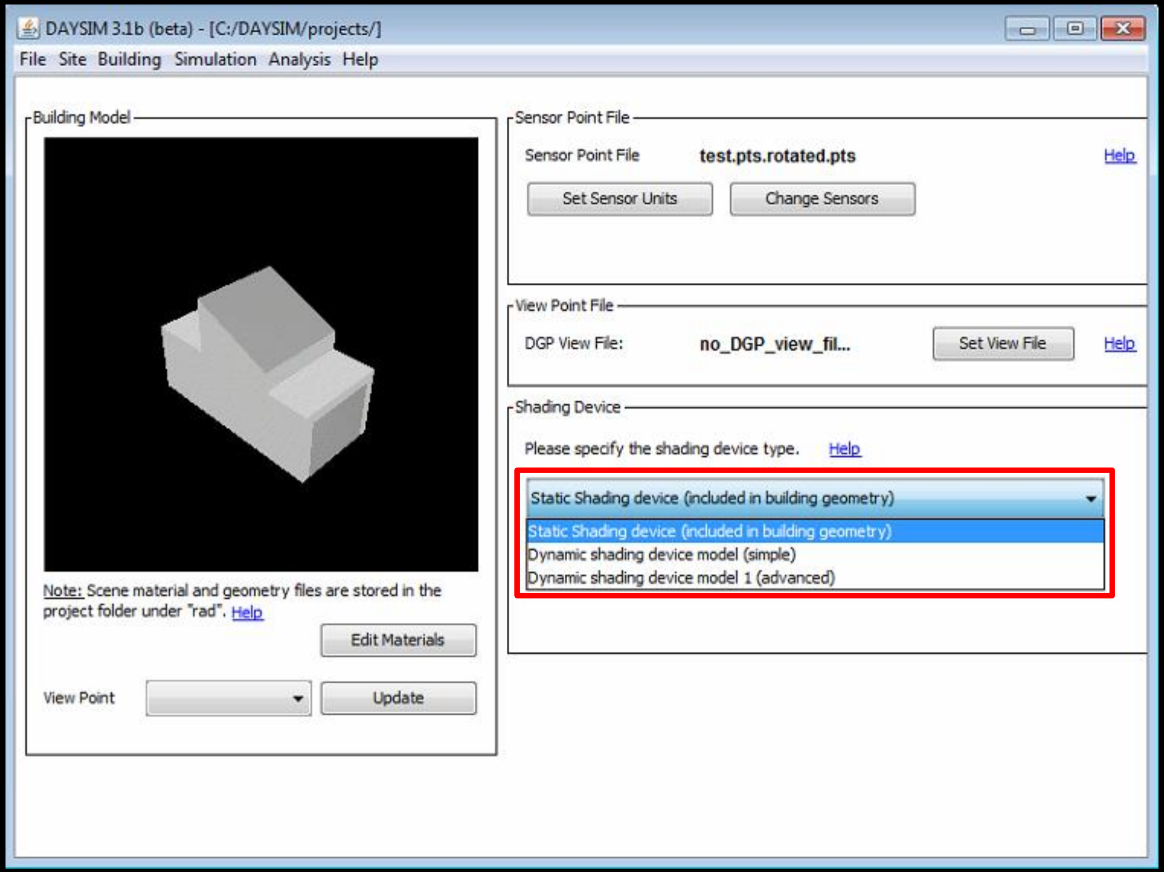
Dynamic daylight simulation:

Daysim:



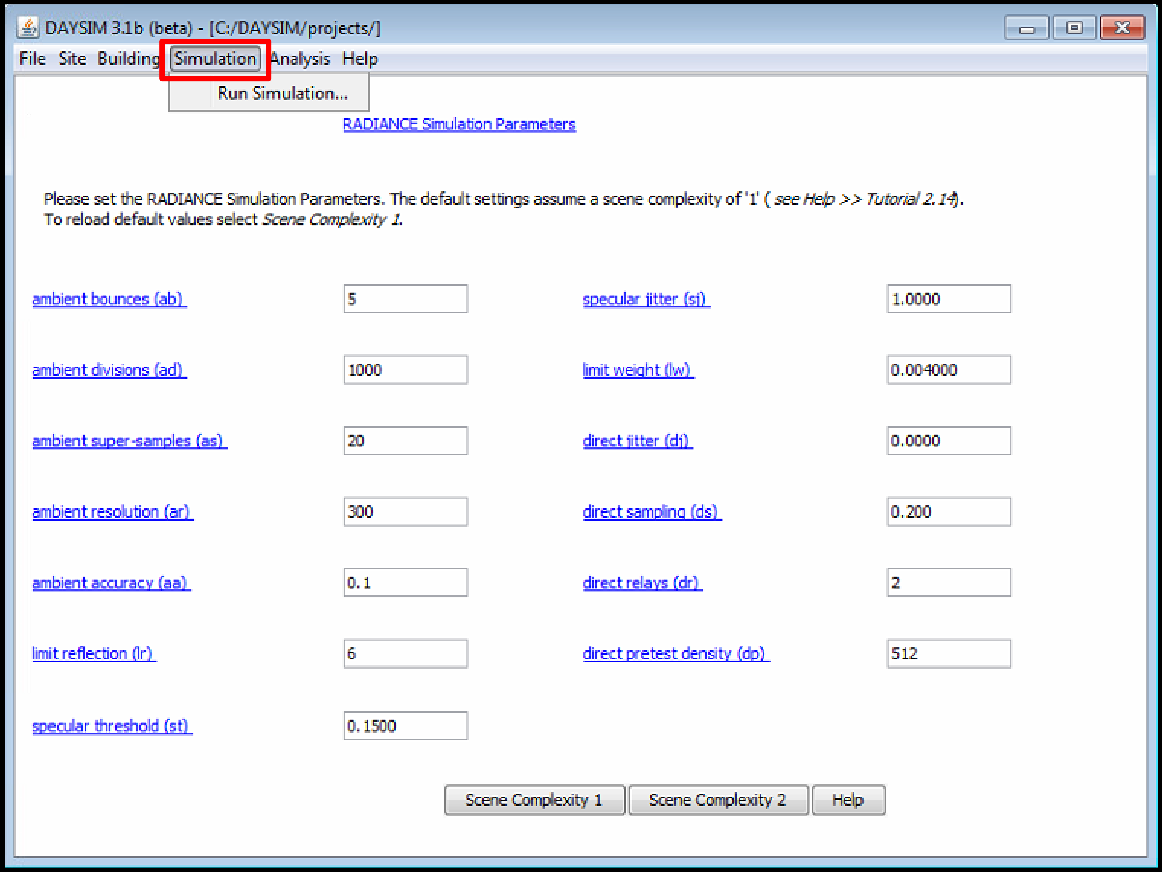
Dynamic daylight simulation:

Daysim:



Dynamic daylight simulation:

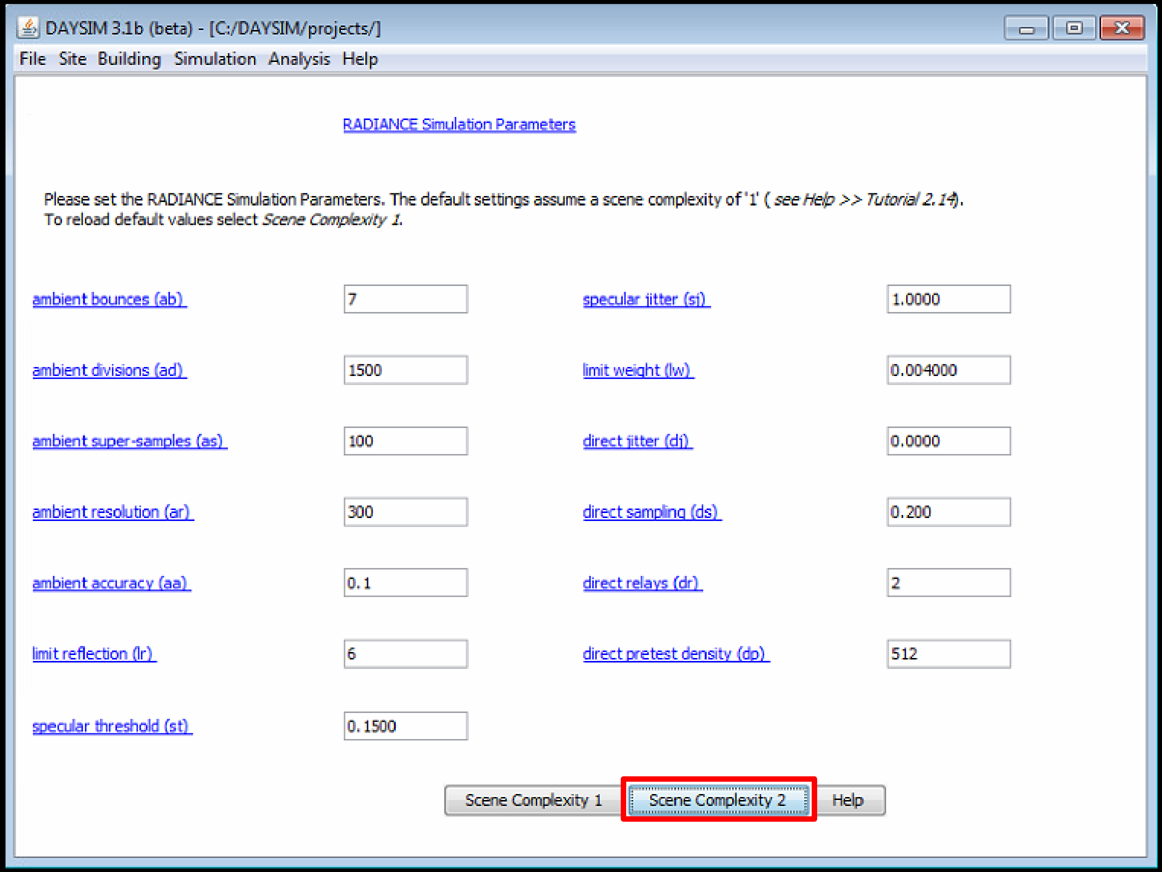
Daysim:



Daysim → Menu → Simulation

Dynamic daylight simulation:

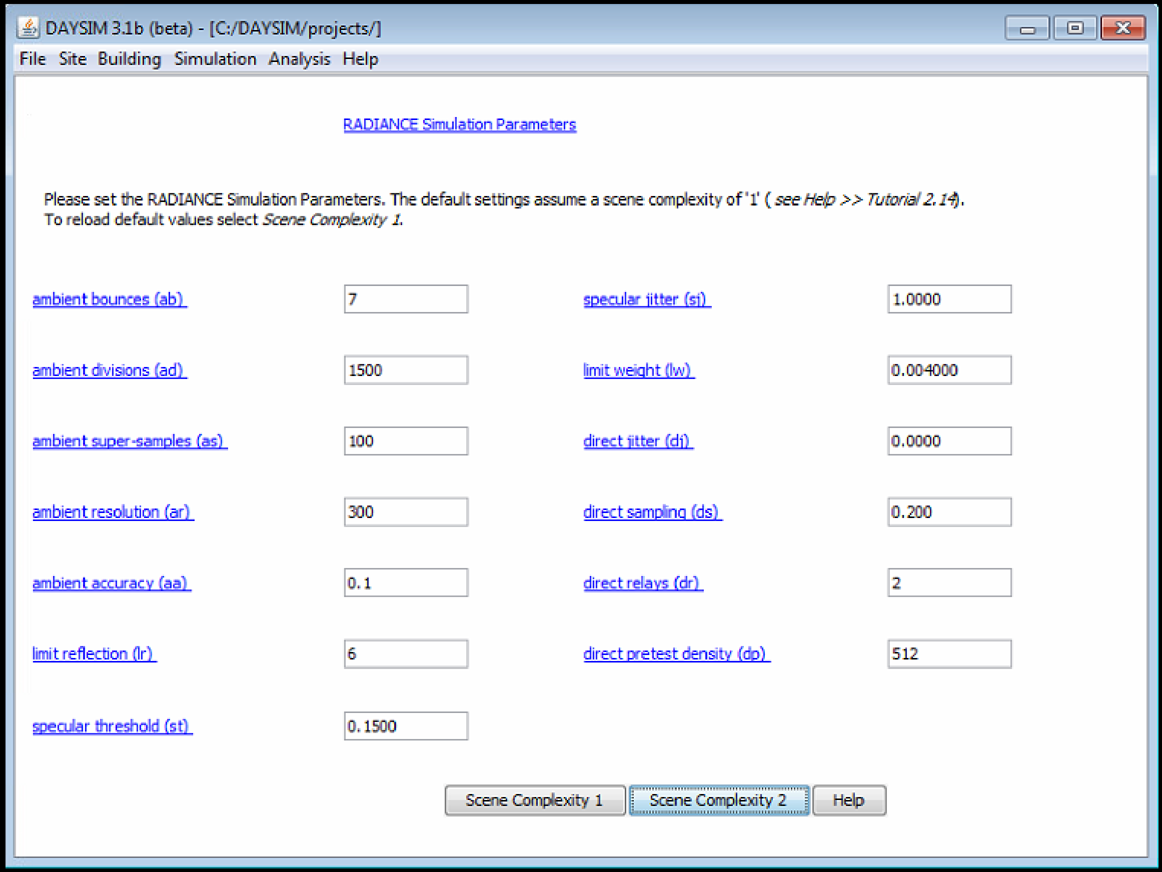
Daysim:



For more accurate calculation → choose Scene Complexity 2

Dynamic daylight simulation:

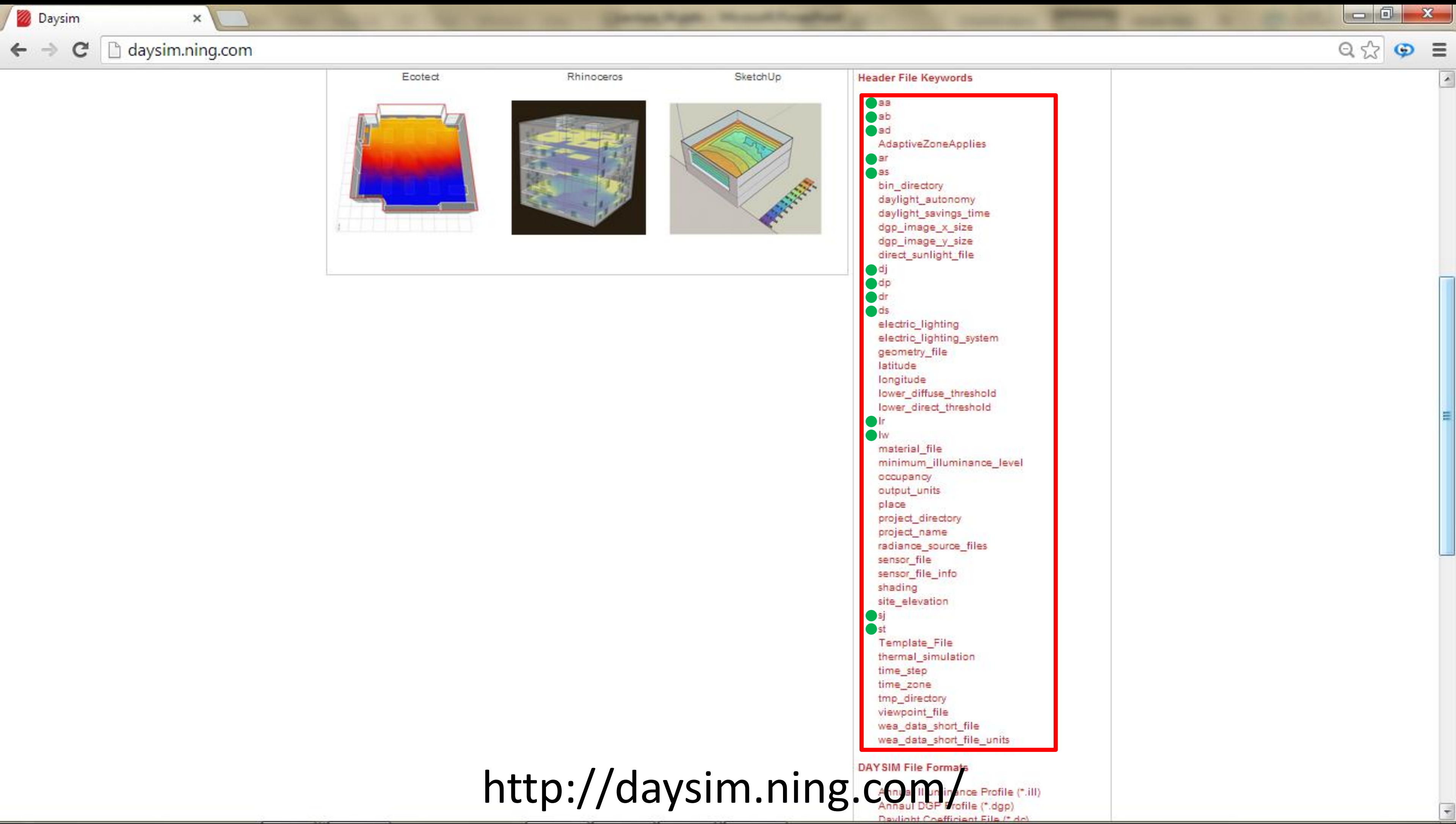
Daysim:



To find helps for ab, ad, as, ar, aa, lr, st, sj, lw, dj, ds, dr, dp

Dynamic daylight simulation:

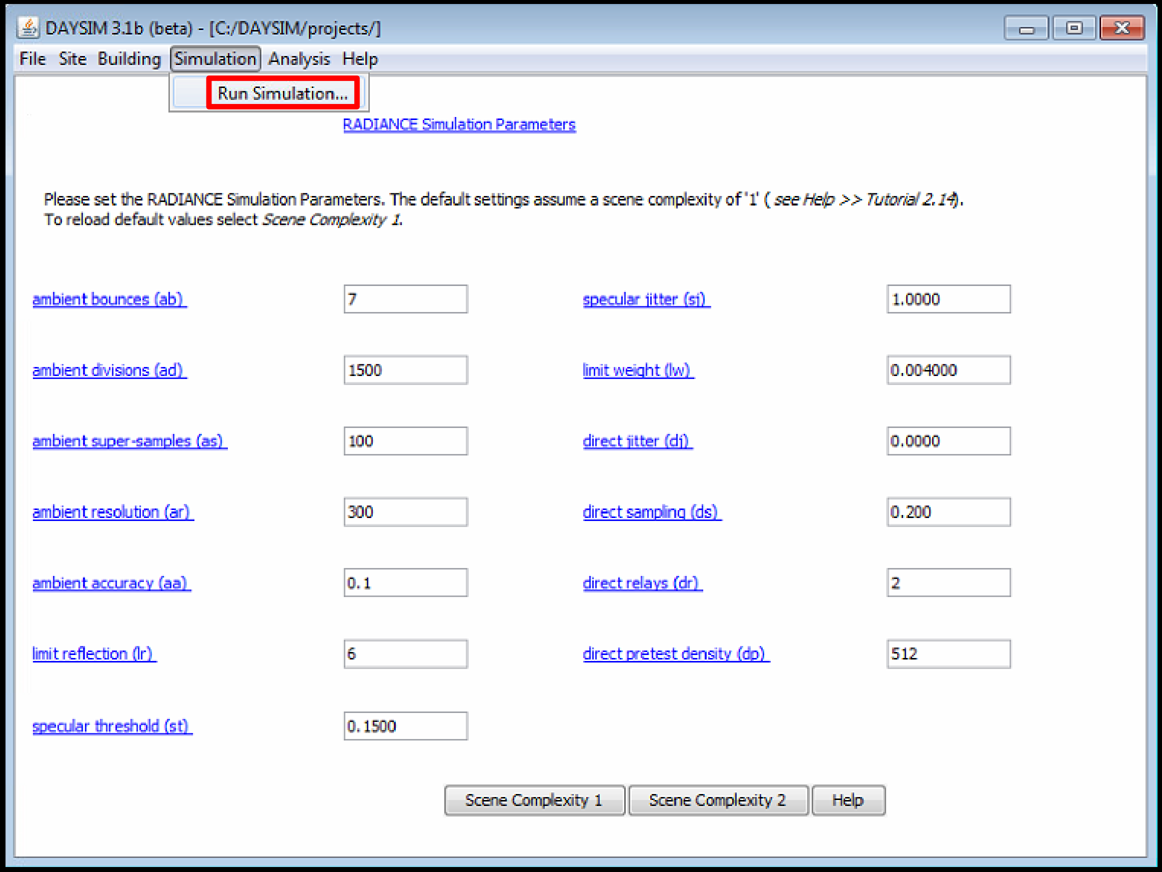
Daysim:



http://daysim.ning.com/

Dynamic daylight simulation:

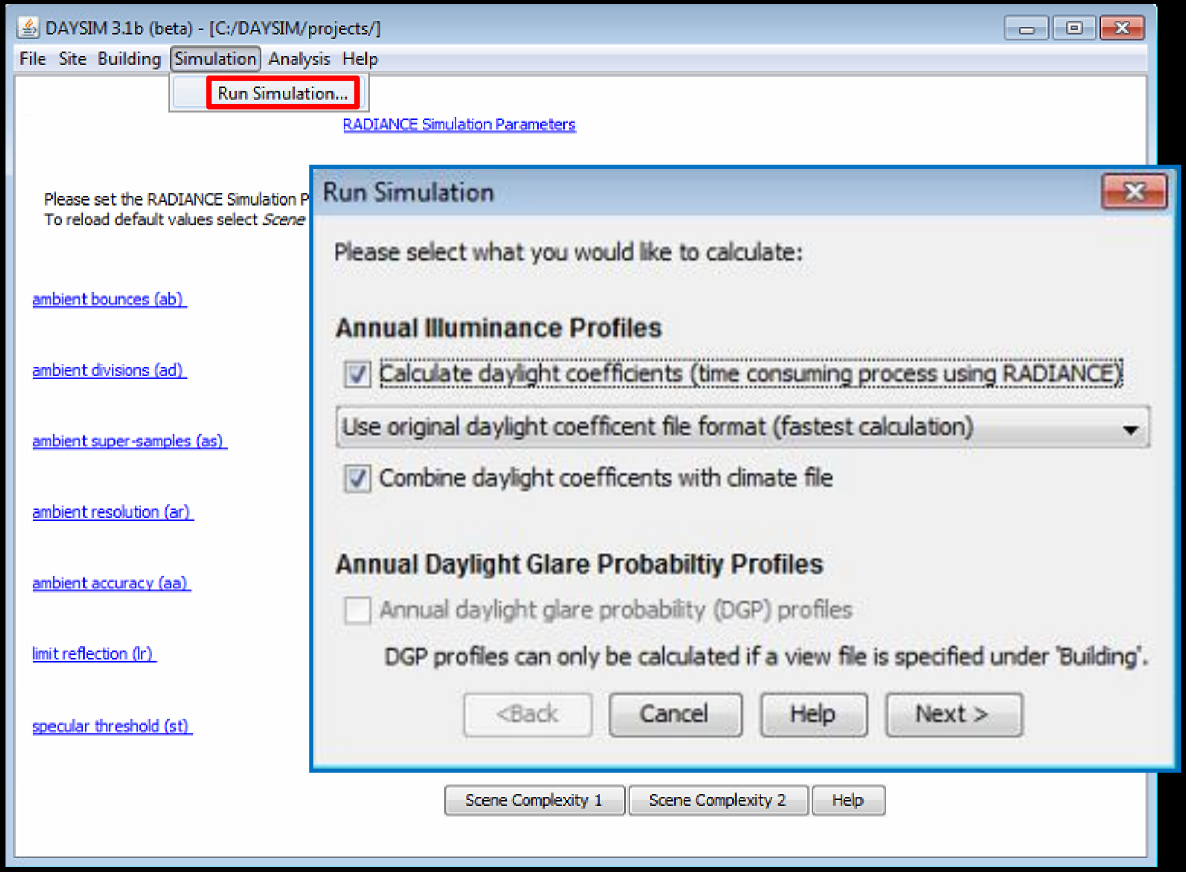
Daysim:



Daysim → Menu → Simulation → Run Simulation

Dynamic daylight simulation:

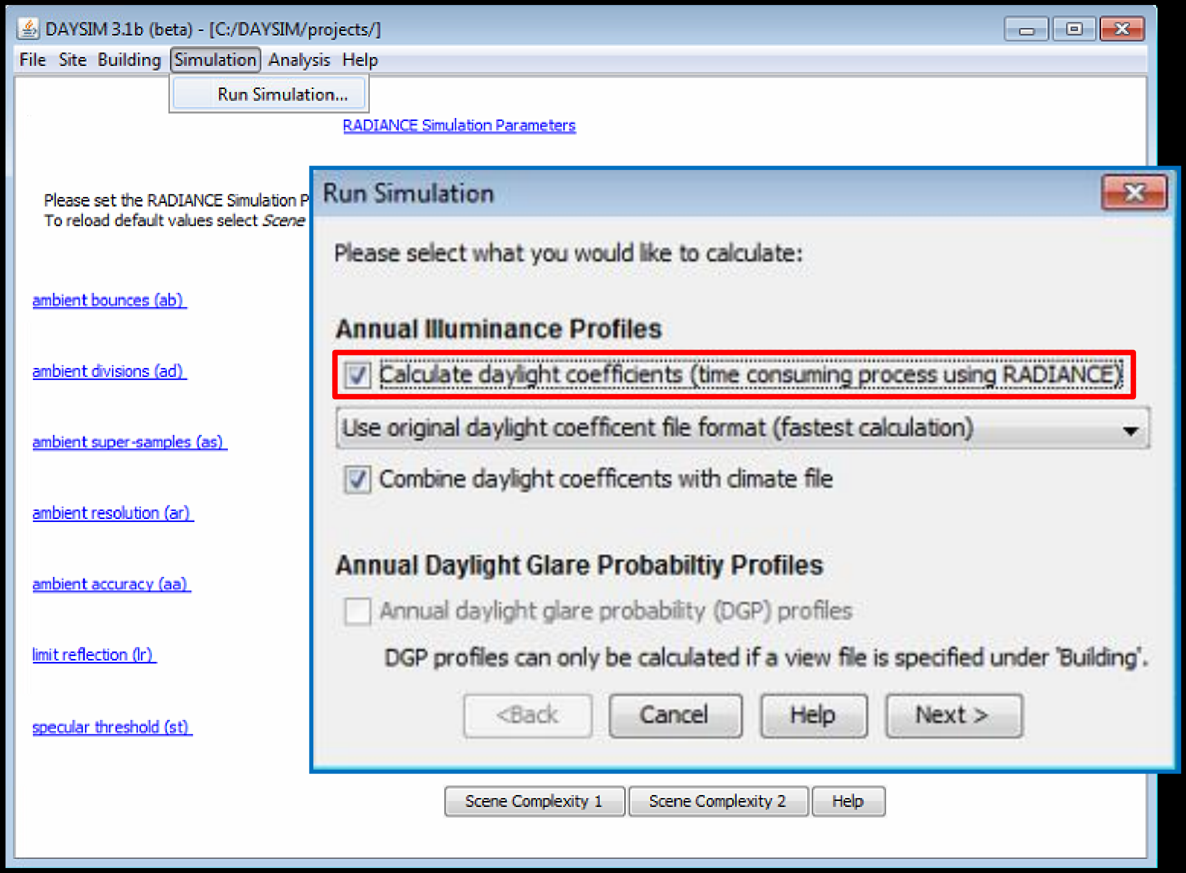
Daysim:



Daysim → Menu → Simulation → Run Simulation

Dynamic daylight simulation:

Daysim:



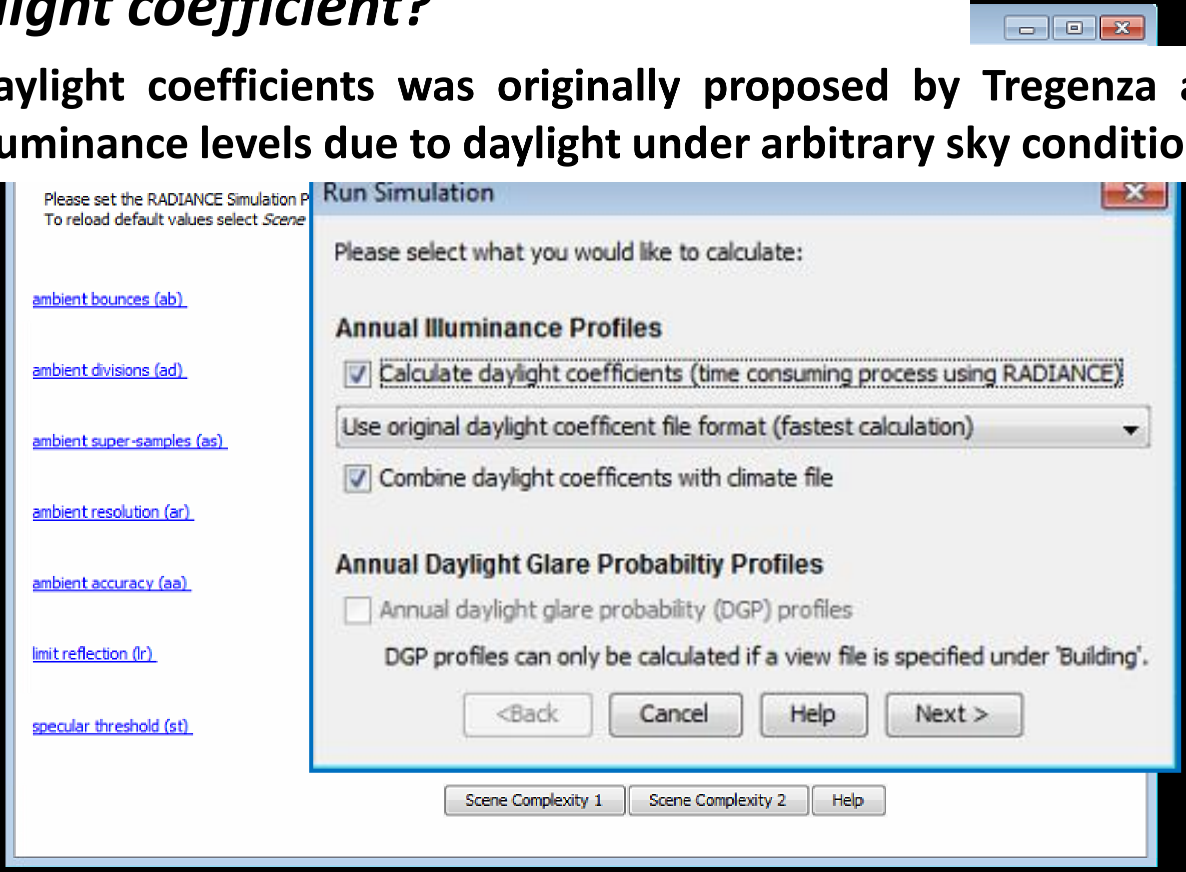
Daysim → Menu → Simulation → Run Simulation

Dynamic daylight simulation:

Daysim:

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.



Dynamic daylight simulation:

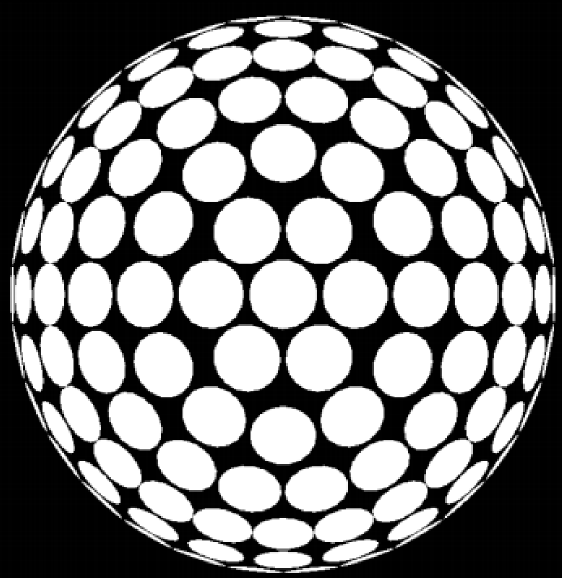
Daysim:

What is a daylight coefficient?

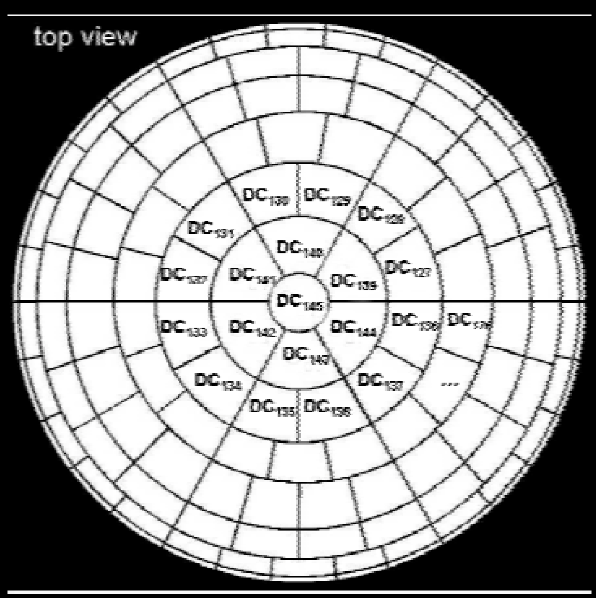
The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Tregenza division



continuous division



Dynamic daylight simulation:

Daysim:

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

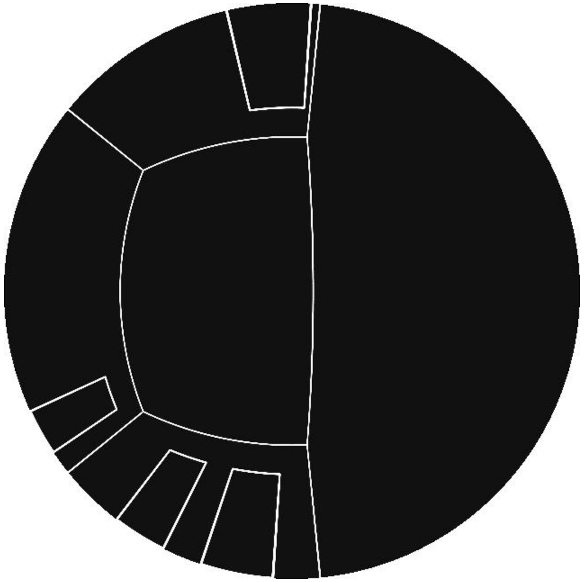
Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.

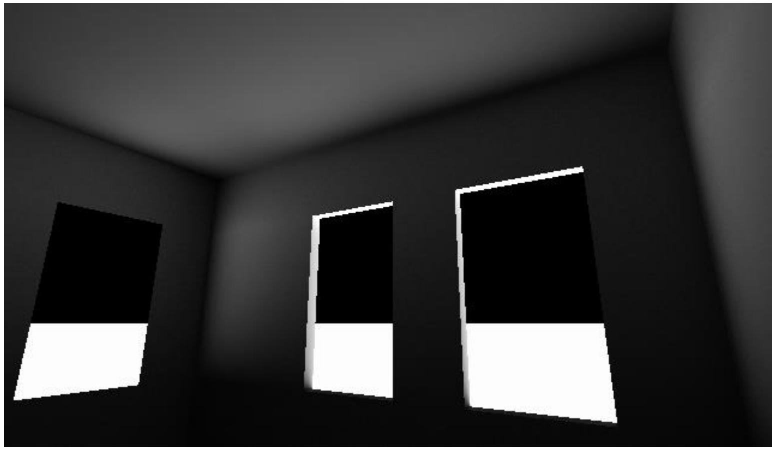
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

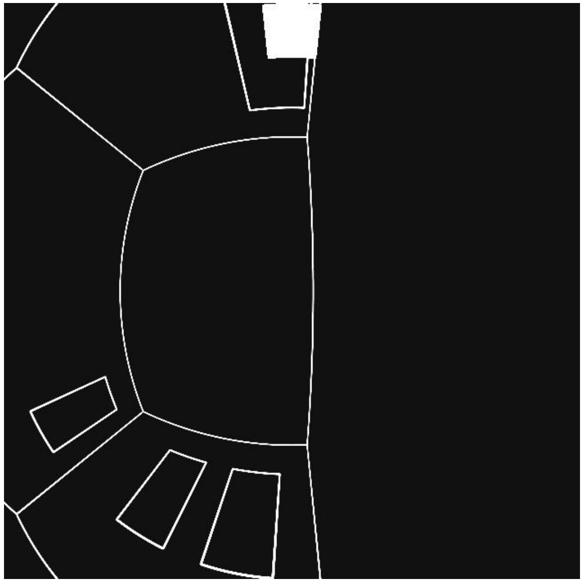
p0

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

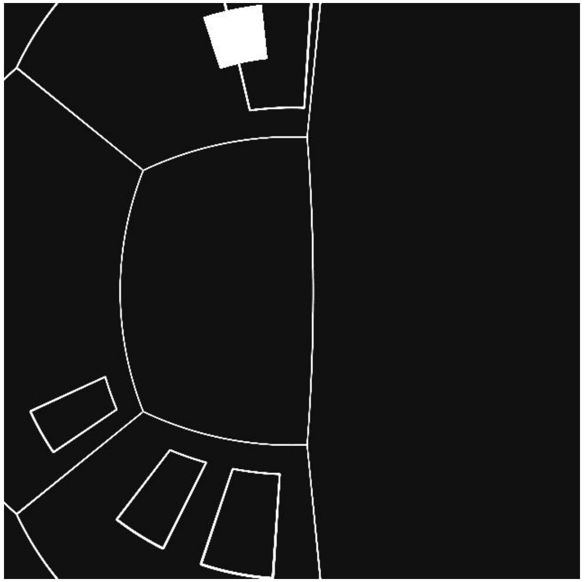
p1

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2

ad=4096

lw=0.0005

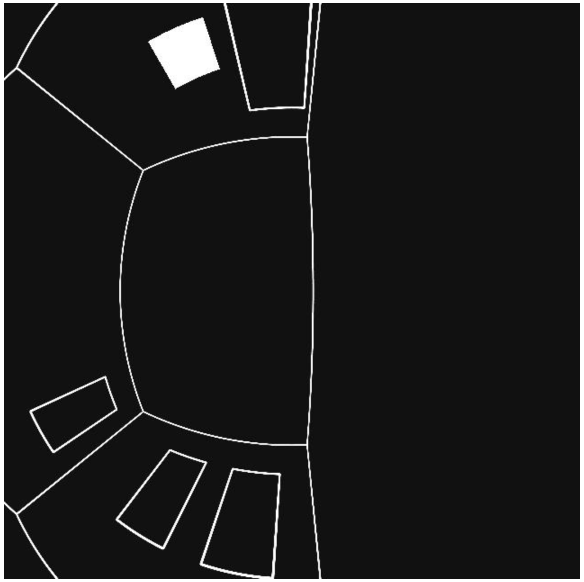
p2

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



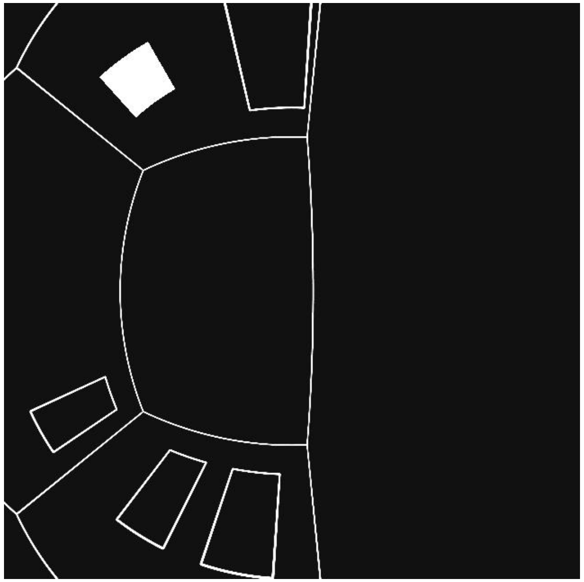
ab=2 **p3**
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



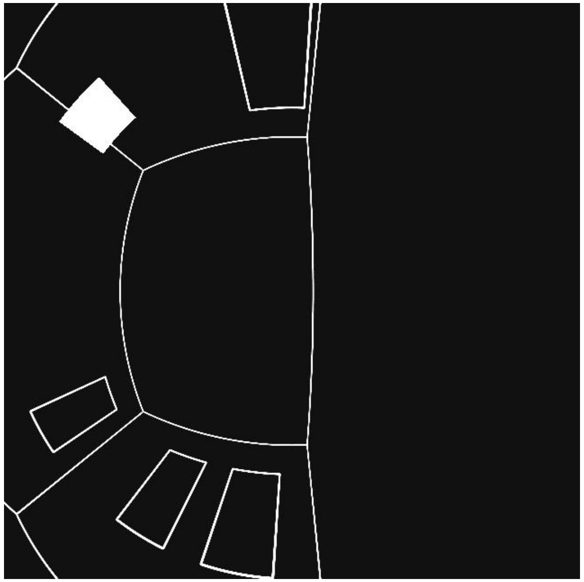
ab=2 **p4**
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

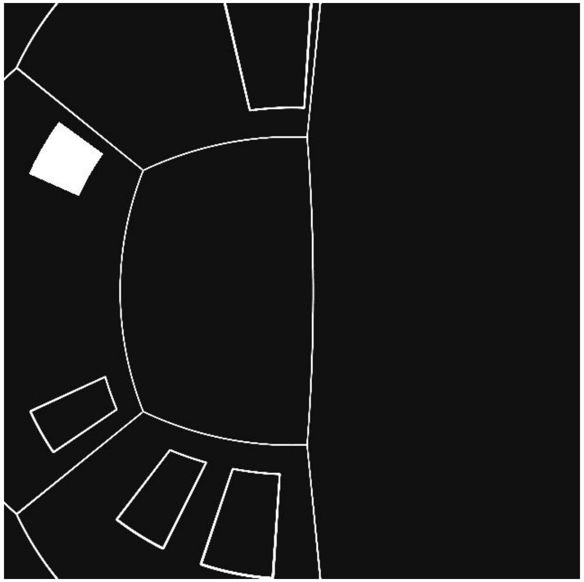
p5

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

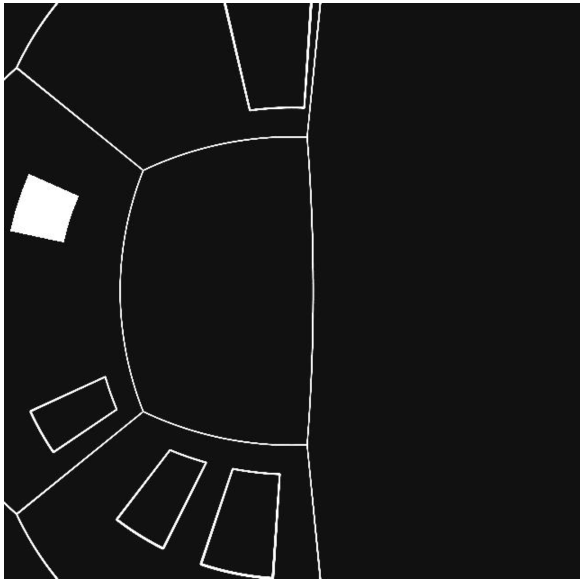
p6

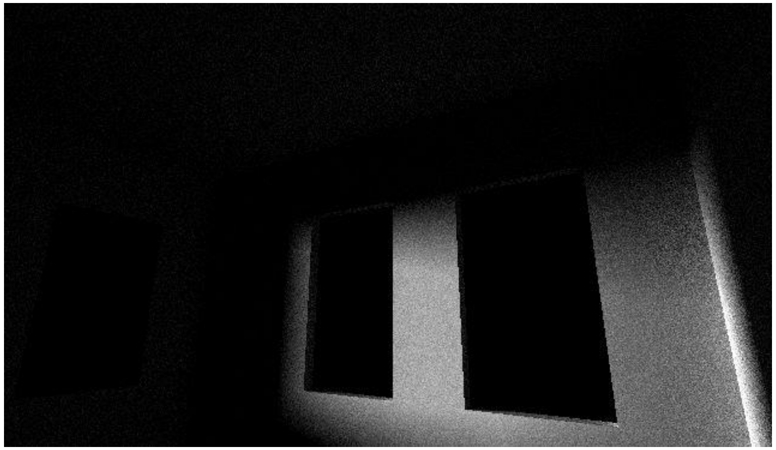
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





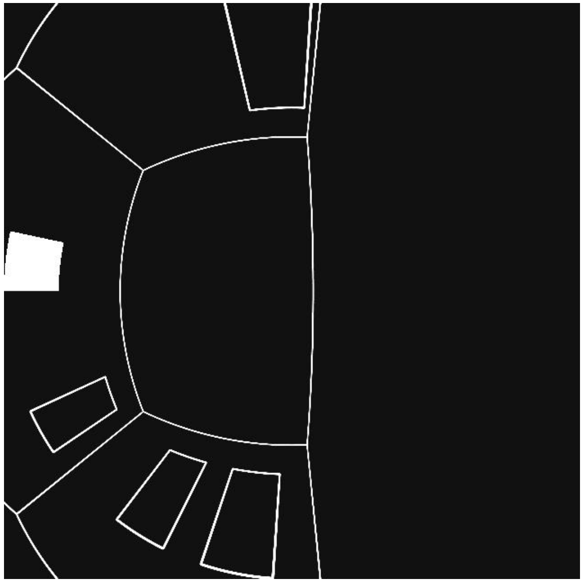
ab=2 **p7**
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

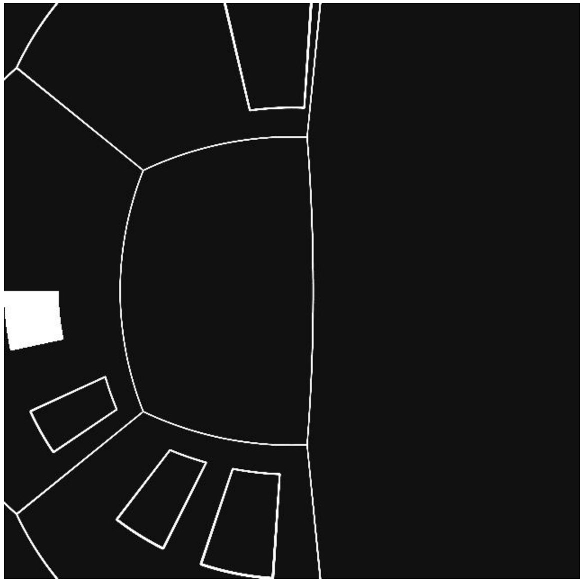
p8

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

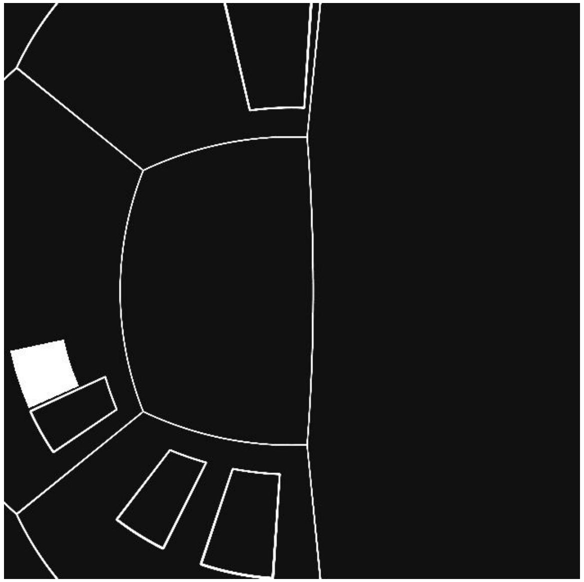
p9

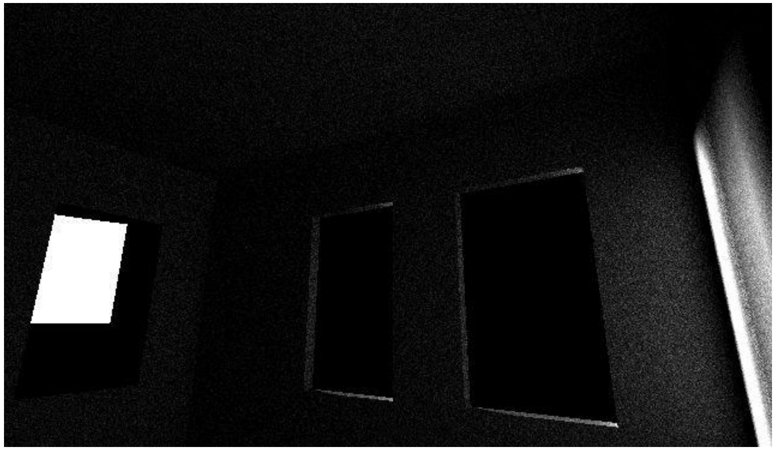
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

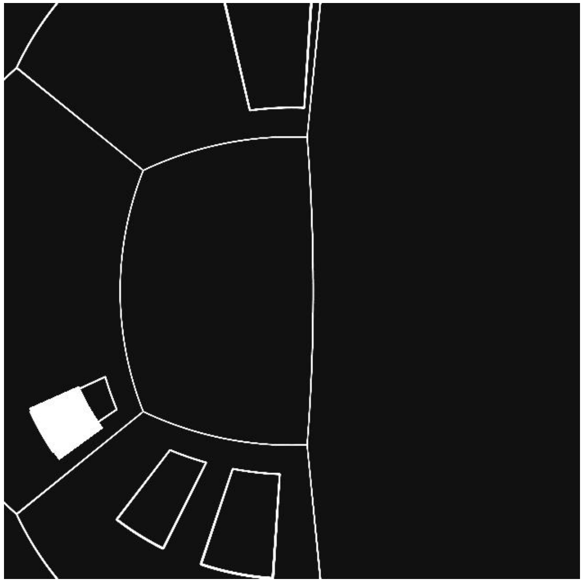
p10

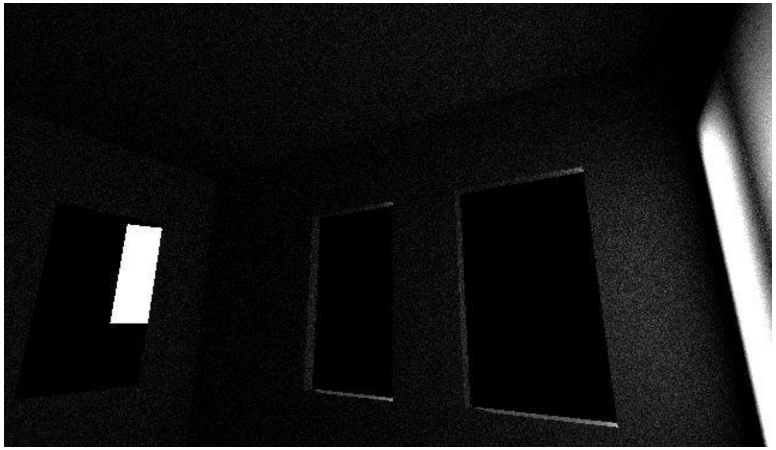
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

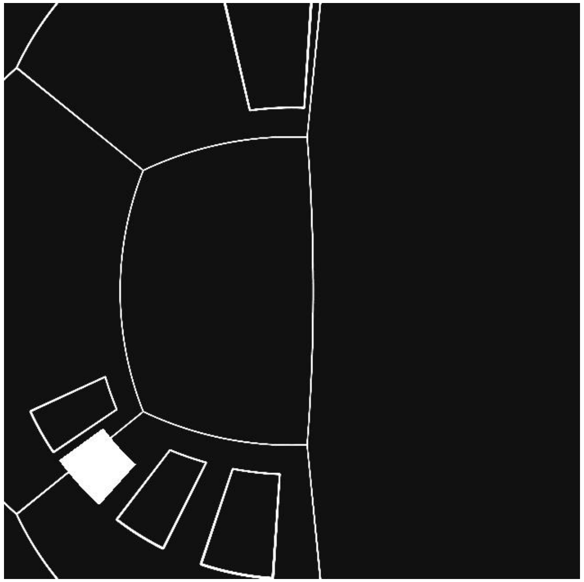
p11

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

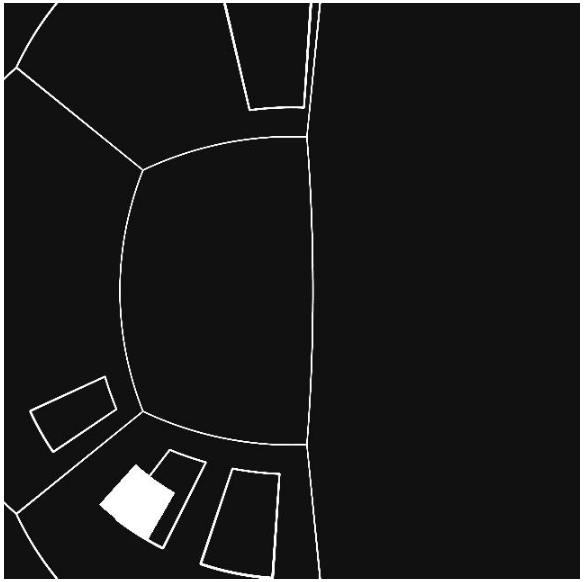
p12

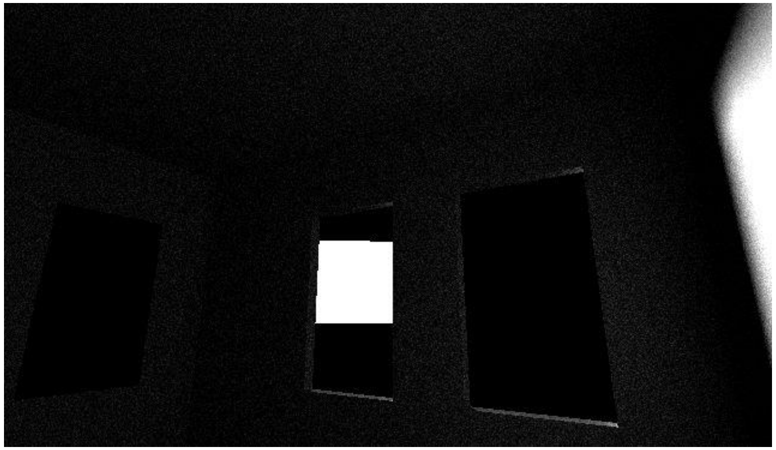
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

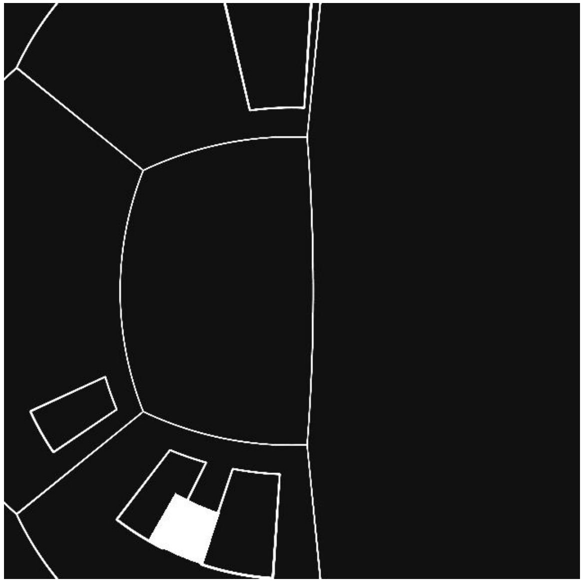
p13

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

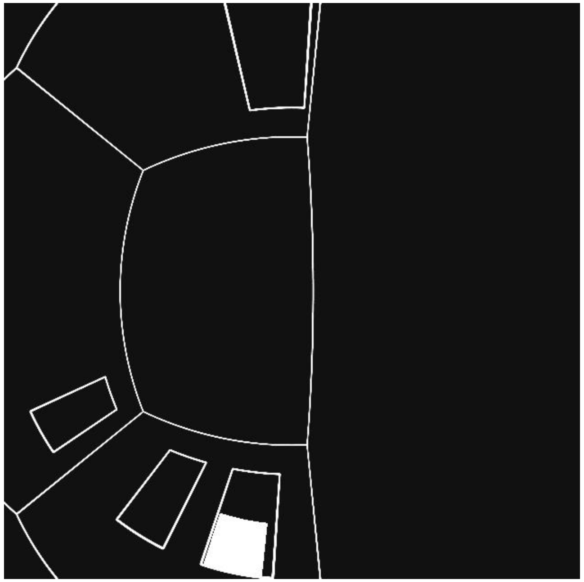
p14

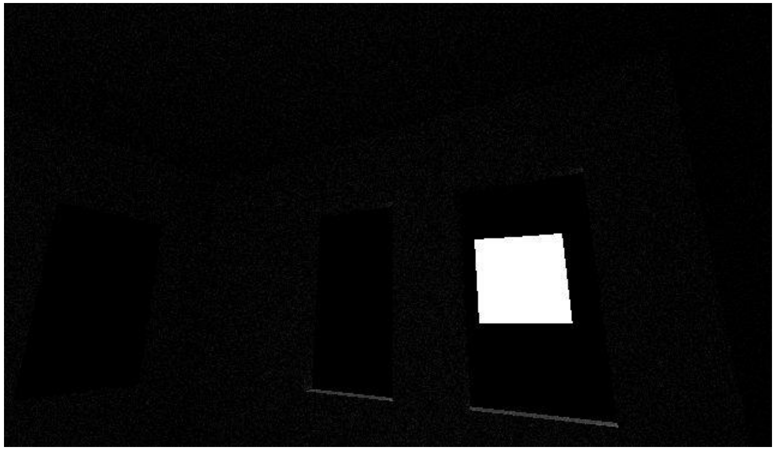
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

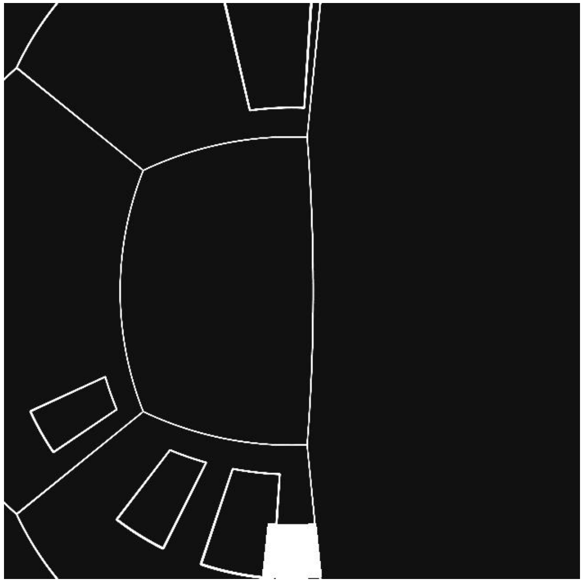
p15

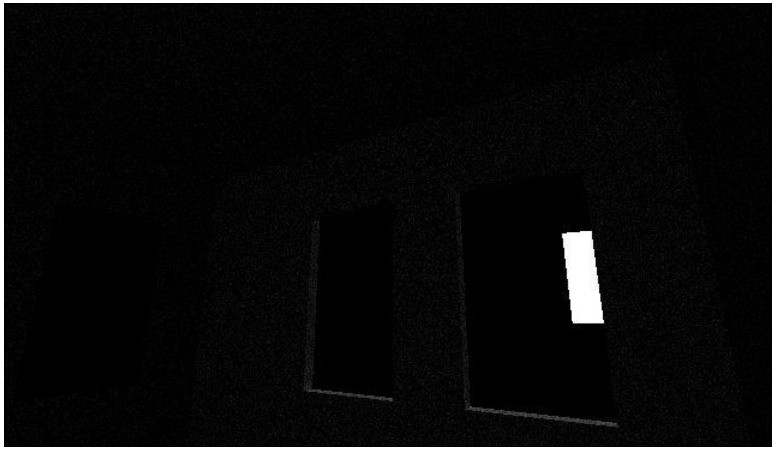
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

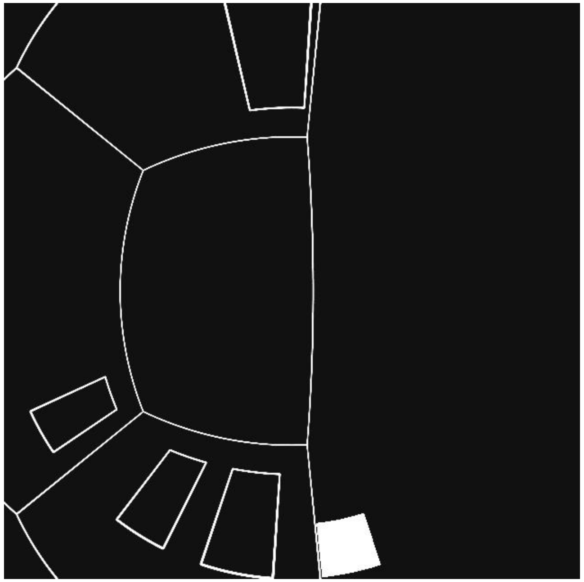
p16

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



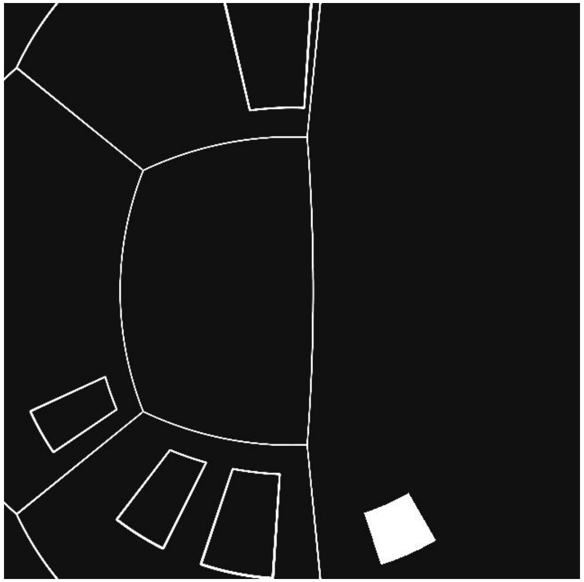
ab=2
ad=4096
lw=0.0005

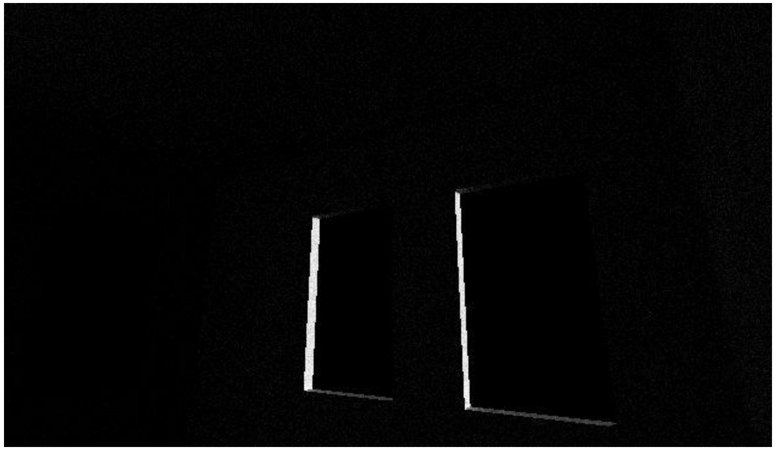
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

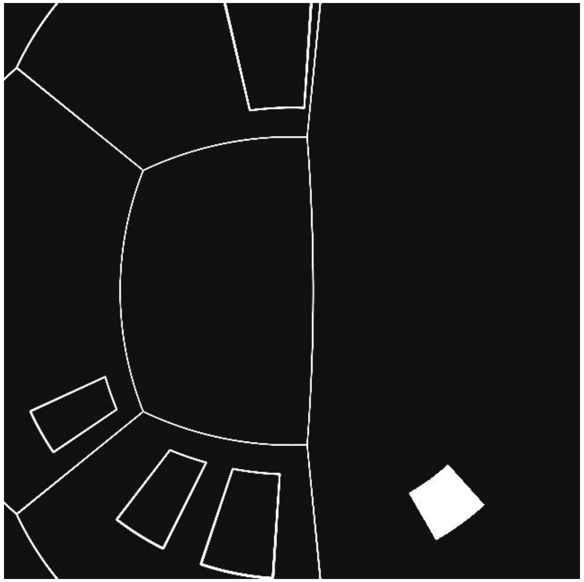
p18

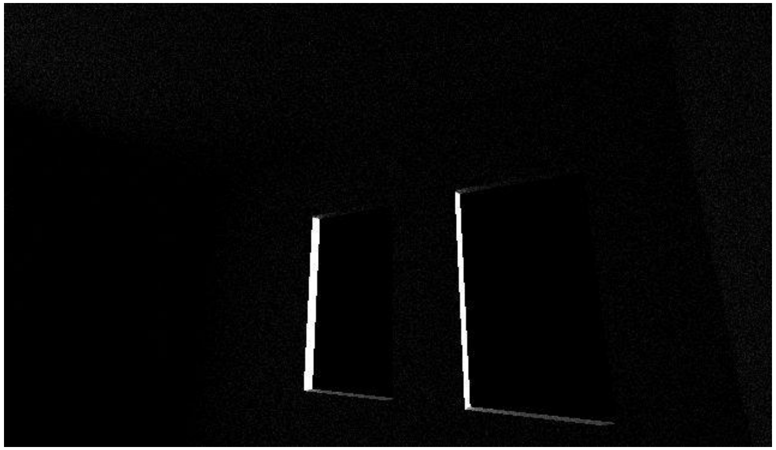
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

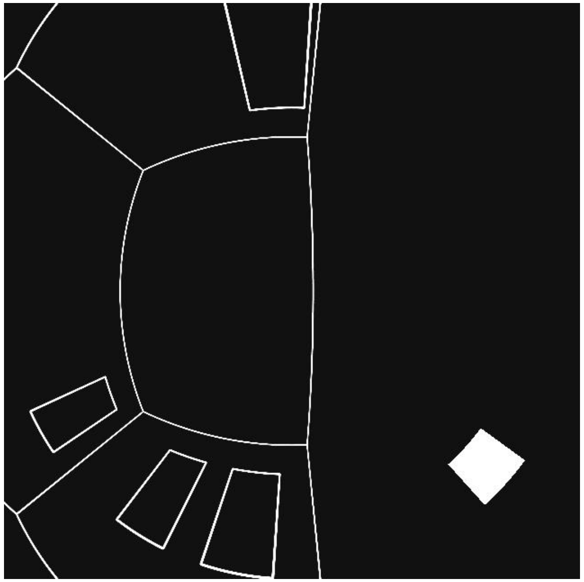
p19

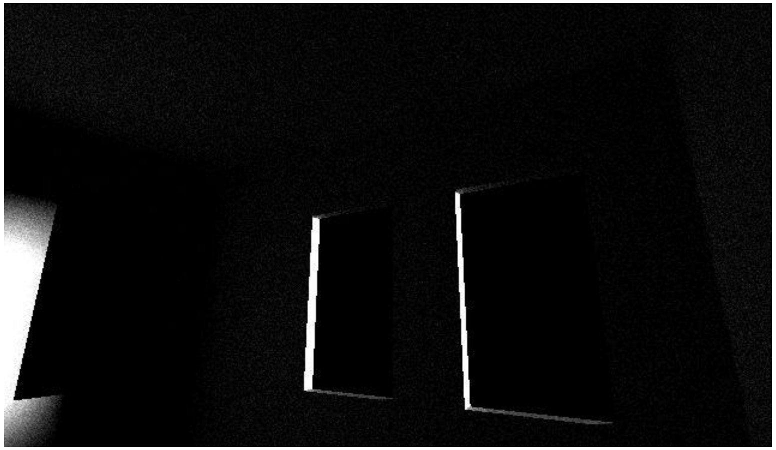
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

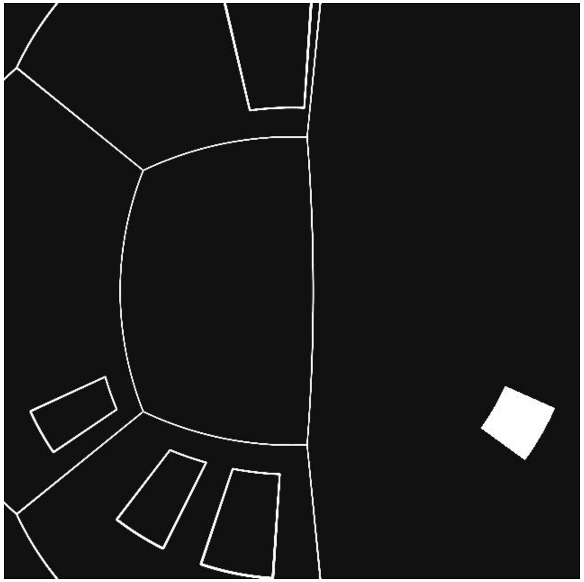
p20

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

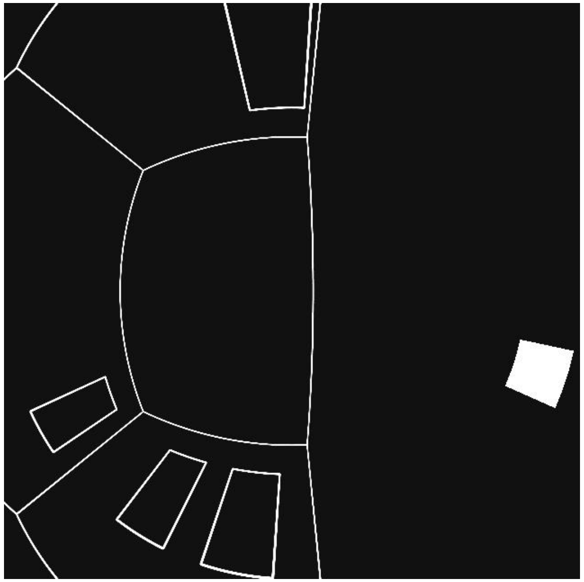
p21

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

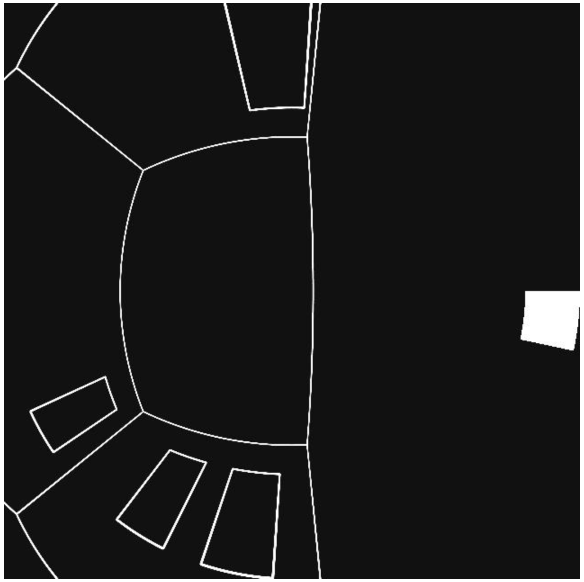
p22

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



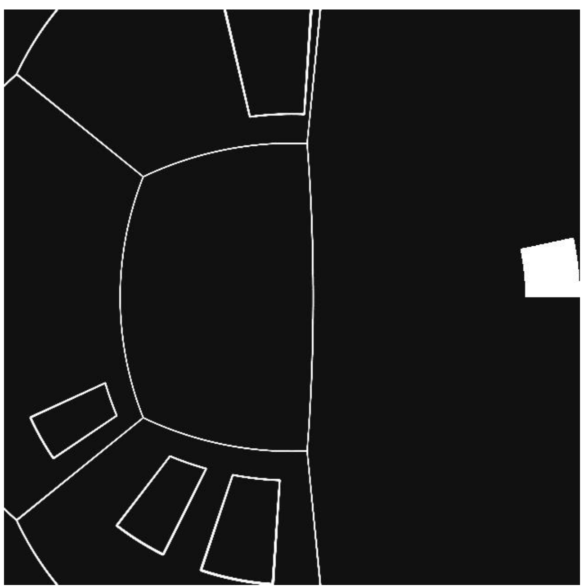
ab=2
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

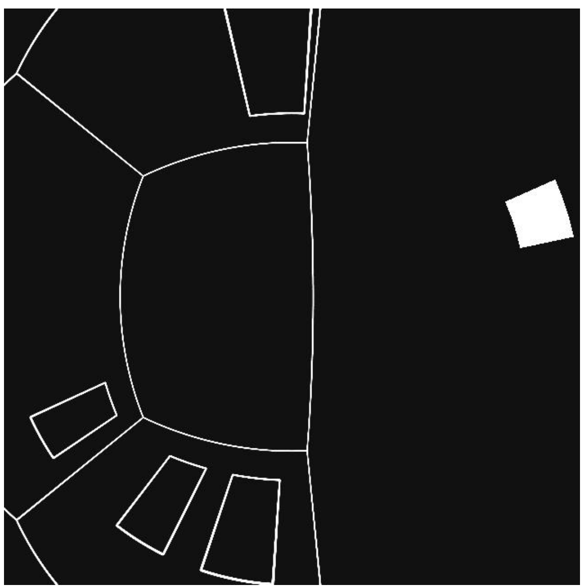
p24

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

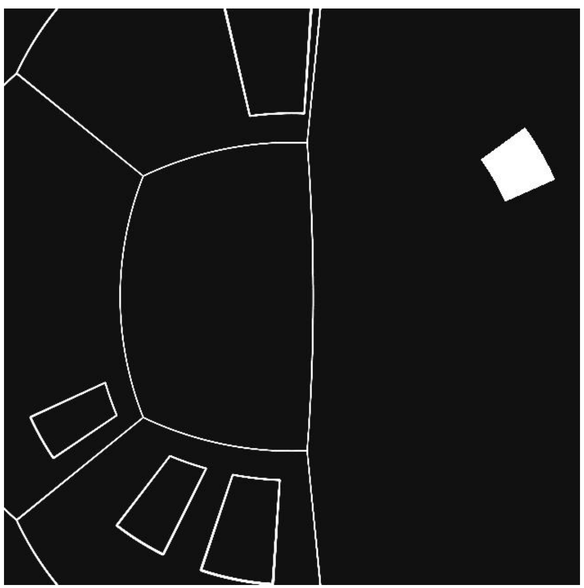
p25

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

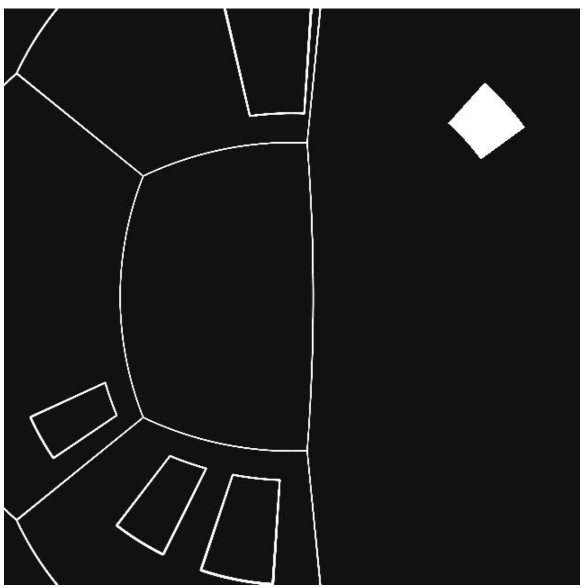
p26

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2 **p27**

ad=4096

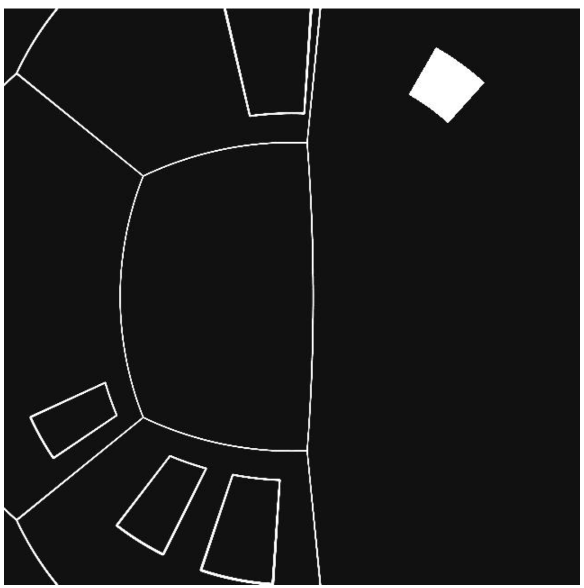
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

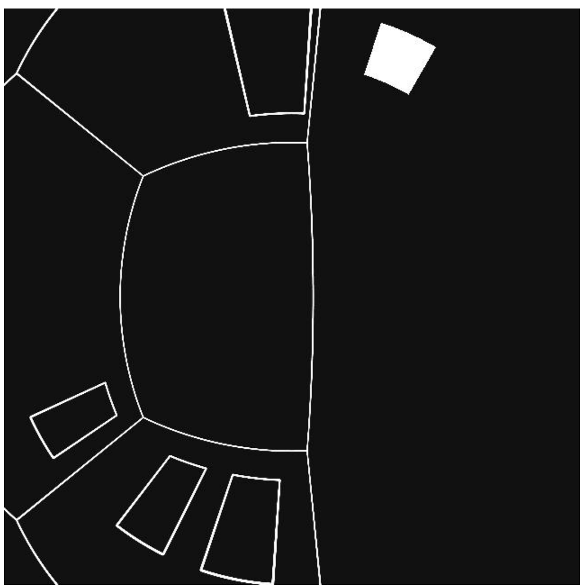
p28

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

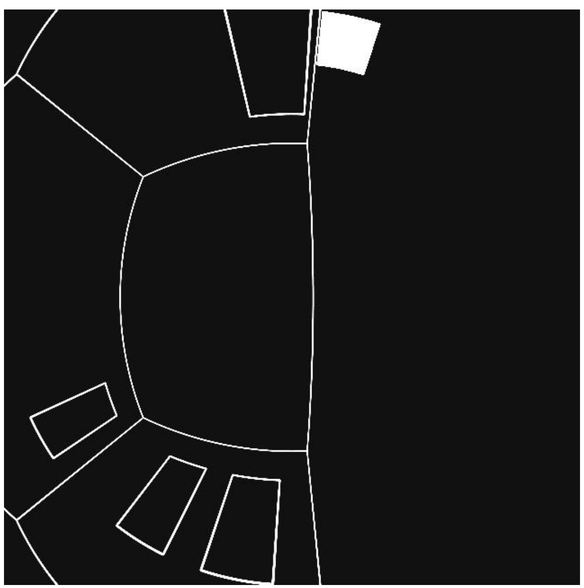
p29

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

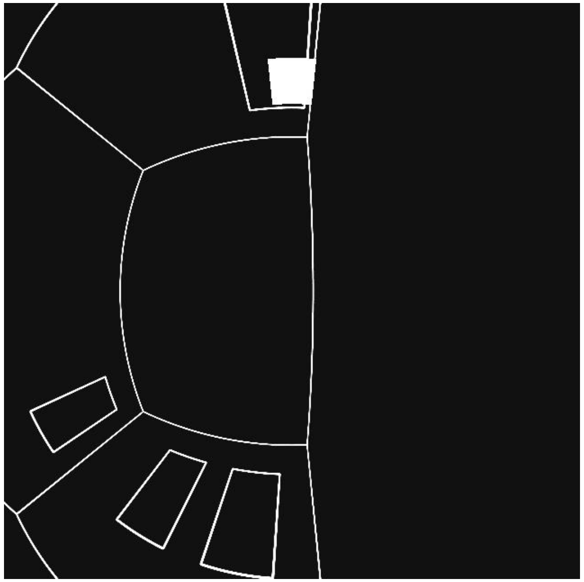
p30

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



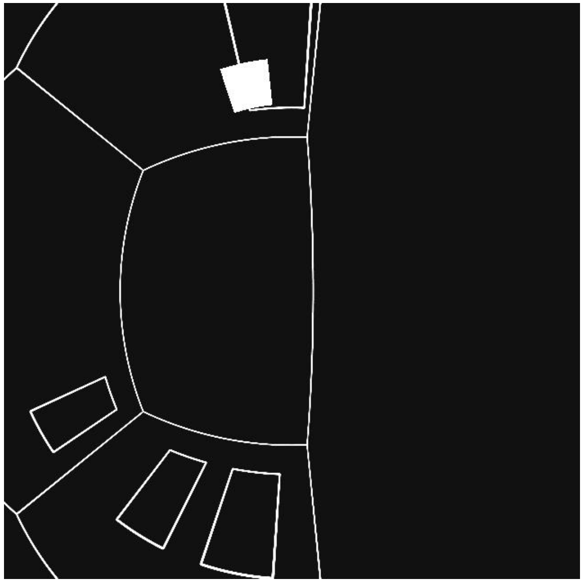
ab=2
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

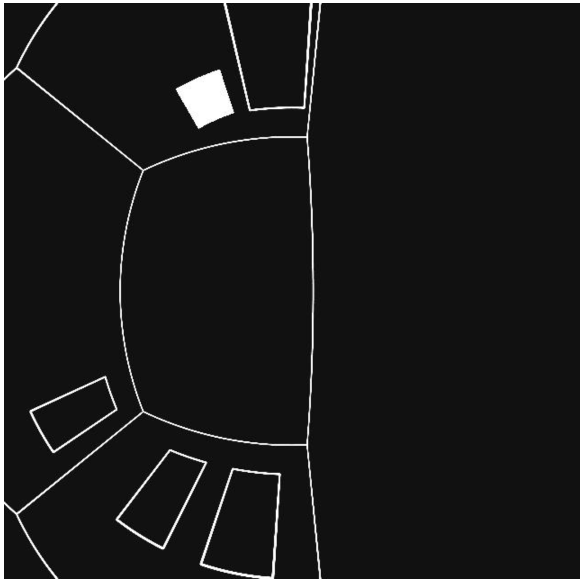
p32

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

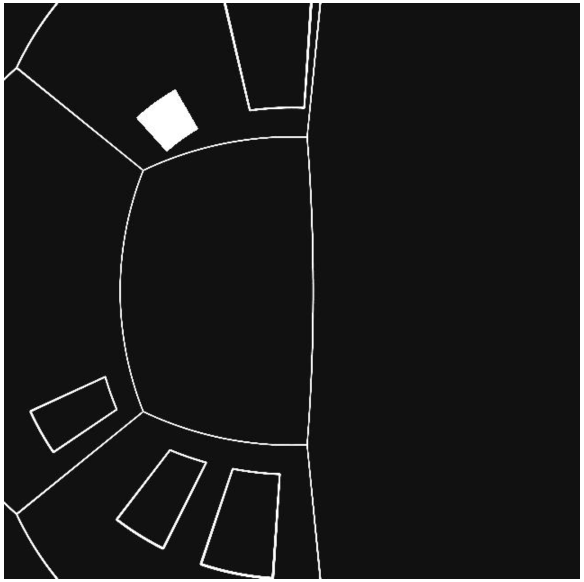
p33

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

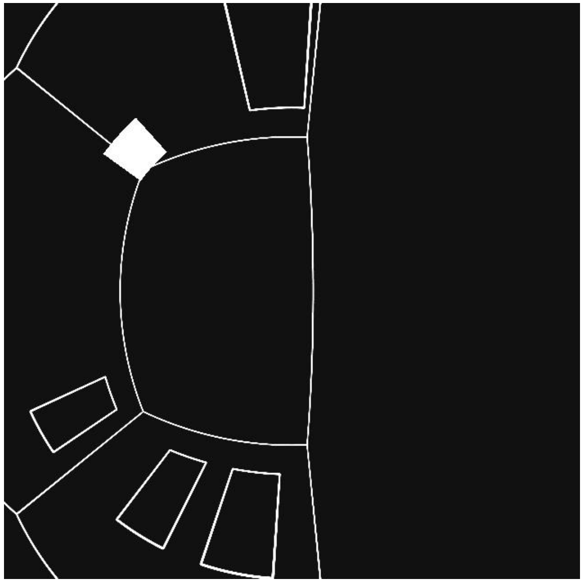
p34

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

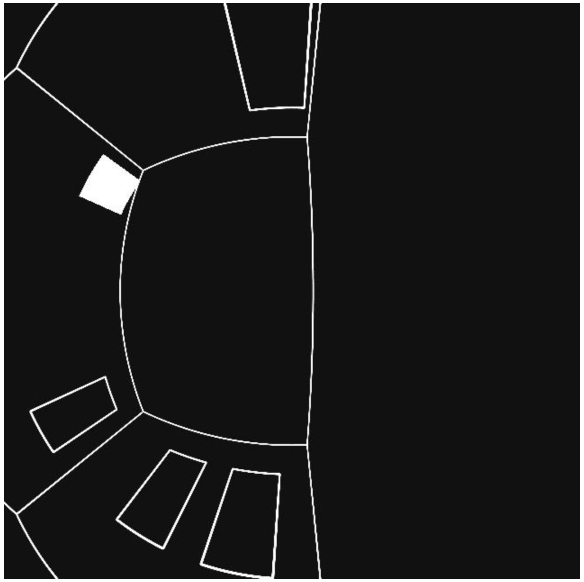
p35

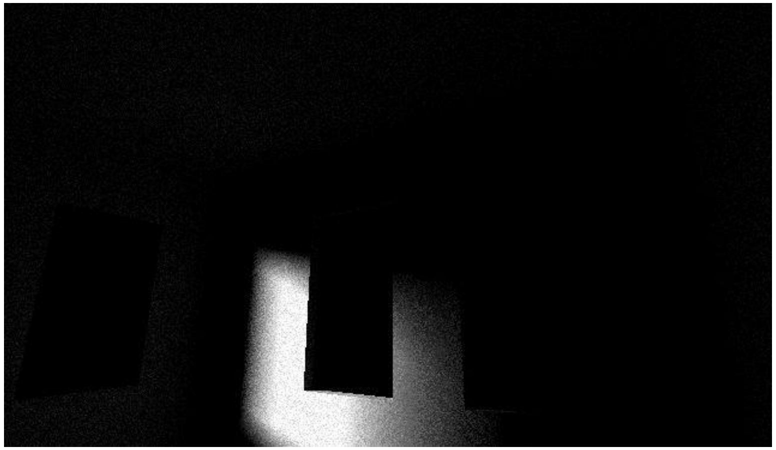
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

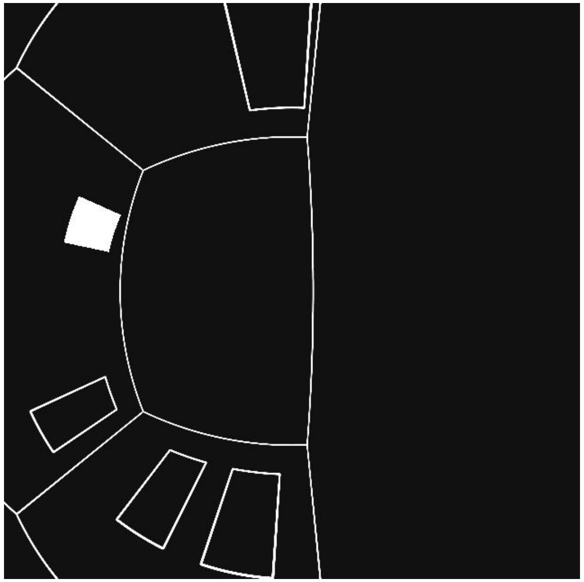
p36

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

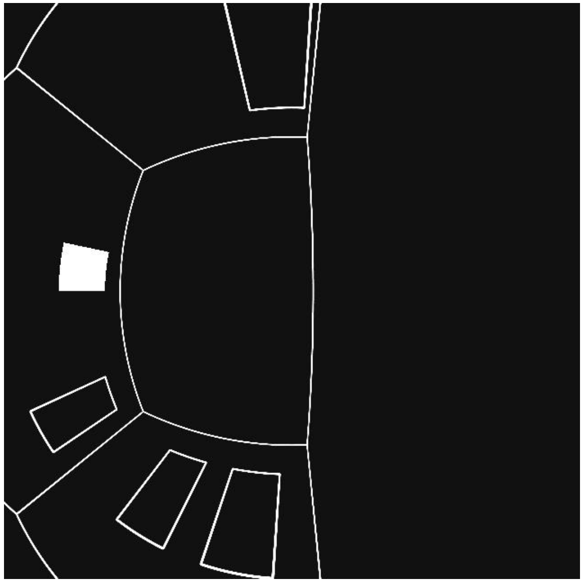
p37

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

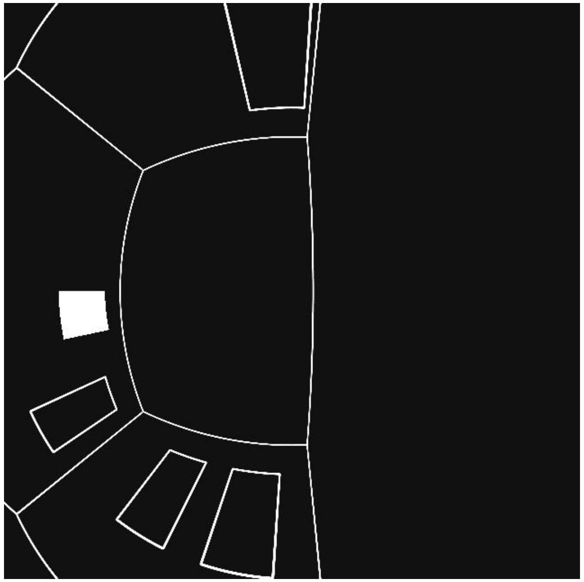
p38

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



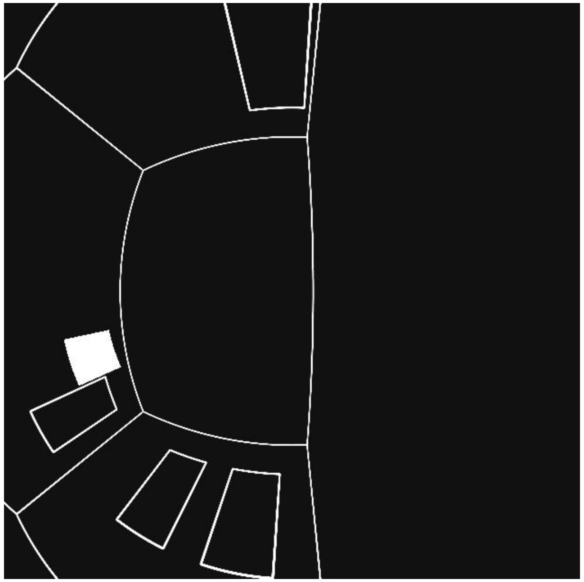
ab=2
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

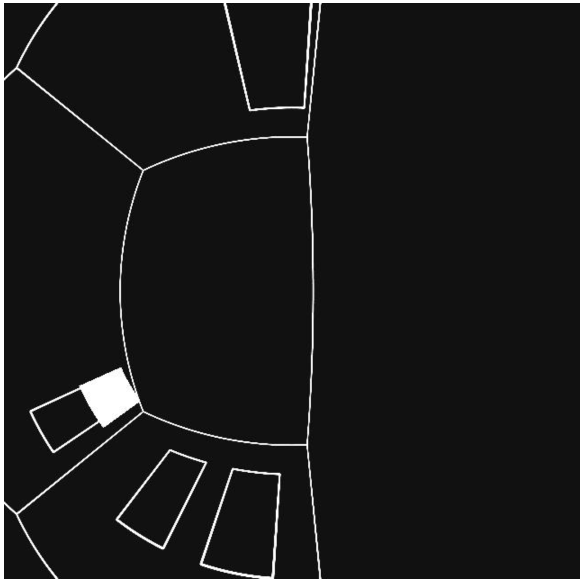
p40

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

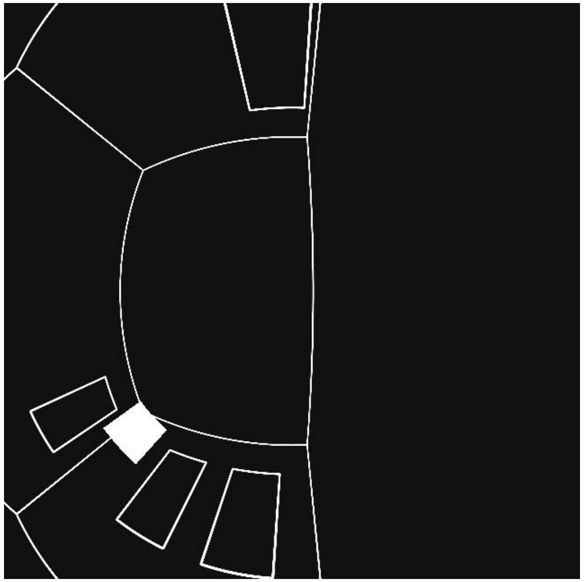
p41

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

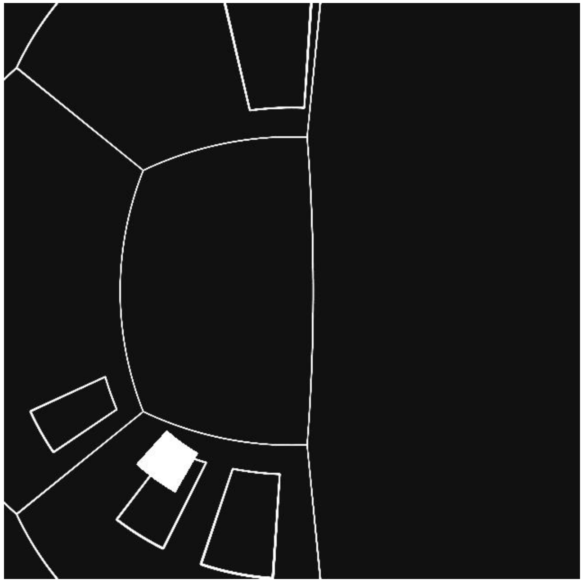
p42

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

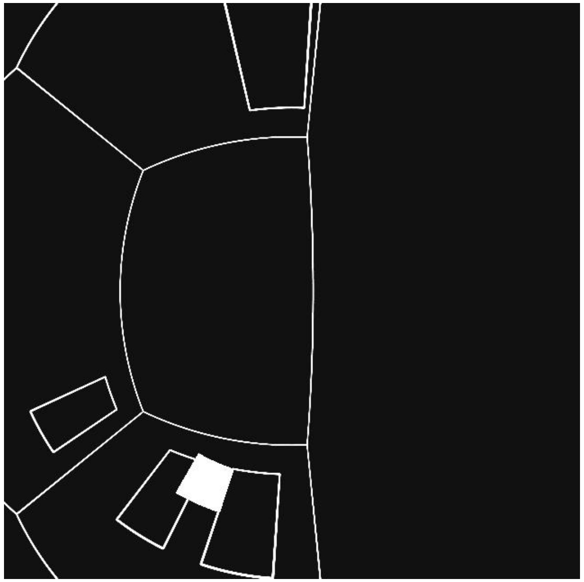
p43

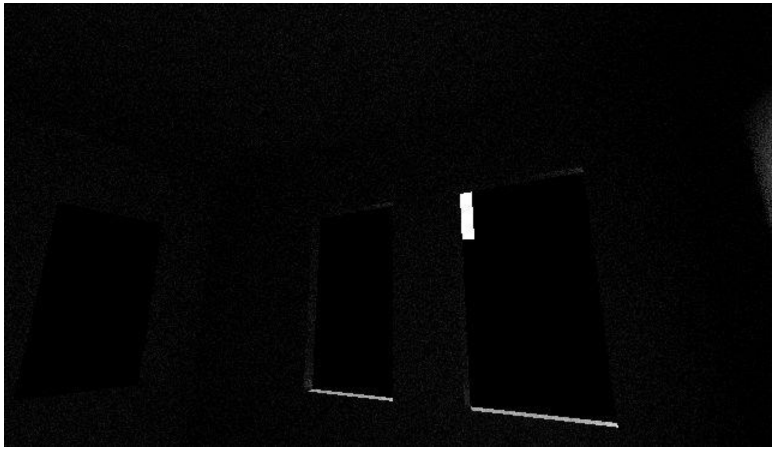
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

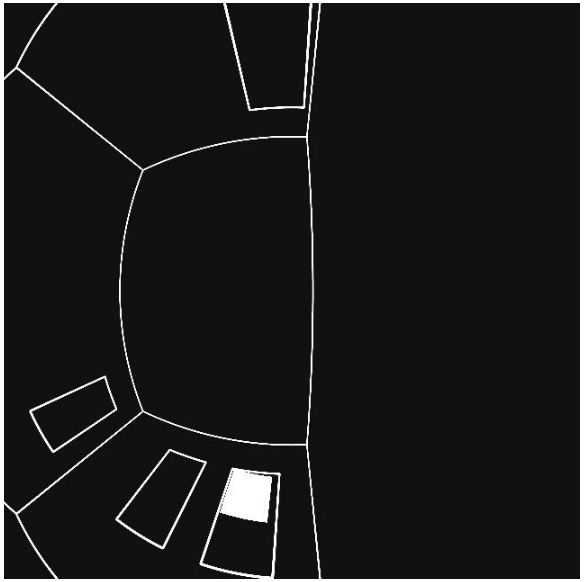
p44

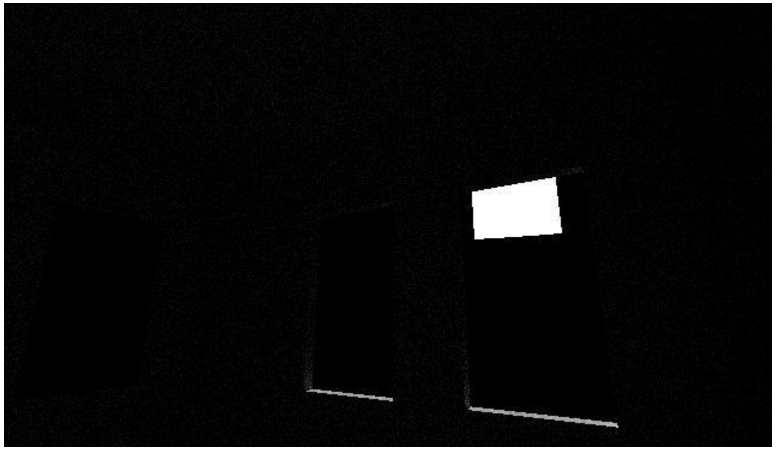
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

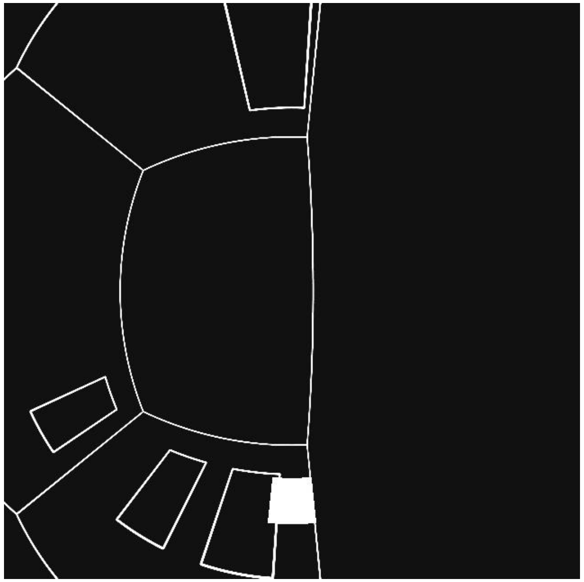
p45

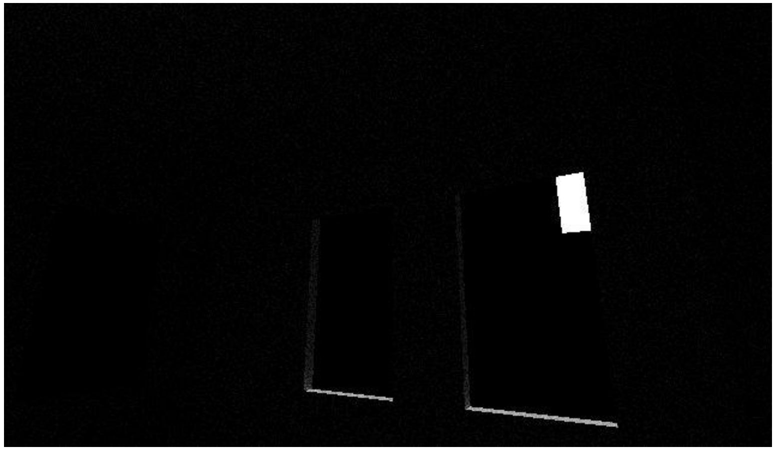
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

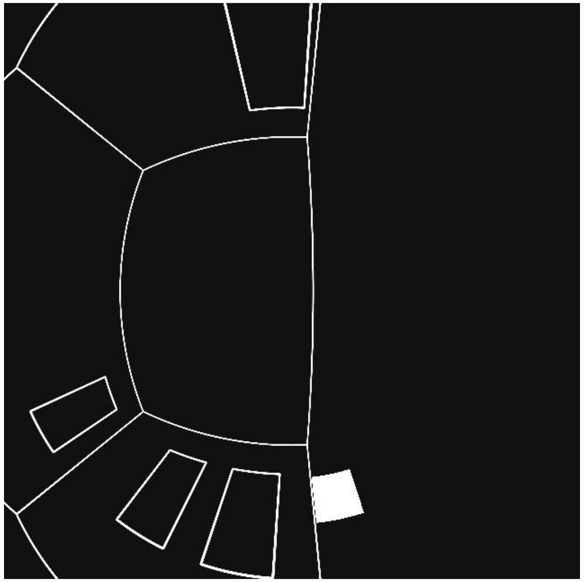
p46

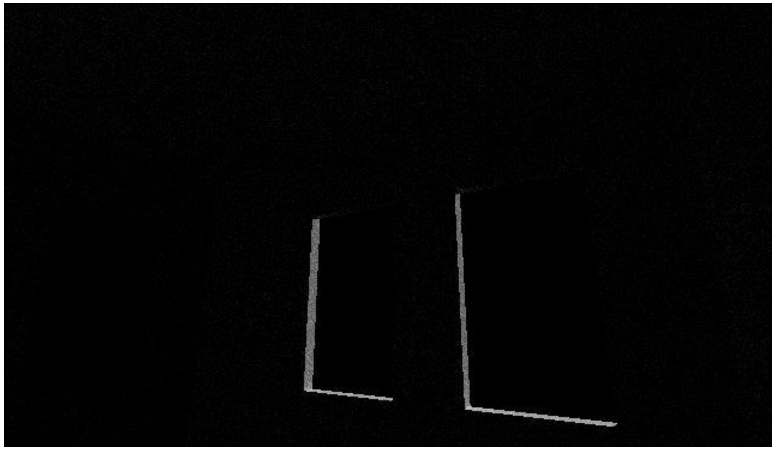
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





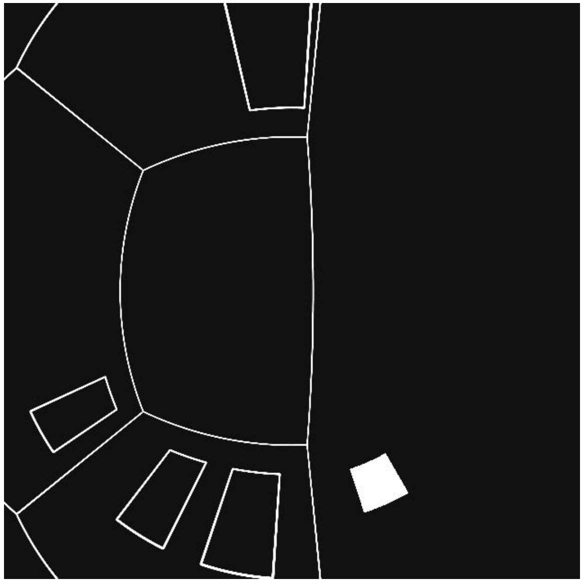
ab=2
ad=4096
lw=0.0005

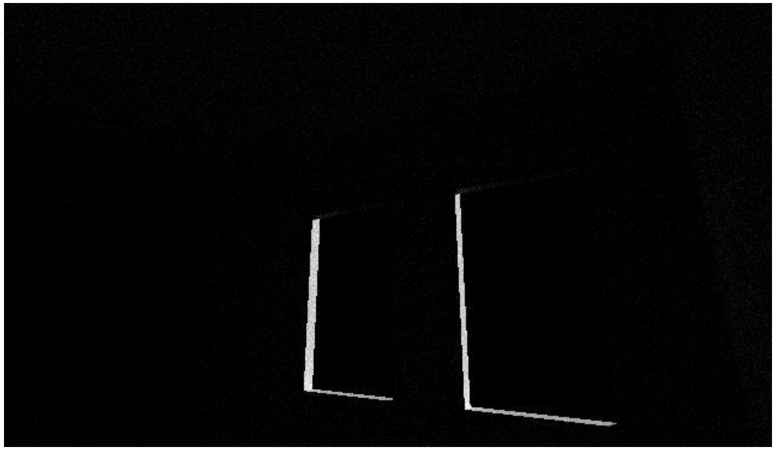
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

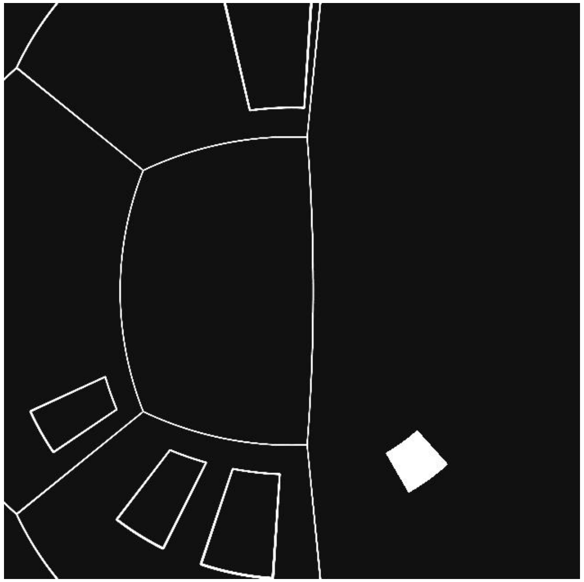
p48

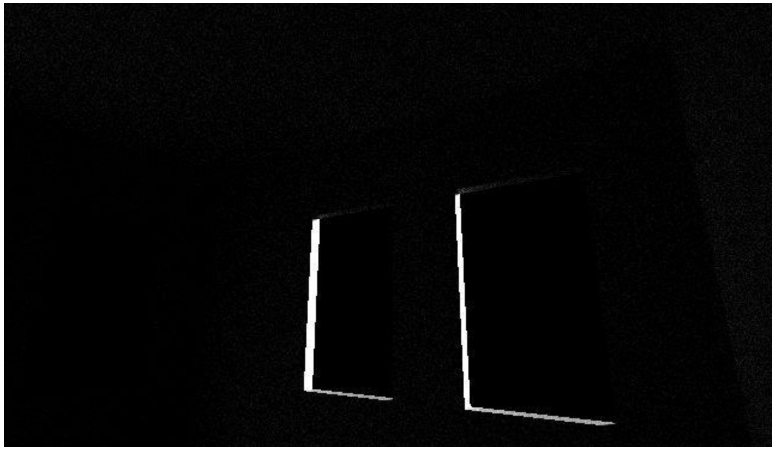
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





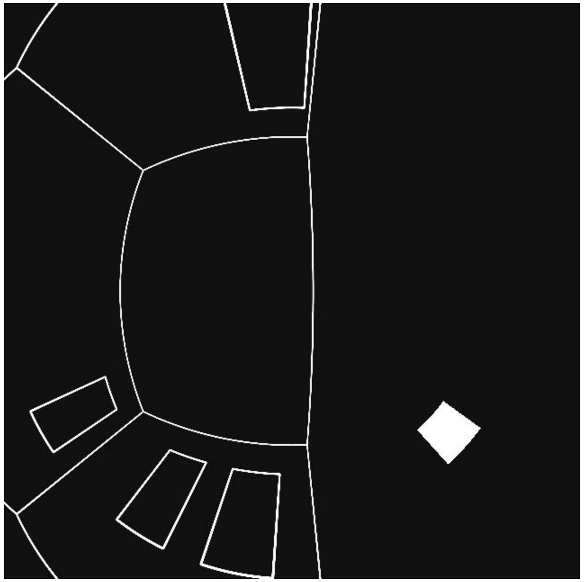
ab=2
ad=4096
lw=0.0005

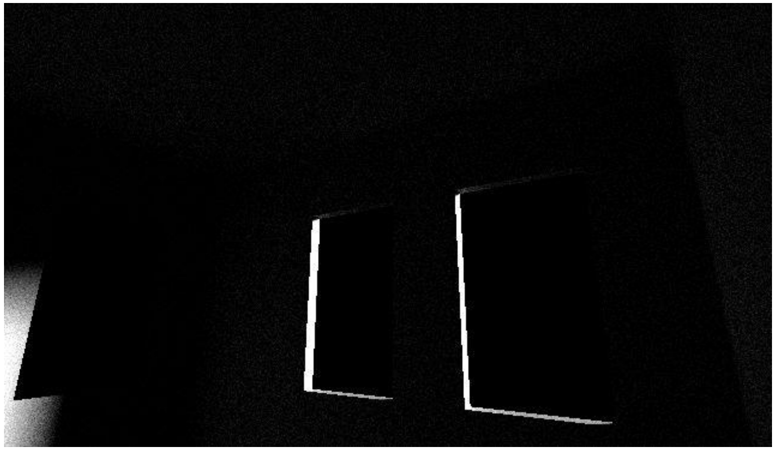
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

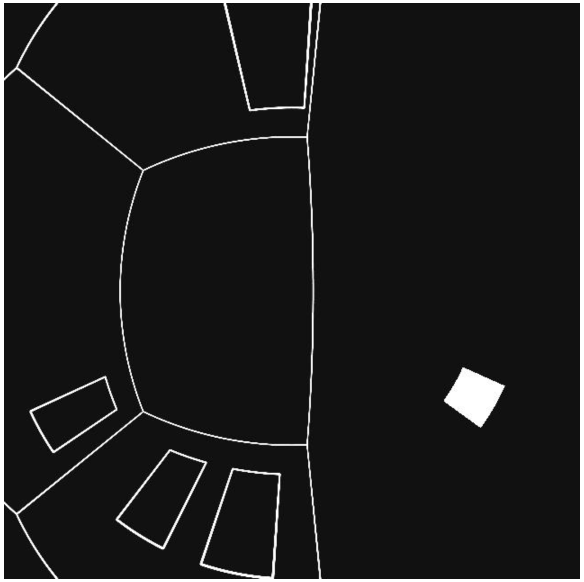
p50

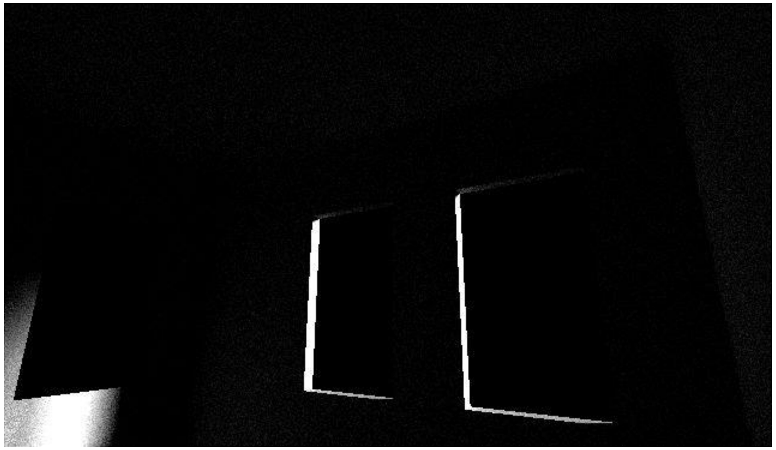
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

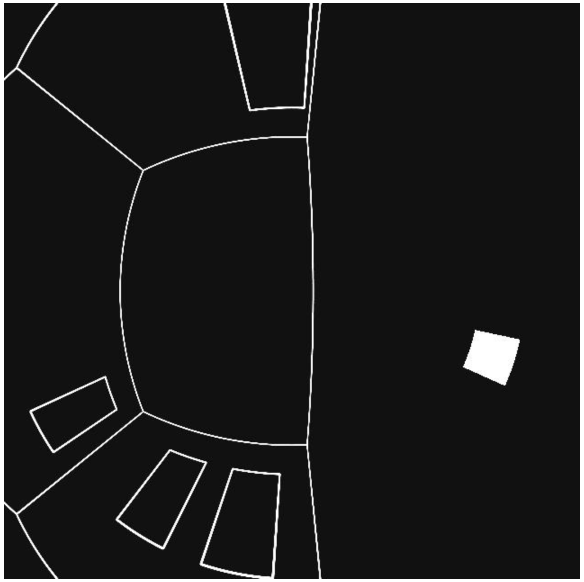
p51

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



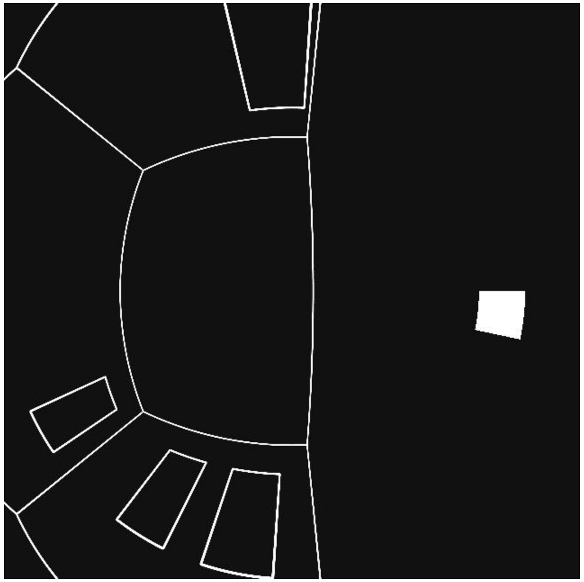
ab=2
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

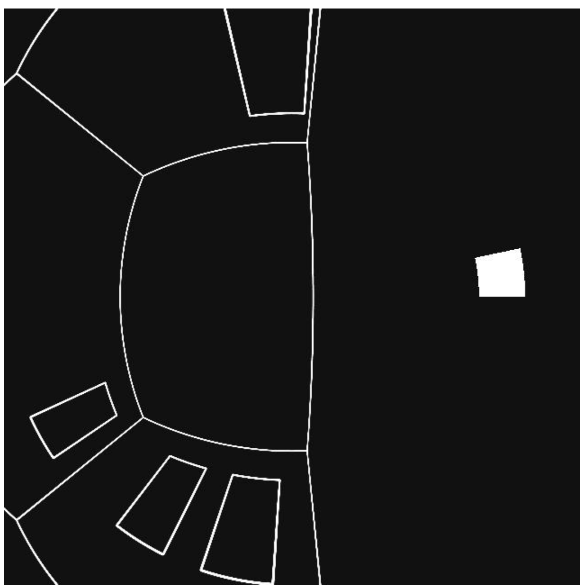
p53

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

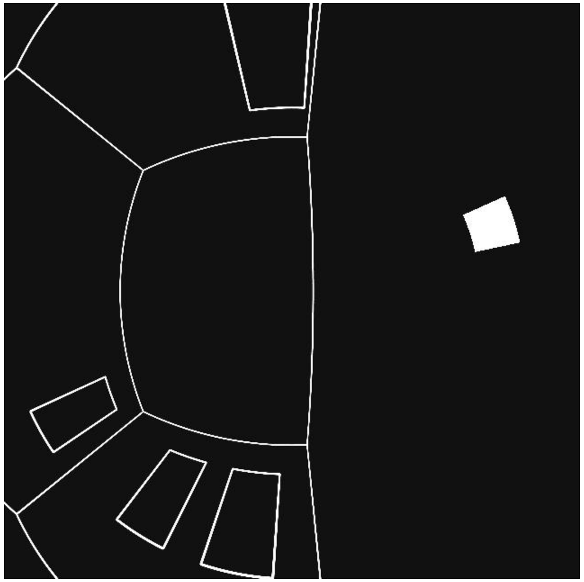
p54

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

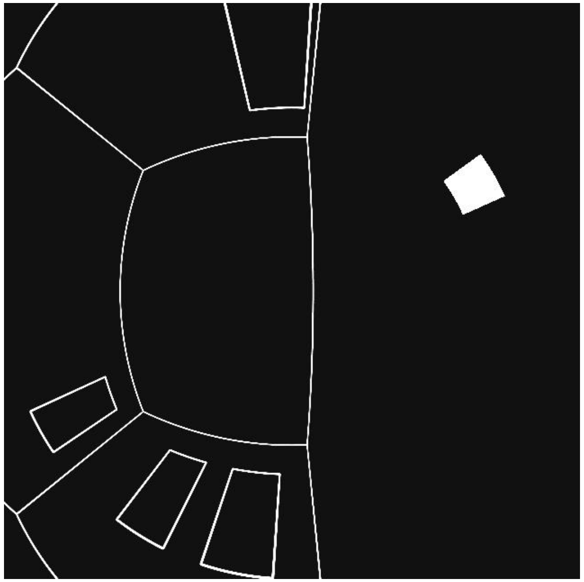
p55

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

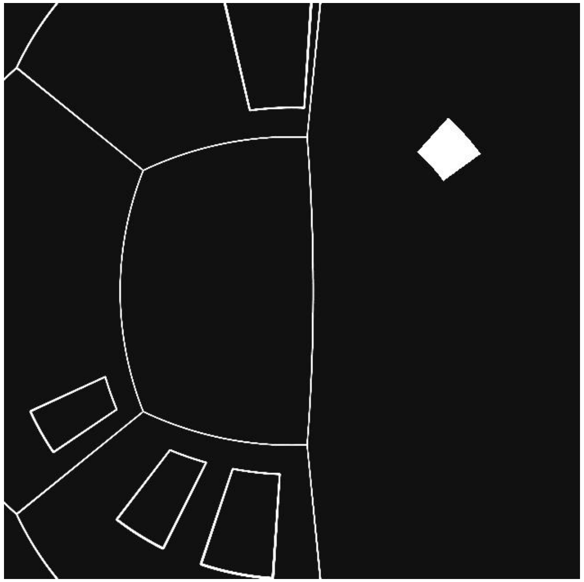
p56

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

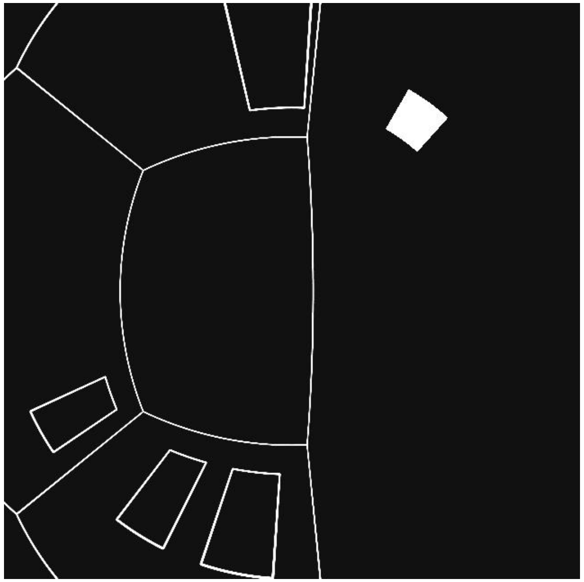
p57

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

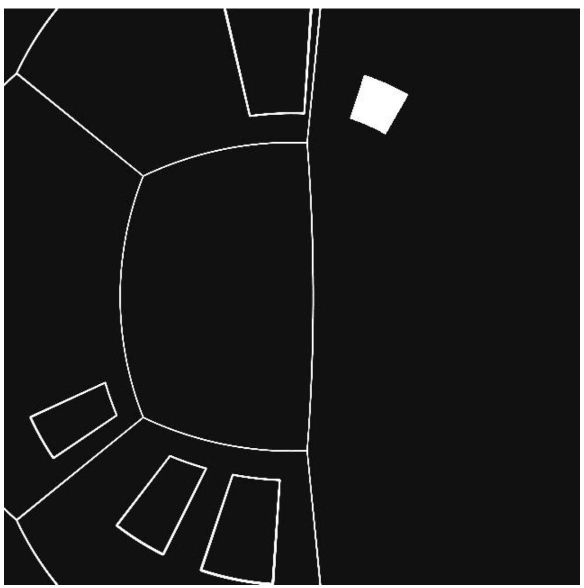
p58

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

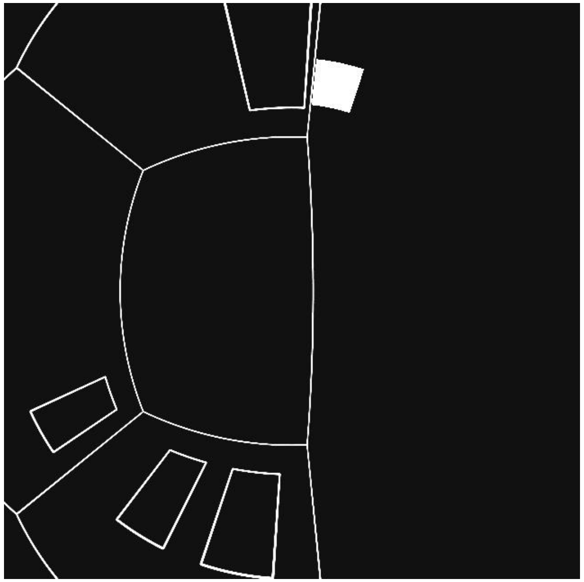
p59

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

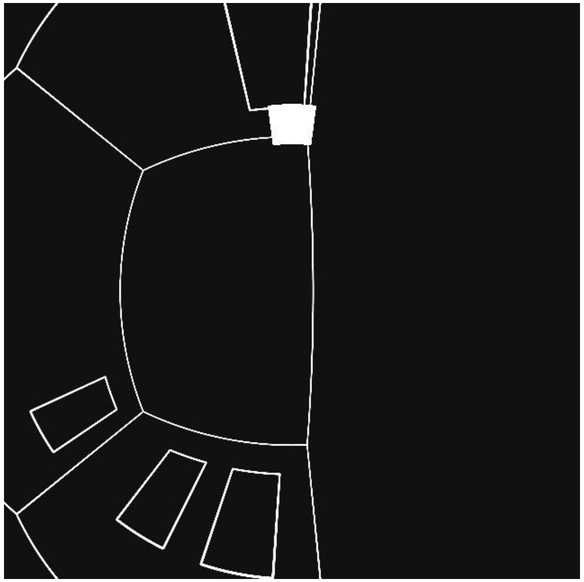
p60

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

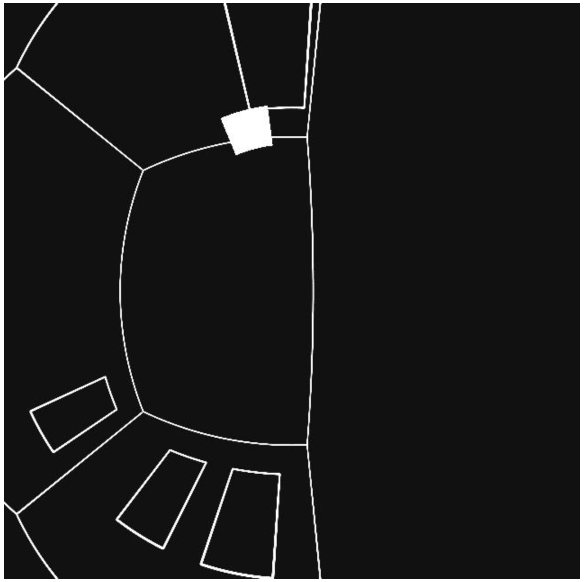
p61

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

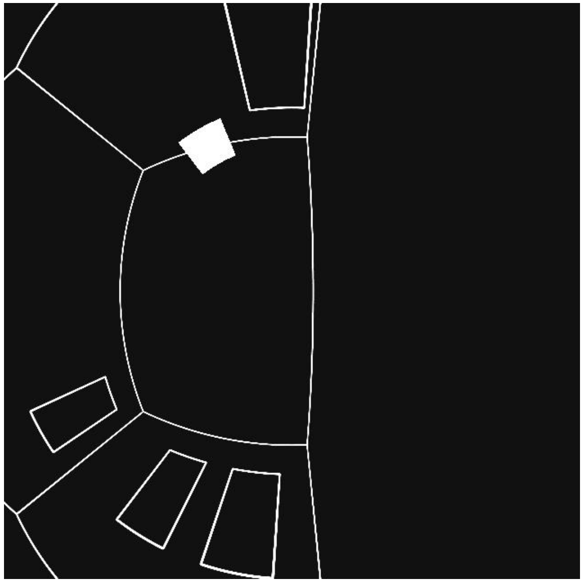
p62

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

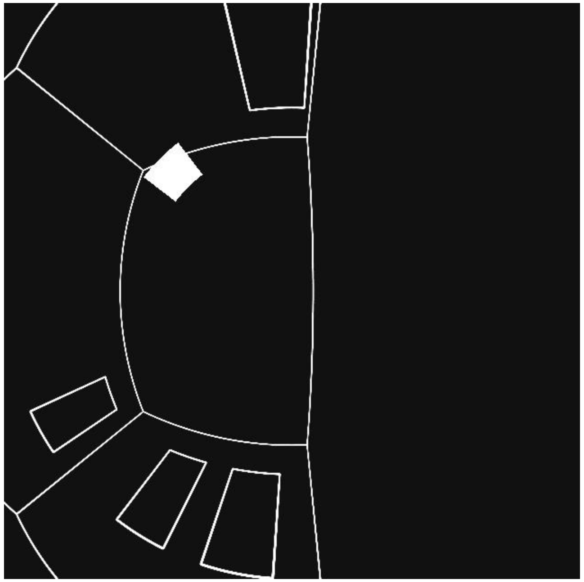
p63

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

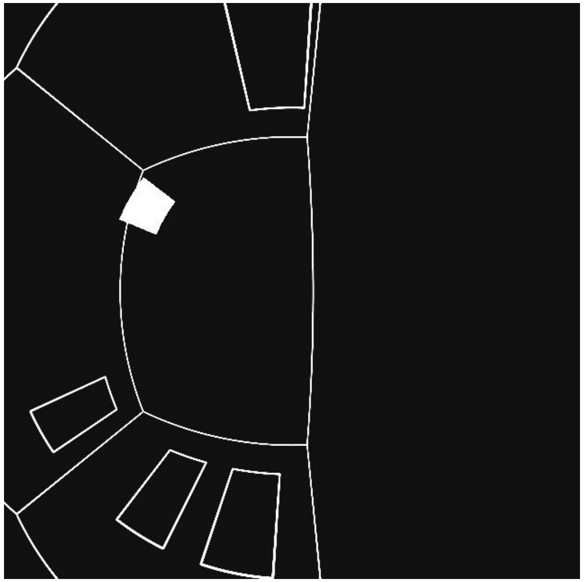
p64

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

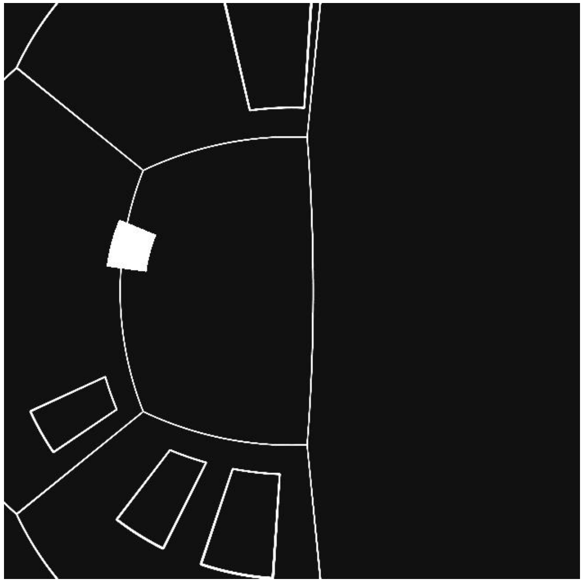
p65

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

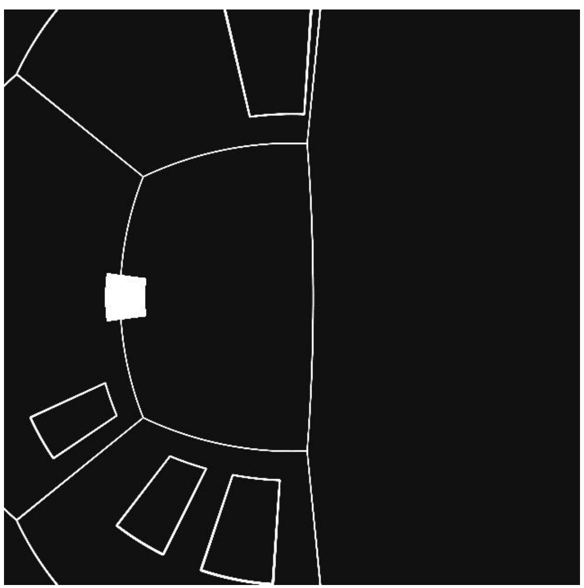
p66

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



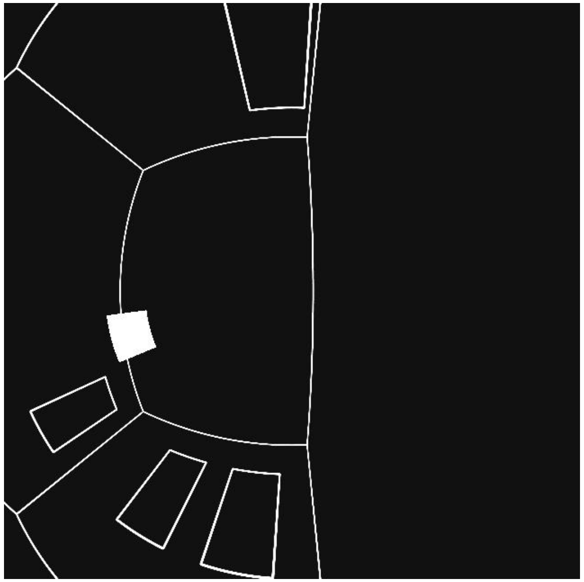
ab=2
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



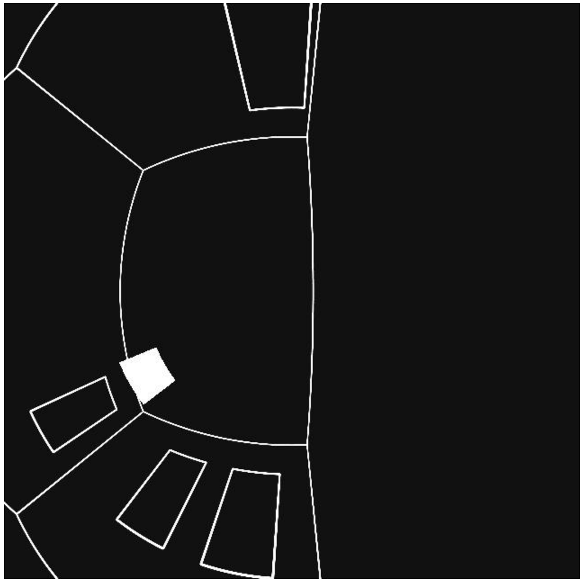
ab=2
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



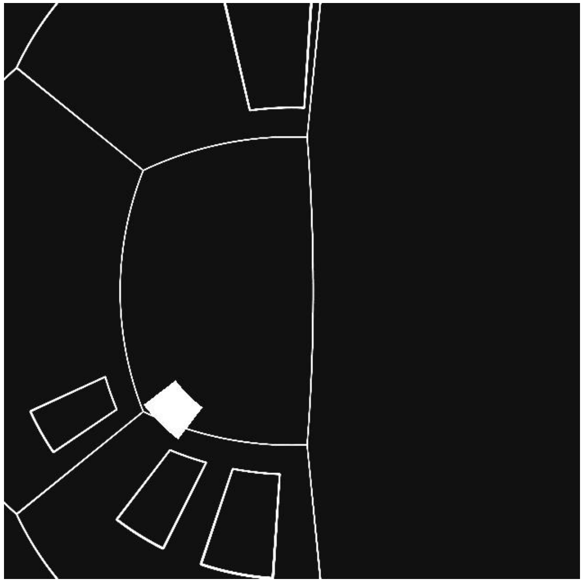
ab=2
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2

ad=4096

lw=0.0005

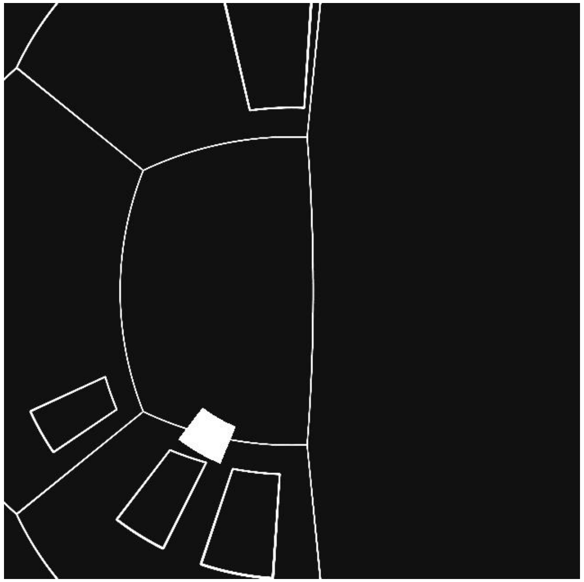
p70

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



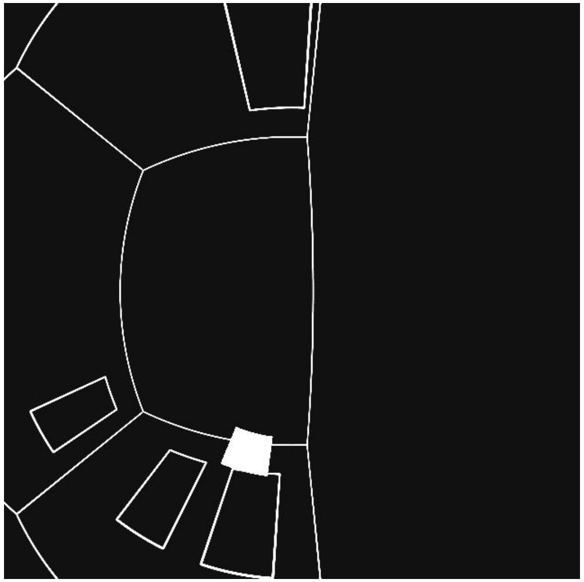
ab=2 **p71**
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

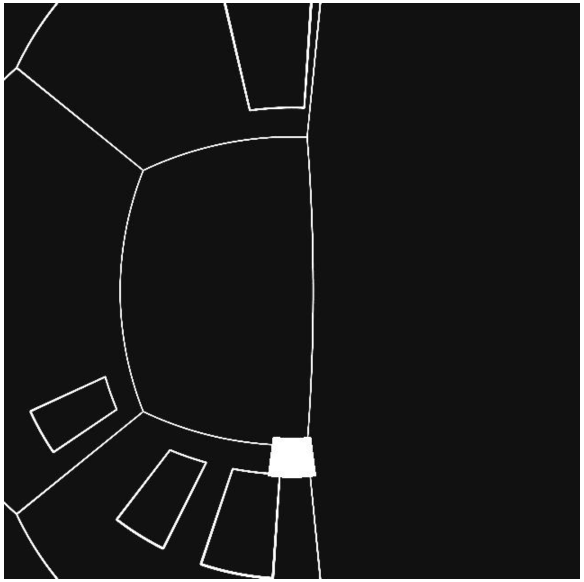
p72

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

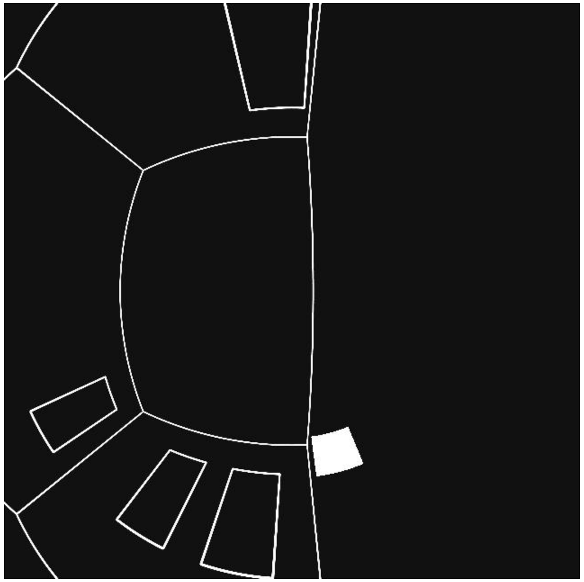
p73

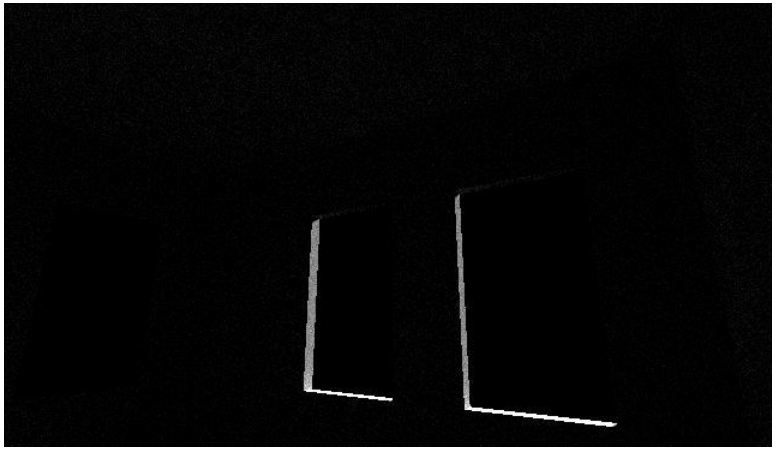
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

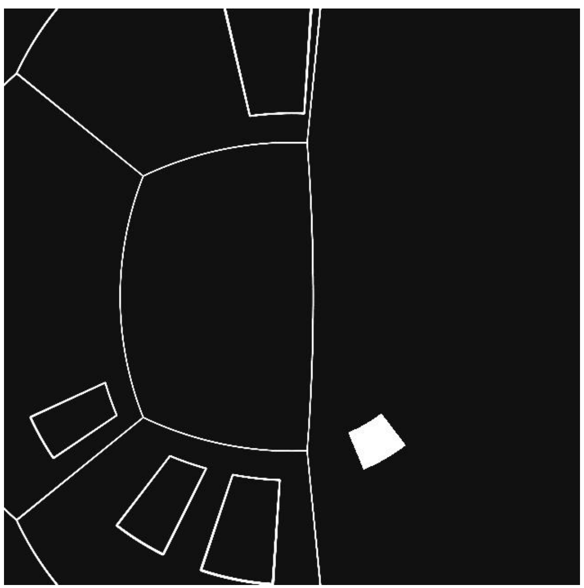
p74

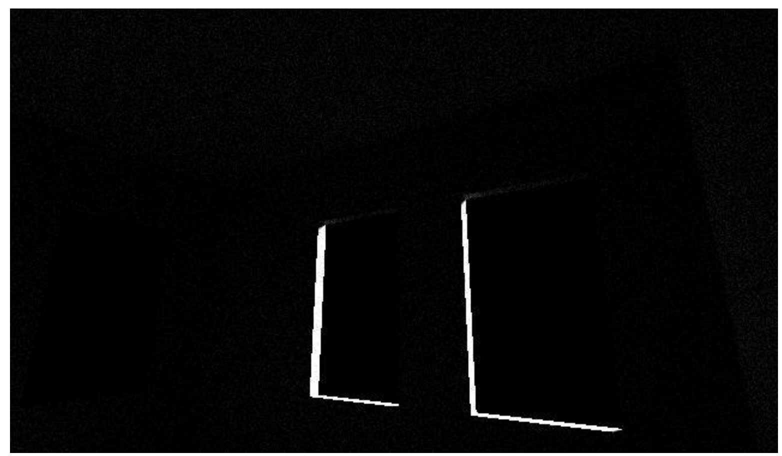
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

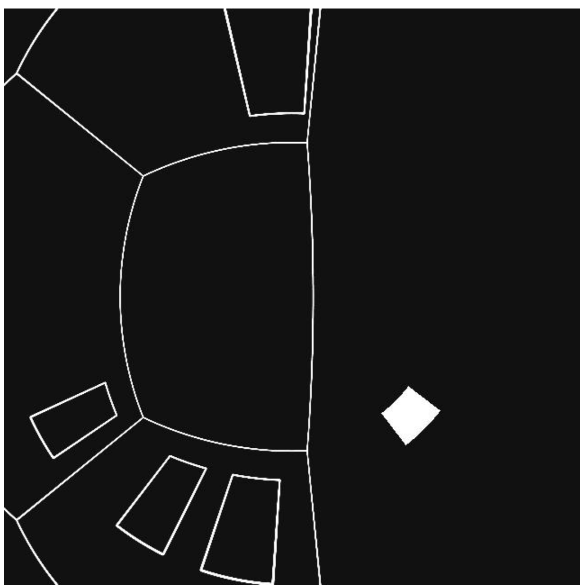
p75

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



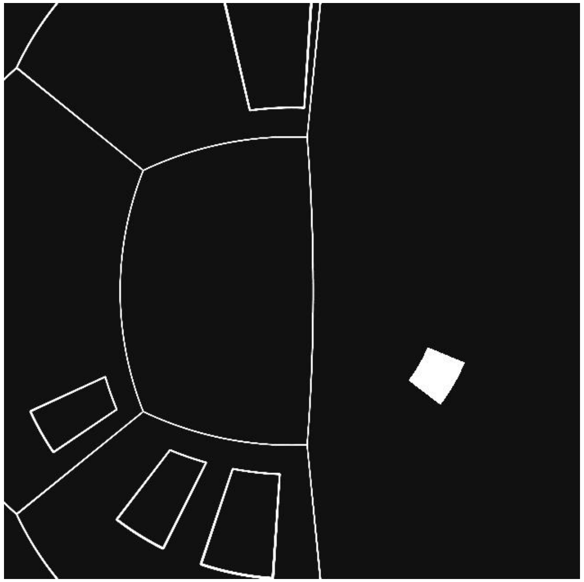
ab=2
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

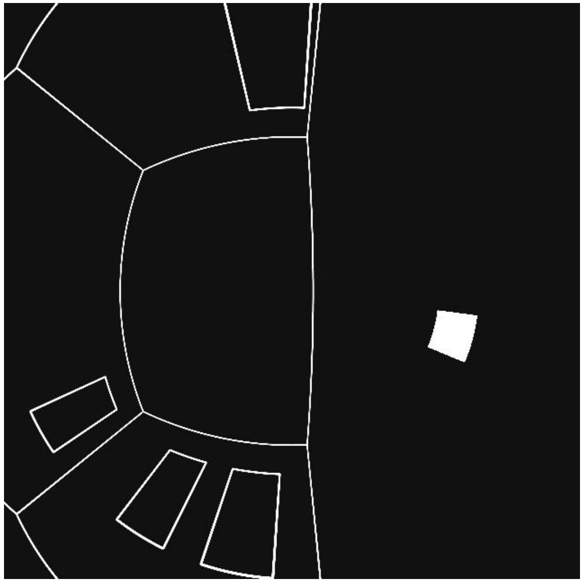
p77

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



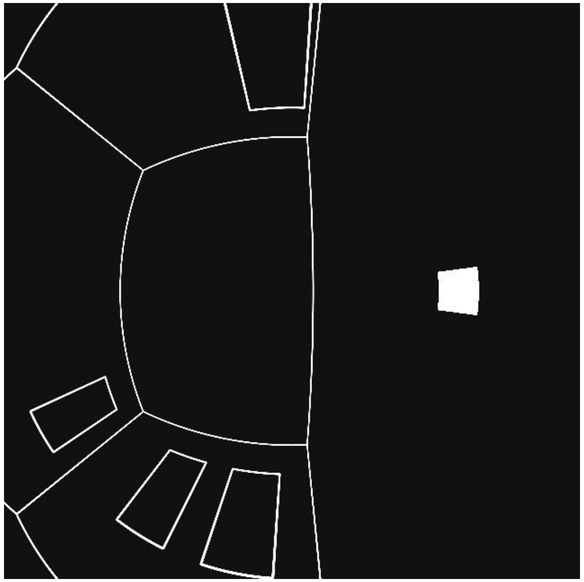
ab=2
ad=4096
lw=0.0005

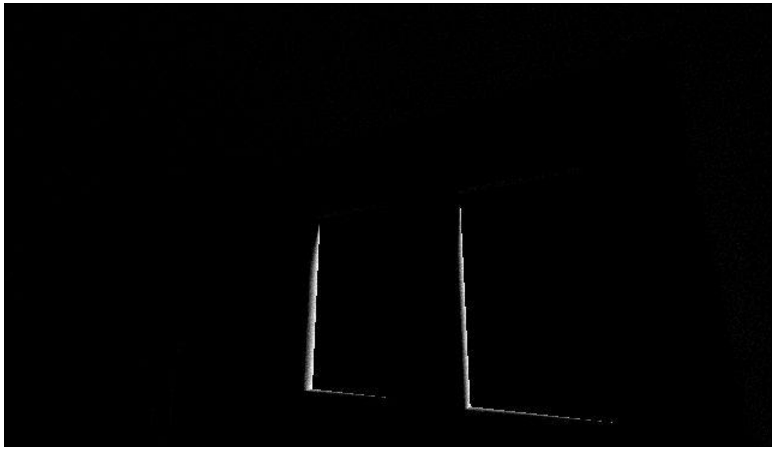
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

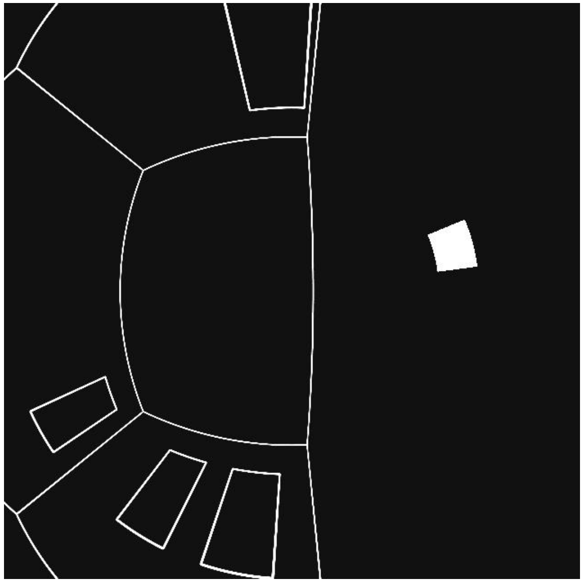
p79

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

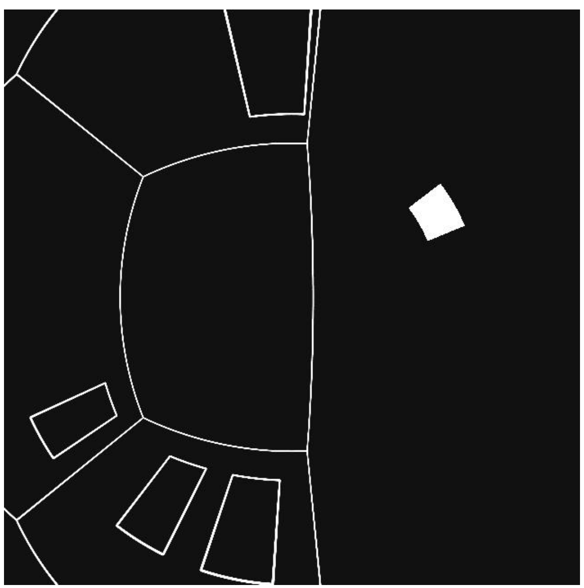
p80

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

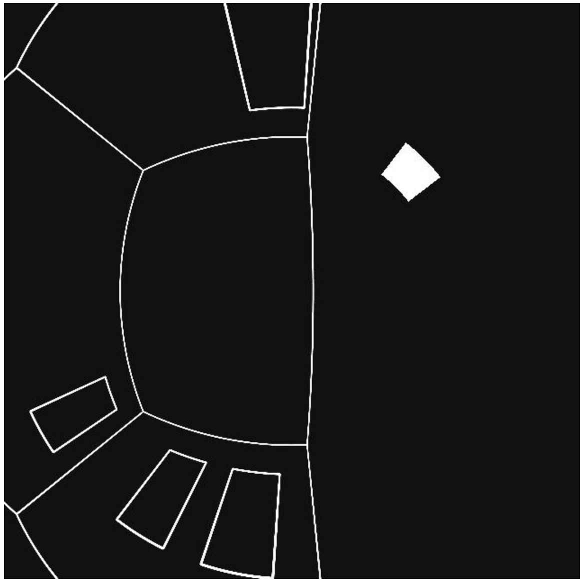
p81

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

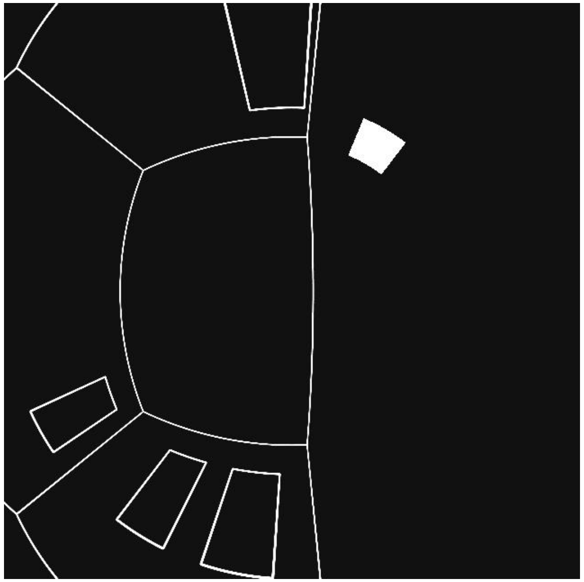
p82

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

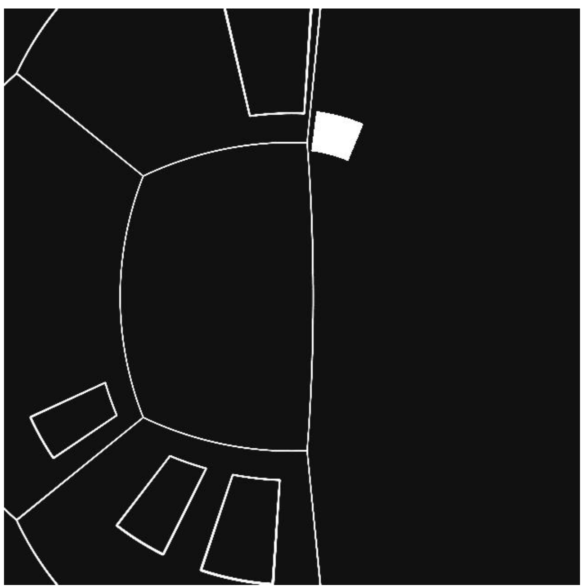
p83

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

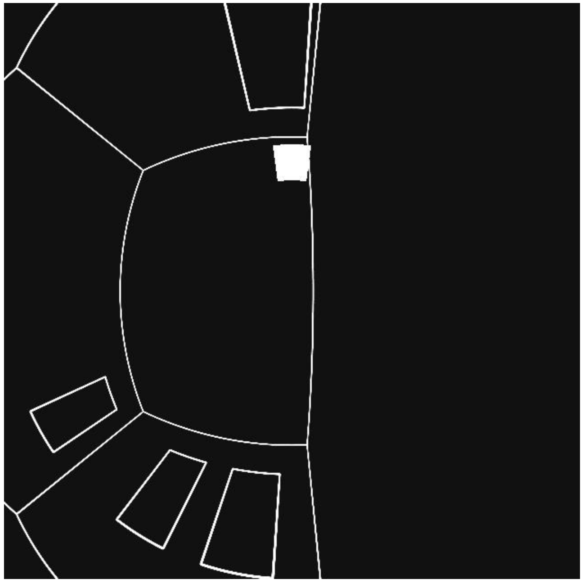
p84

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

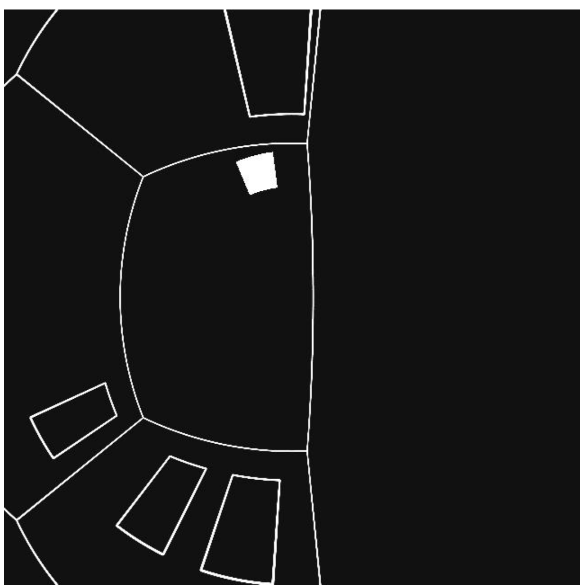
p85

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

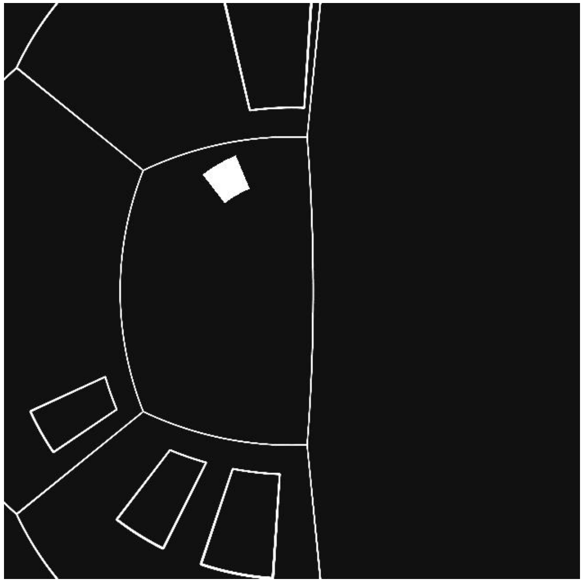
p86

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

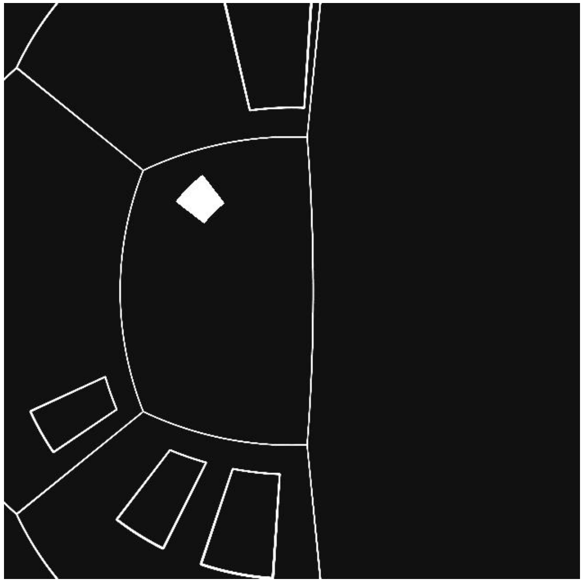
p87

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

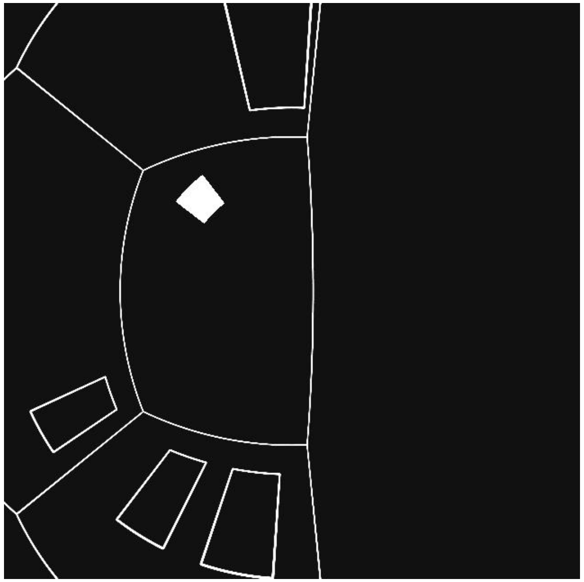
p88

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

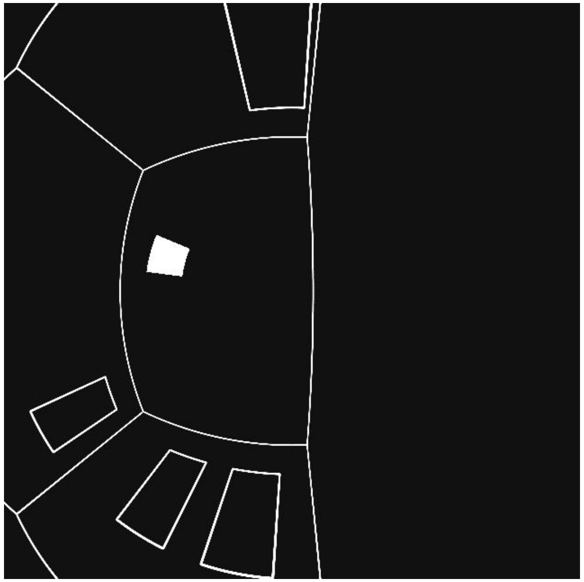
p89

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



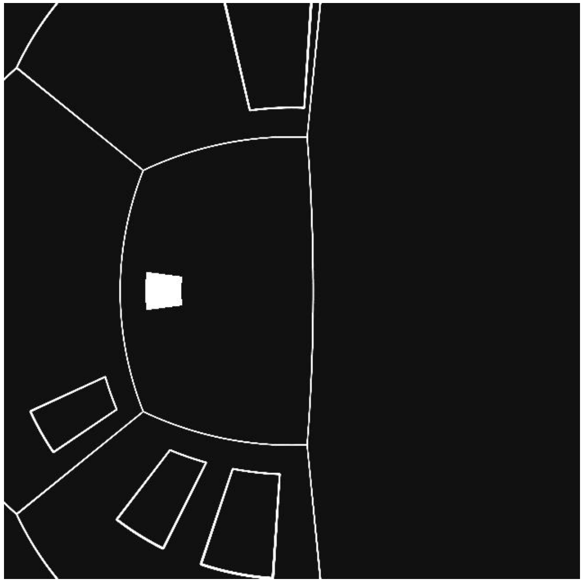
ab=2 **p90**
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

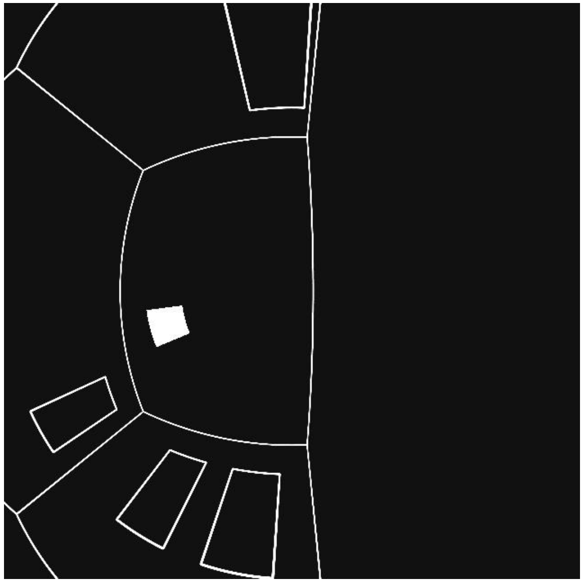
p91

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

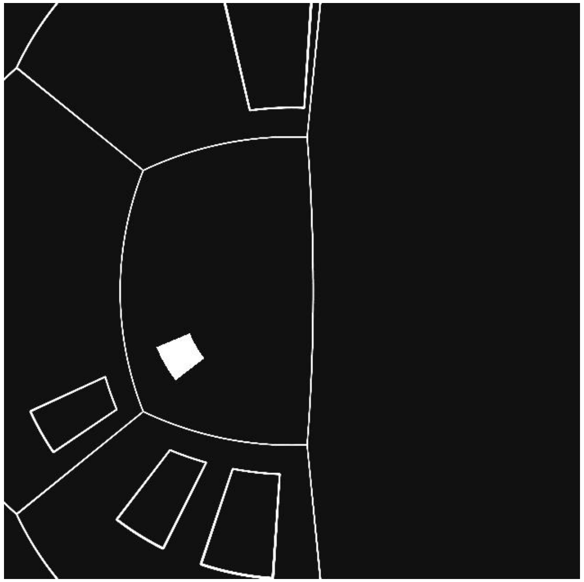
p92

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

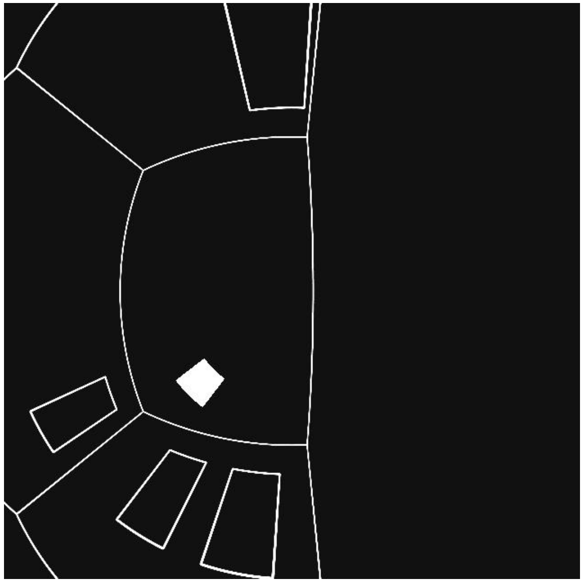
p93

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

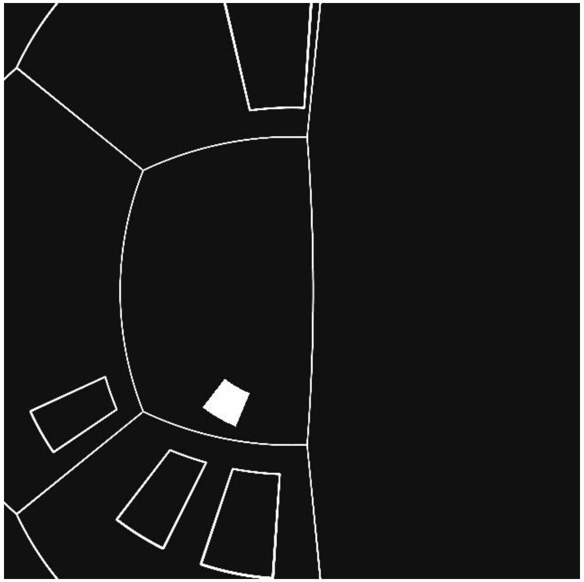
p94

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



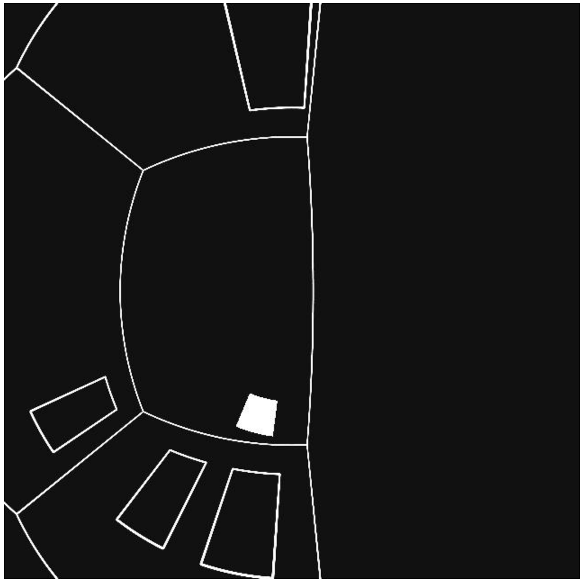
ab=2 **p95**
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

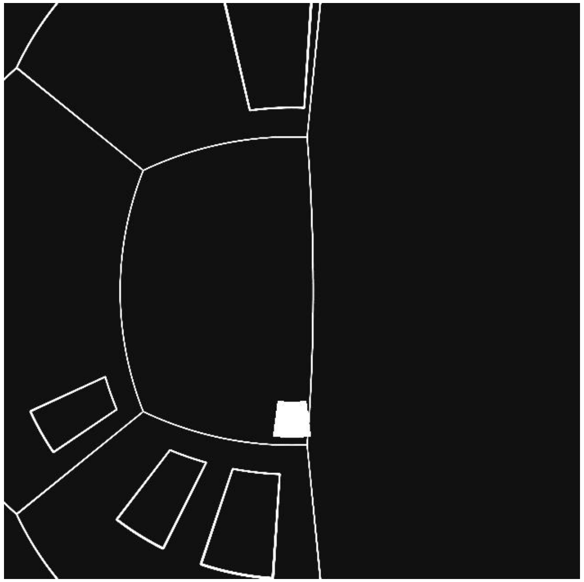
p96

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2

ad=4096

lw=0.0005

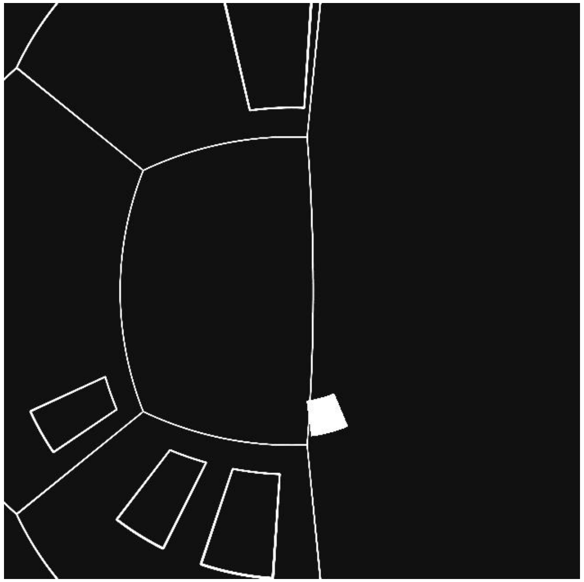
p97

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

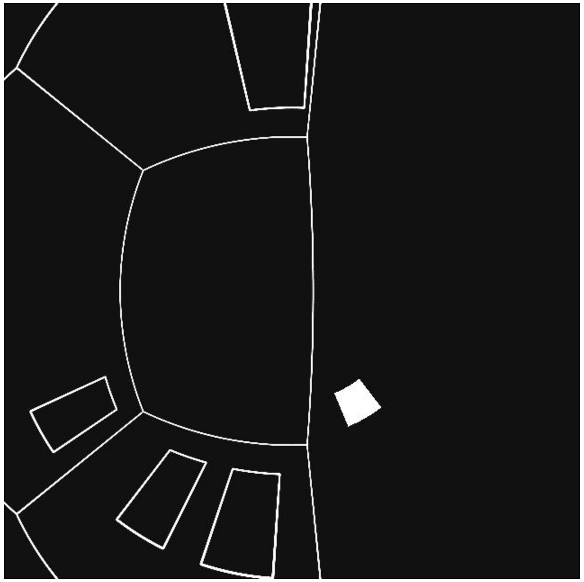
p98

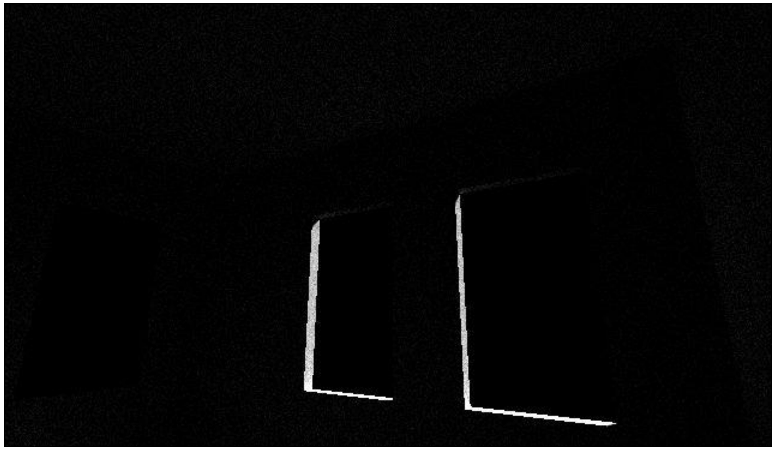
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

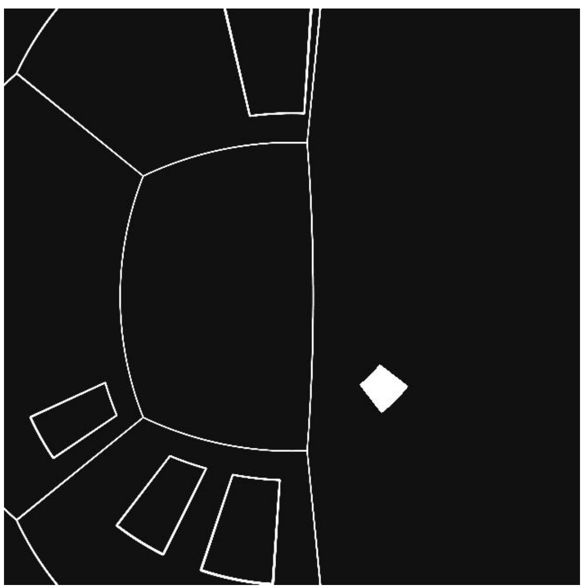
p99

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

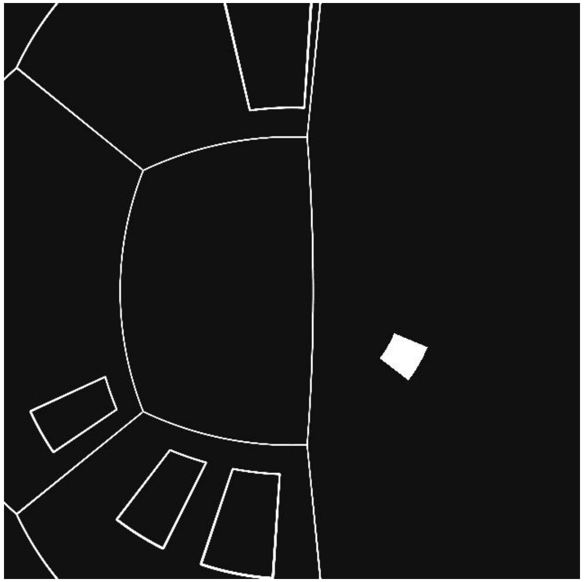
p100

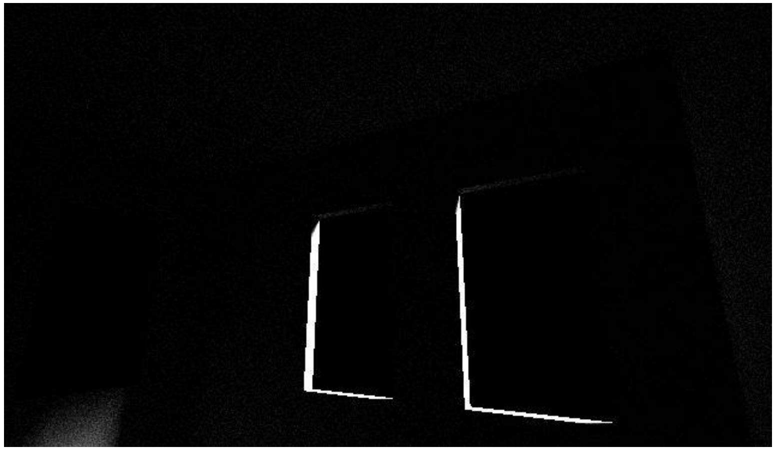
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

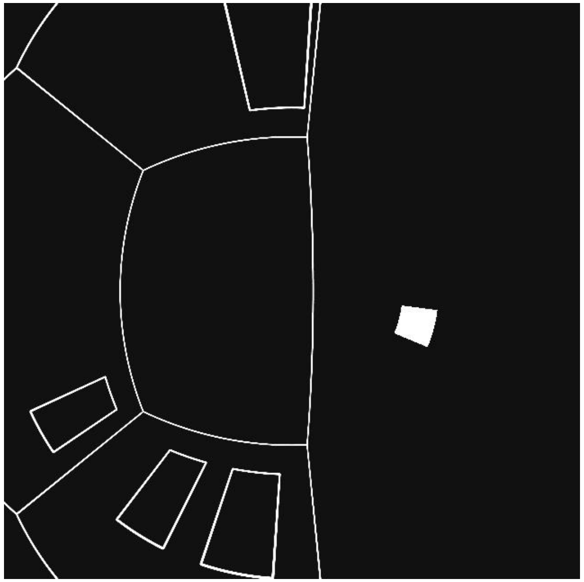
p101

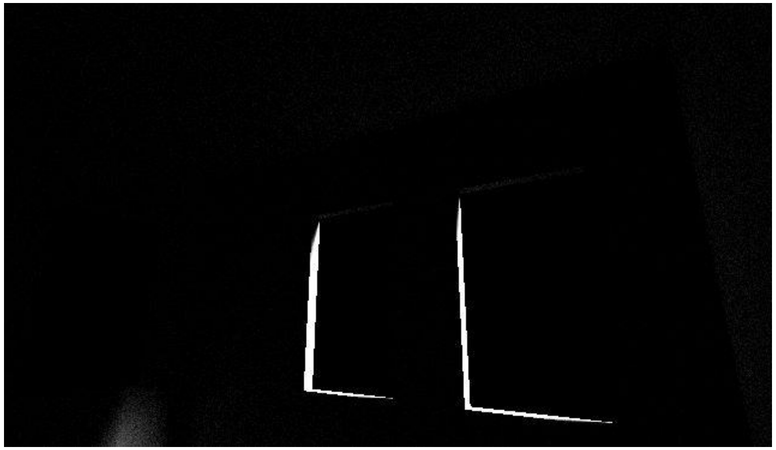
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





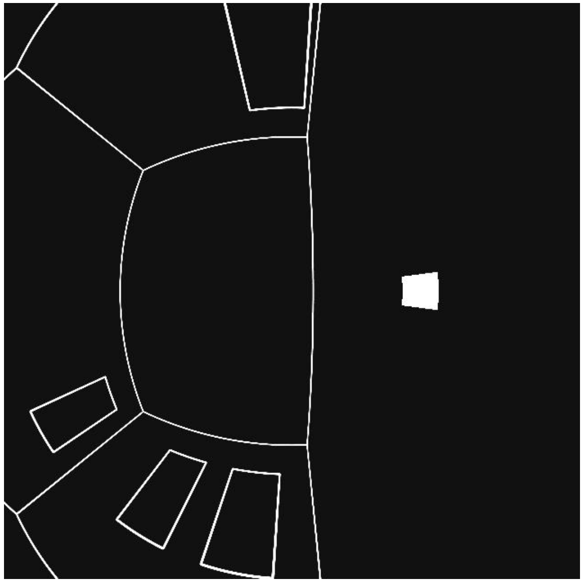
ab=2
ad=4096
lw=0.0005

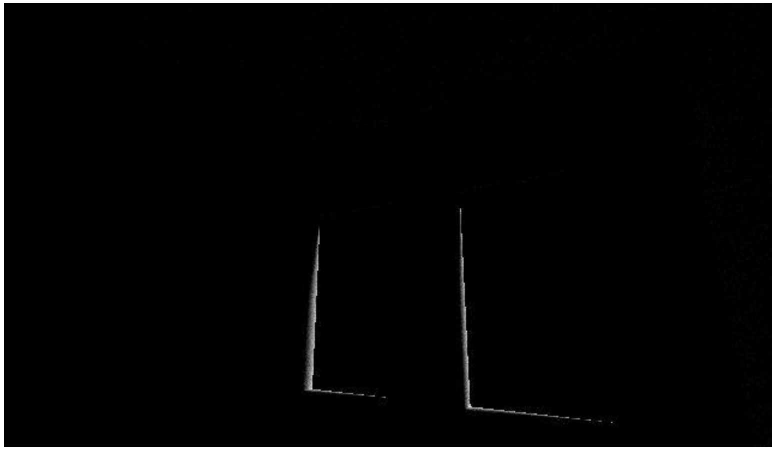
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

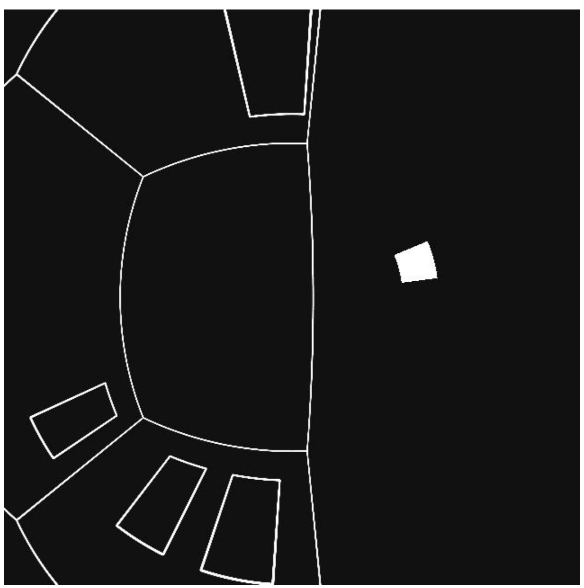
p103

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



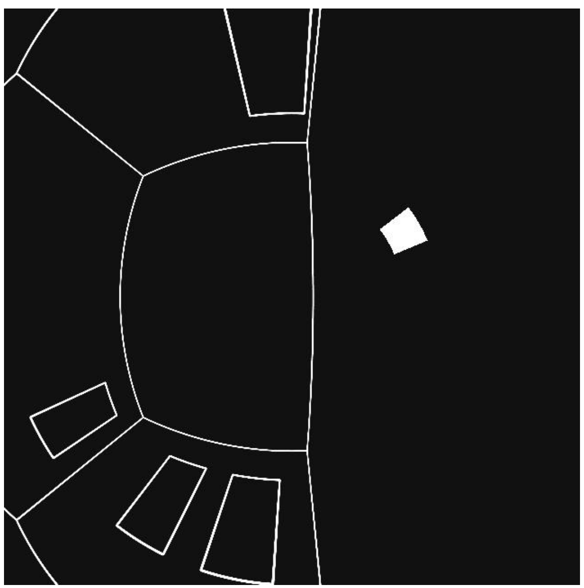
ab=2 **104**
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

p105

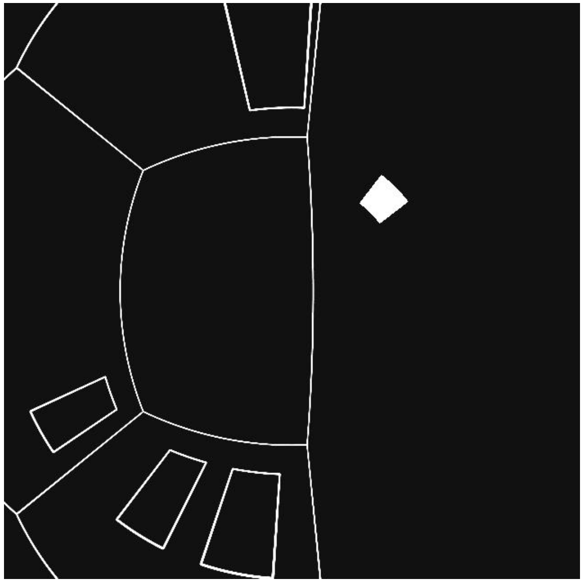
Daysim

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

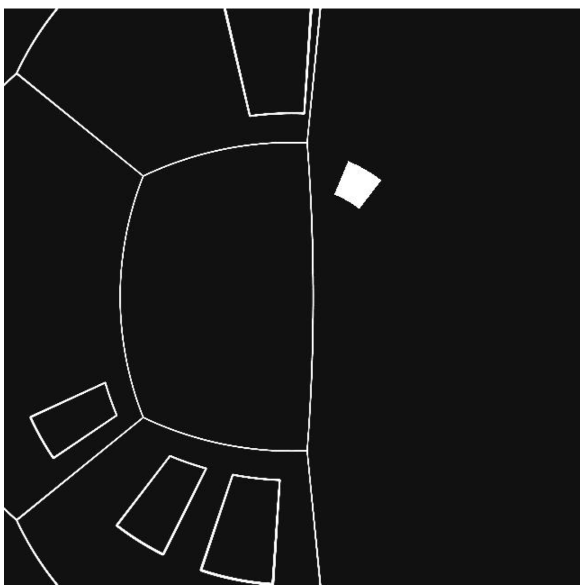
p106

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

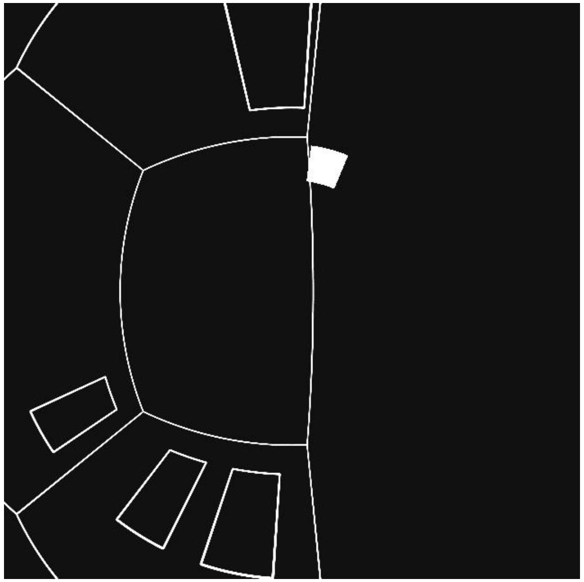
p107

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

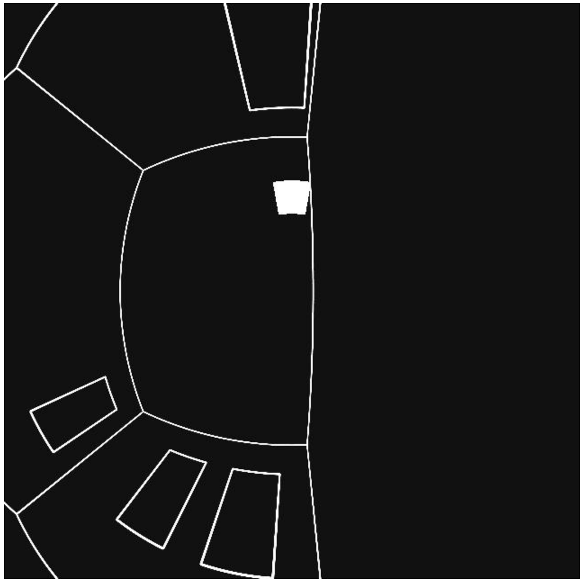
p108

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

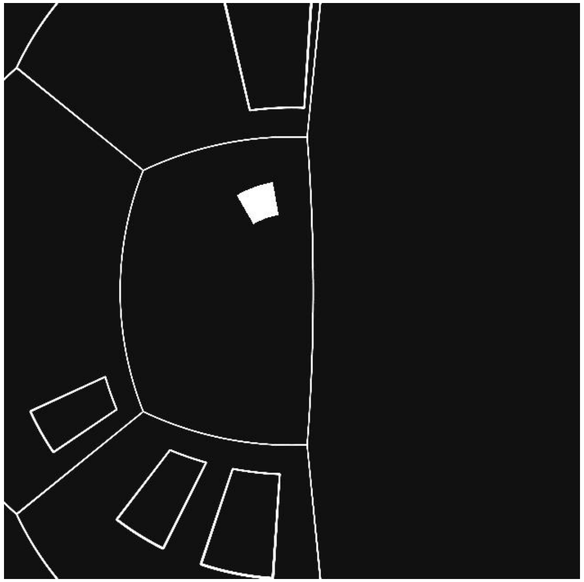
p109

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

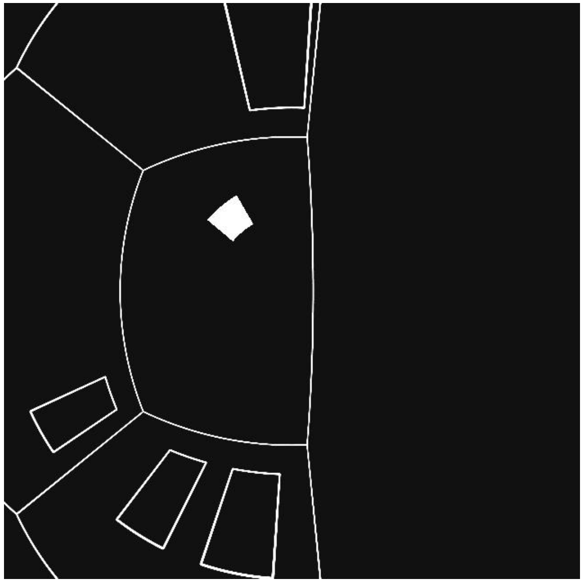
p110

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

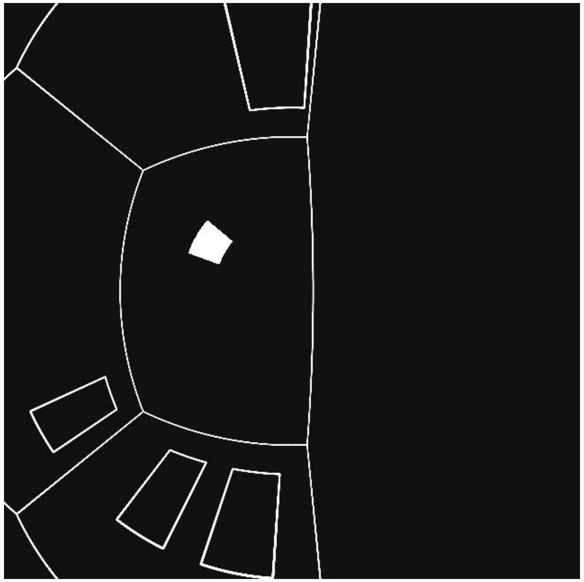
p111

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

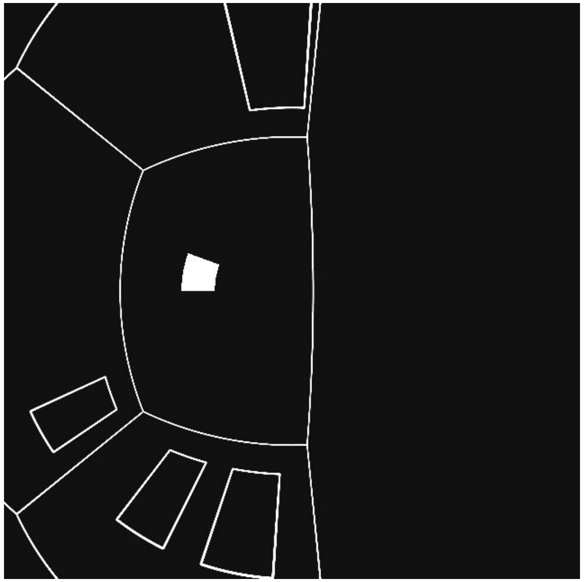
p112

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

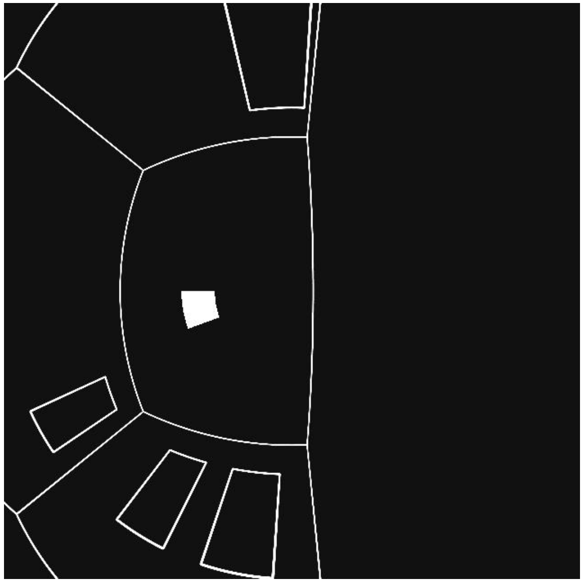
p113

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

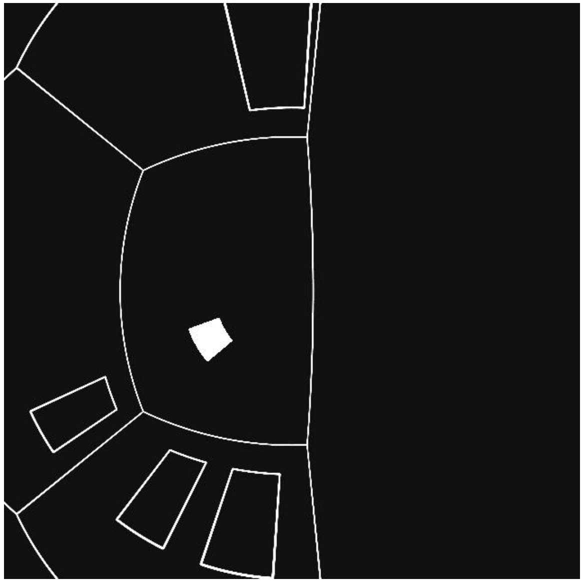
p114

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

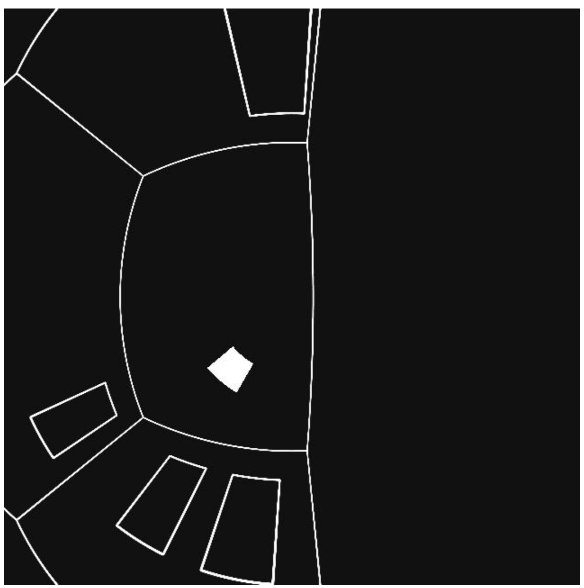
p115

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

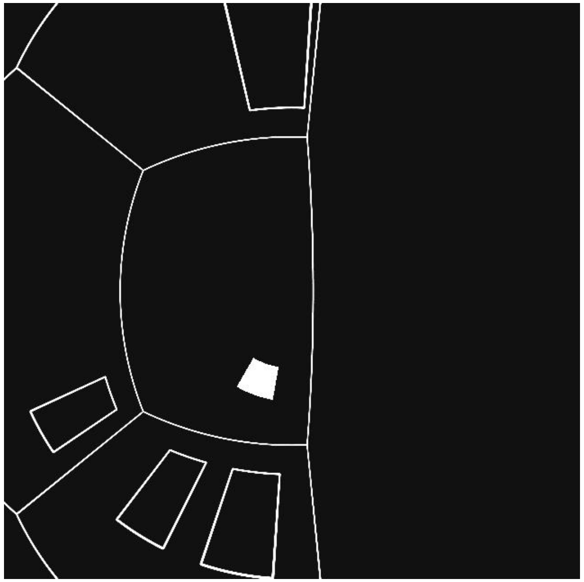
p116

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

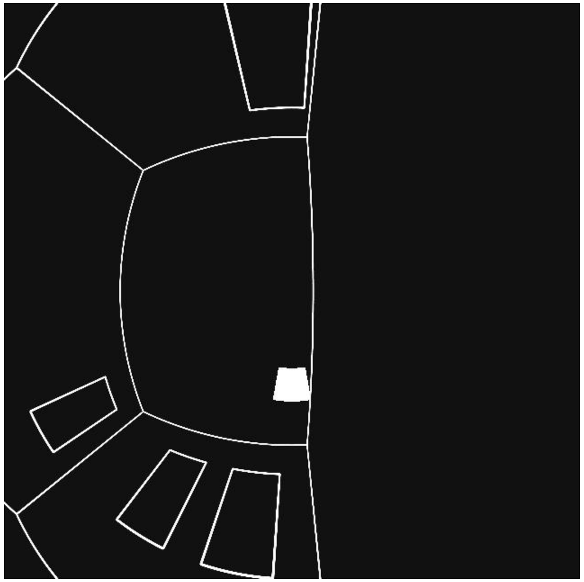
p117

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

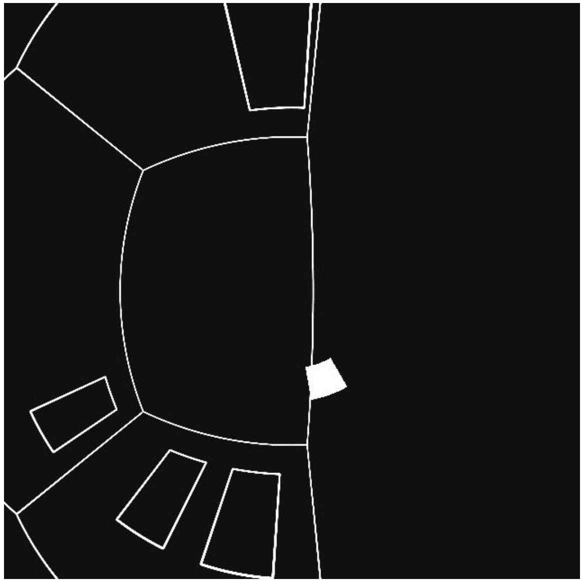
p118

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

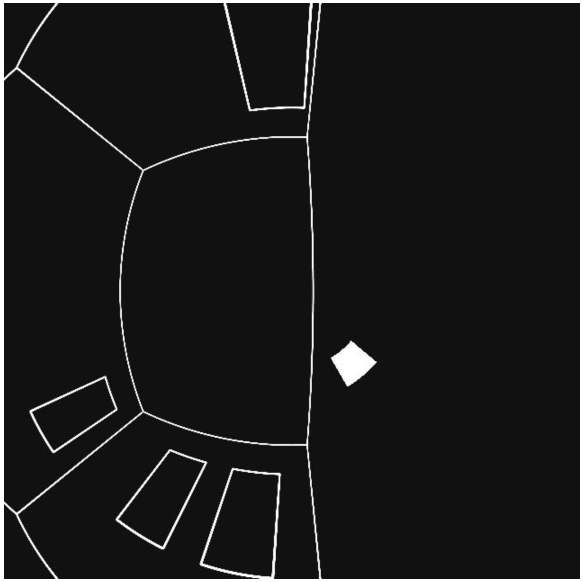
p119

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

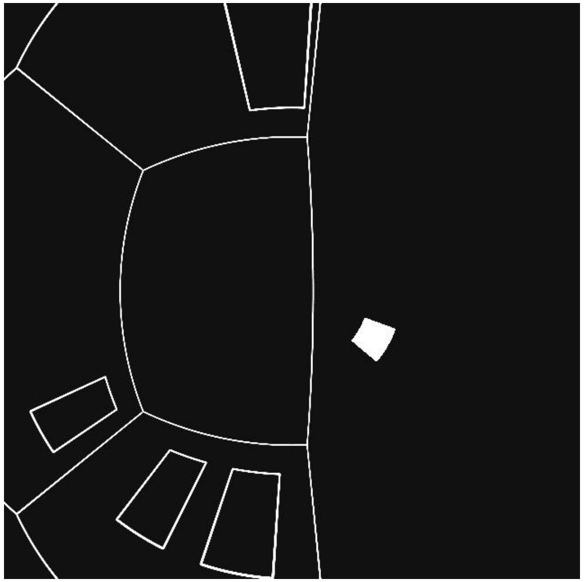
p120

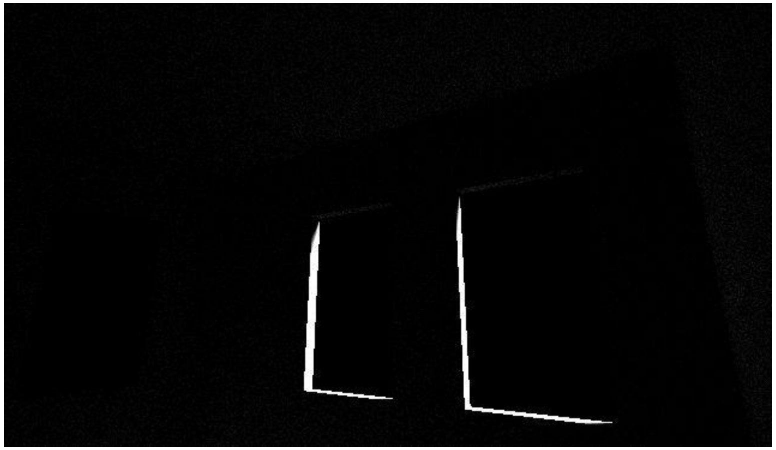
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

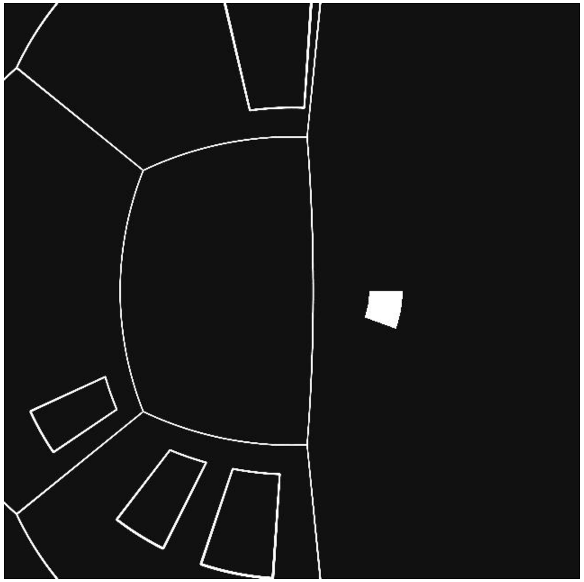
p121

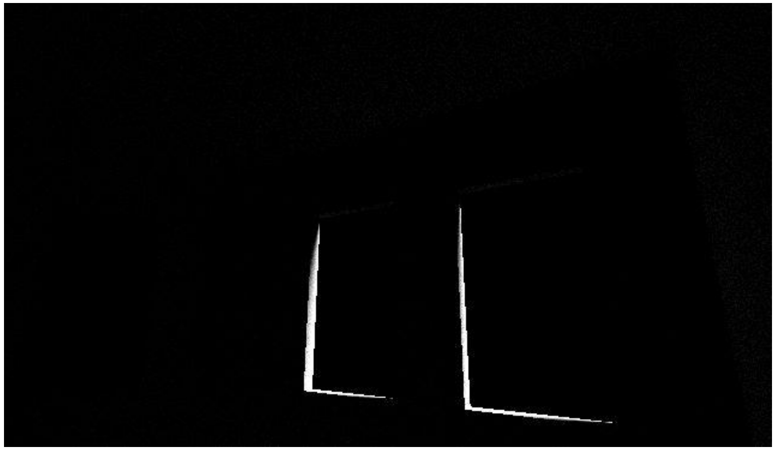
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





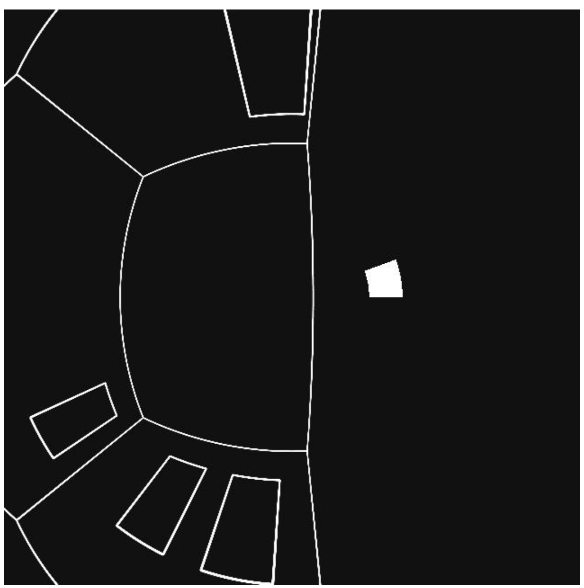
ab=2
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

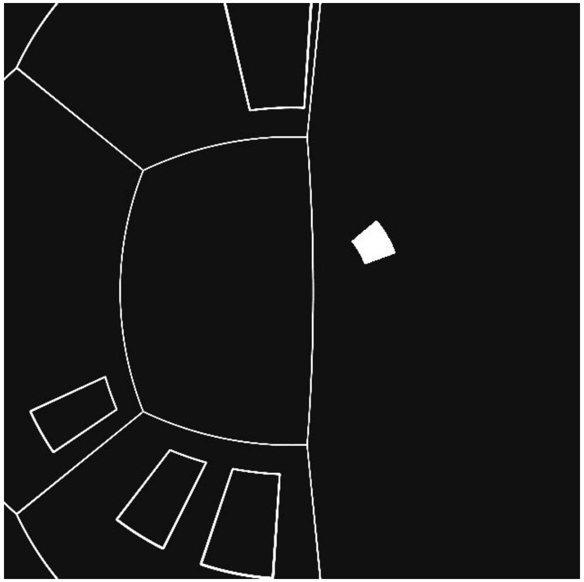
p123

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

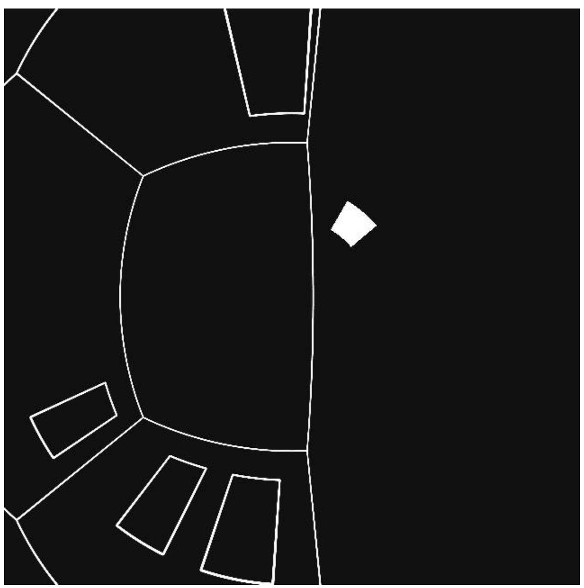
p124

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

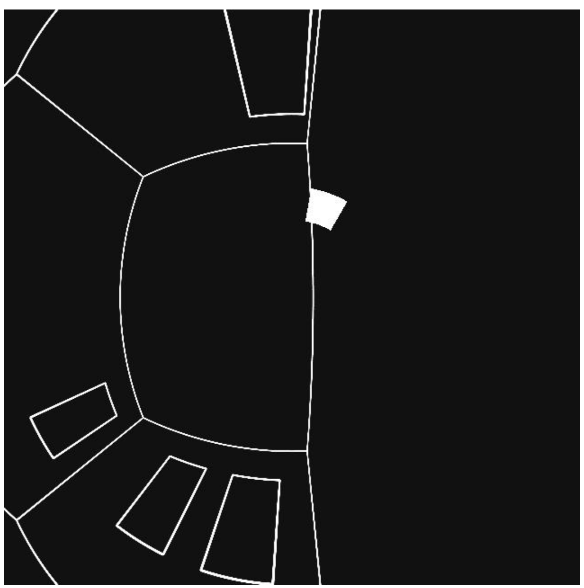
p125

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



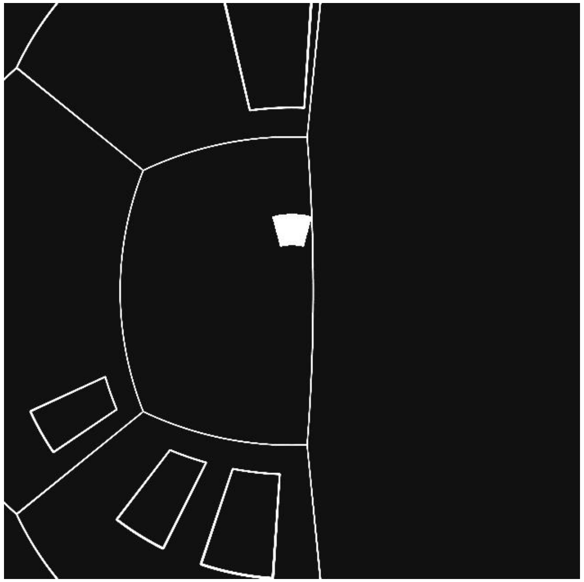
ab=2 **p126**
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

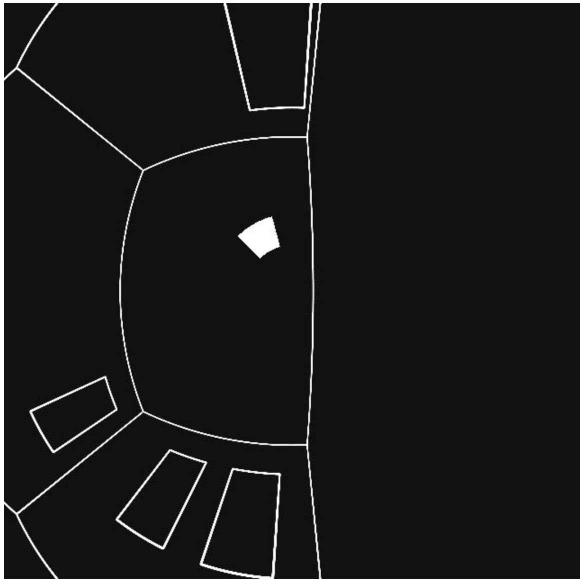
p127

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2

ad=4096

lw=0.0005

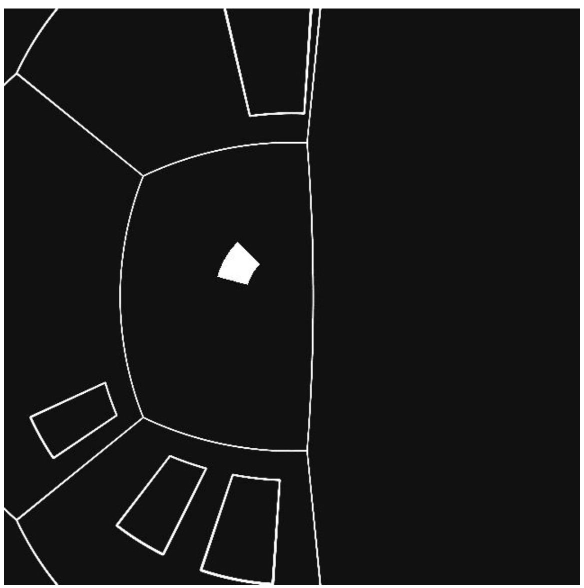
p128

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

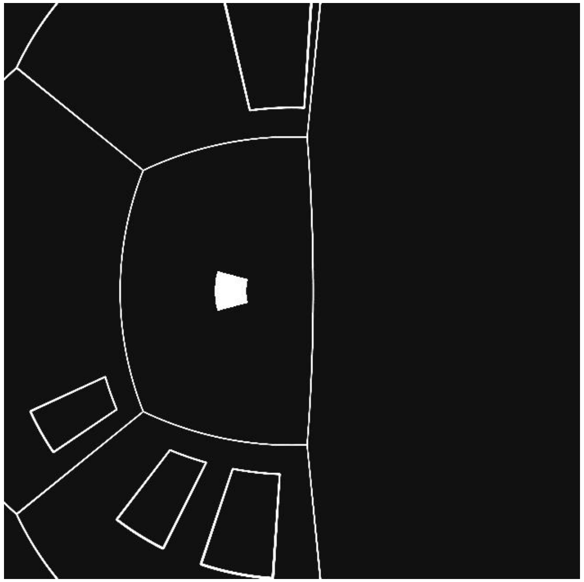
p129

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

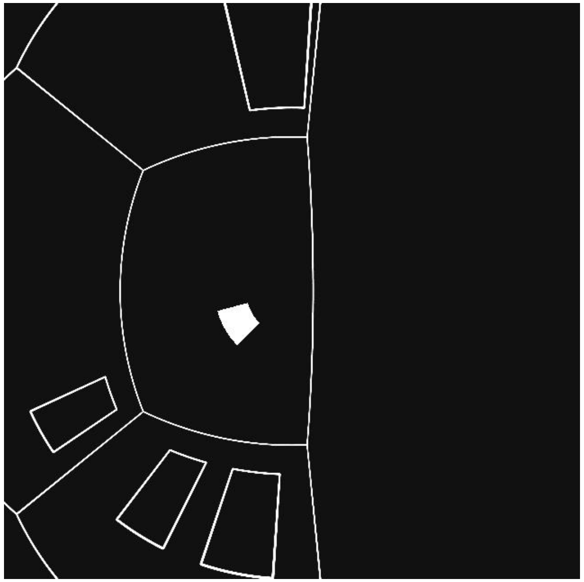
p130

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

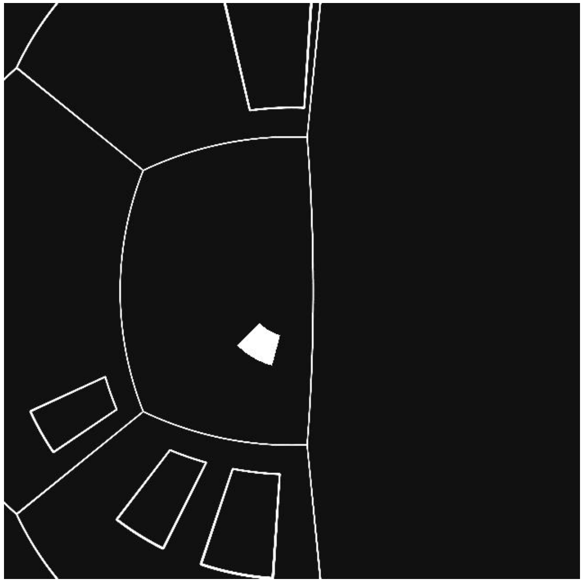
p131

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

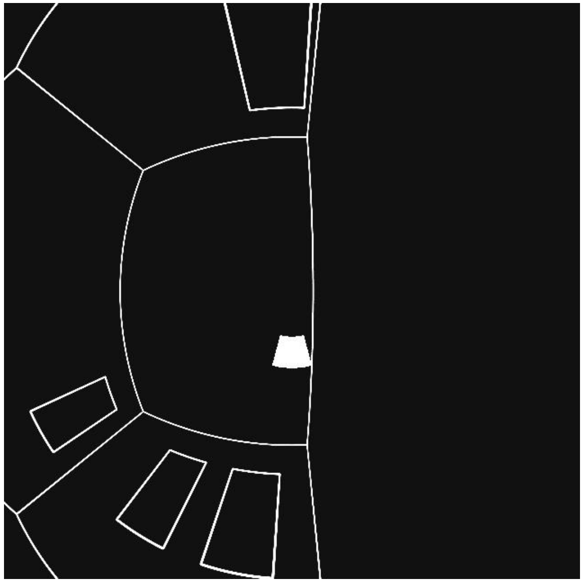
p132

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

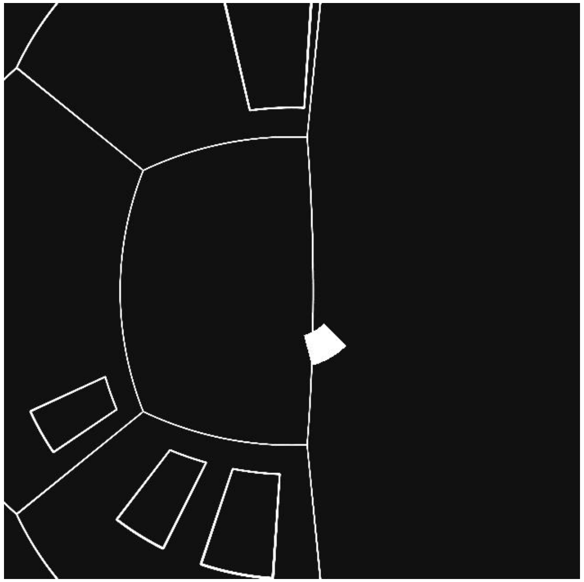
p133

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

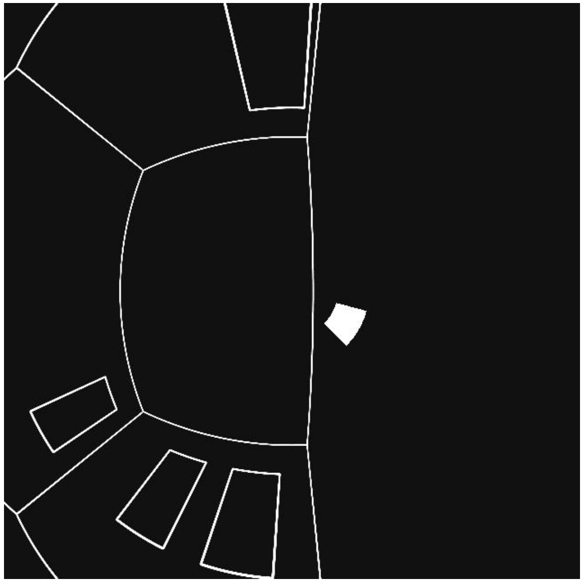
p134

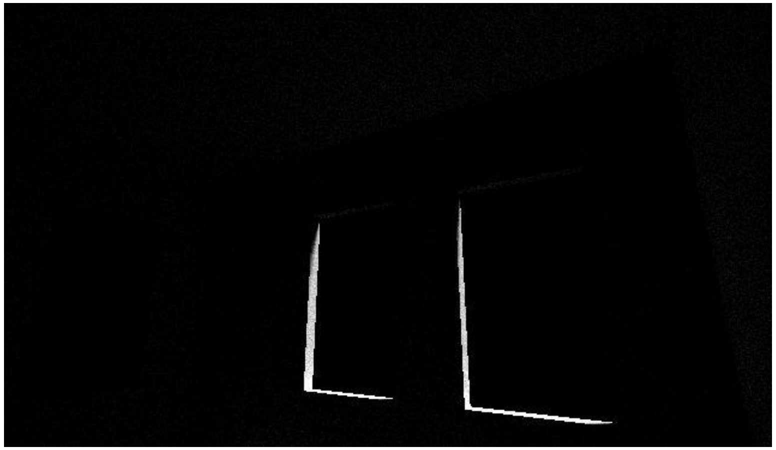
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

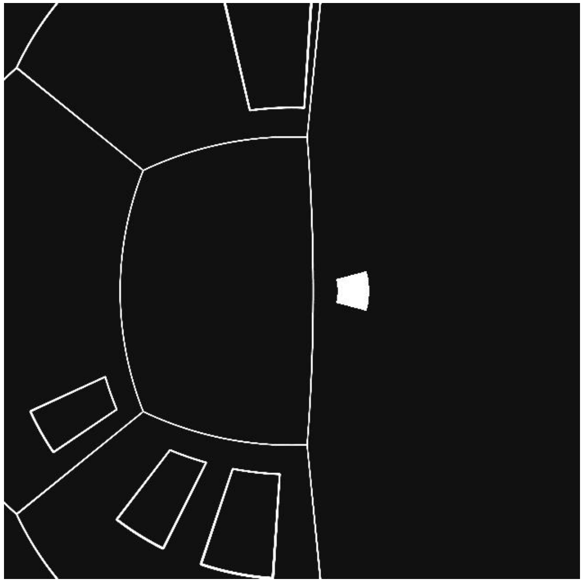
p135

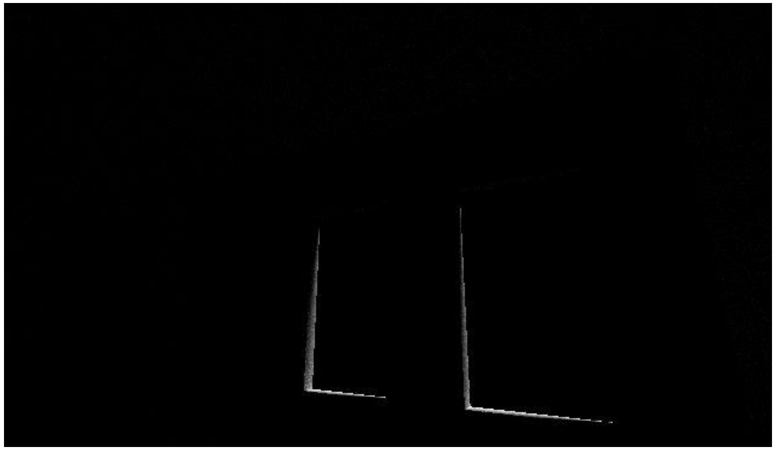
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

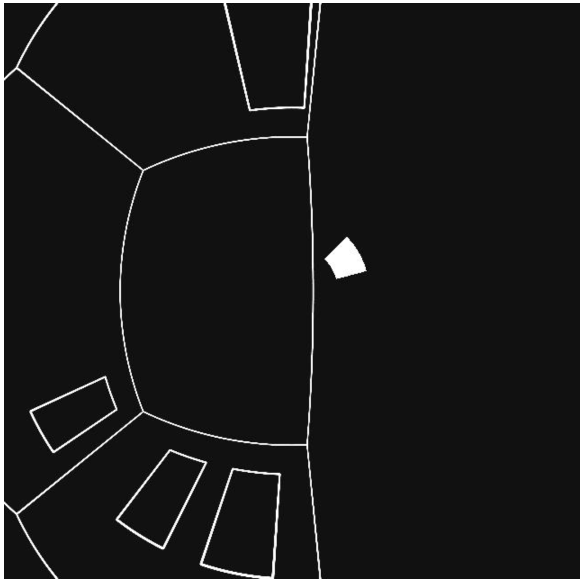
p136

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

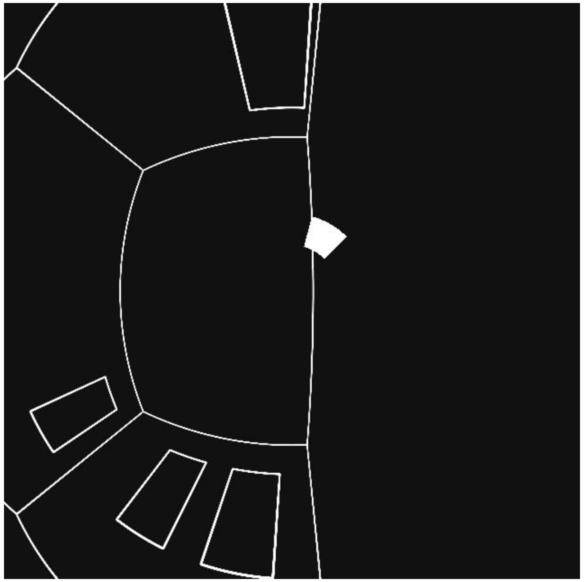
p137

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



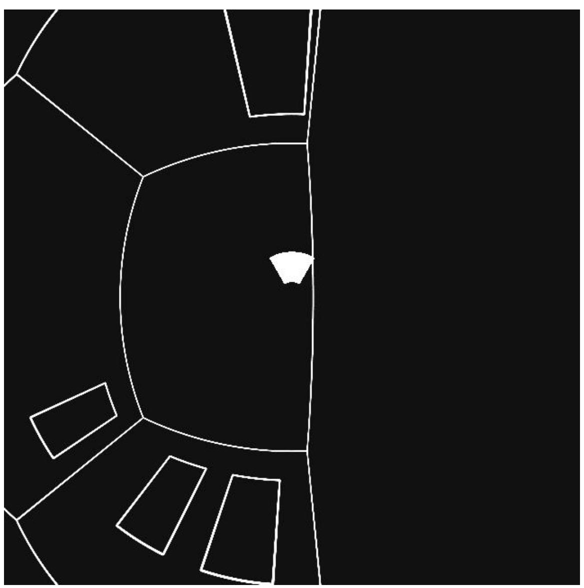
ab=2 **p138**
ad=4096
lw=0.0005

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



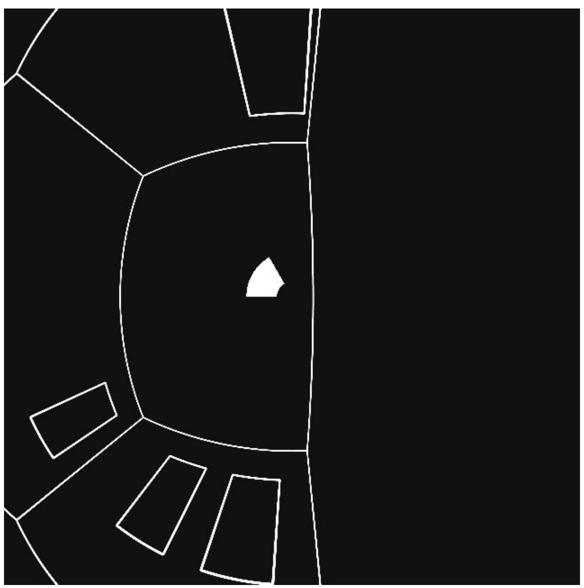
ab=2 **p139**
ad=4096
lw=0.0005

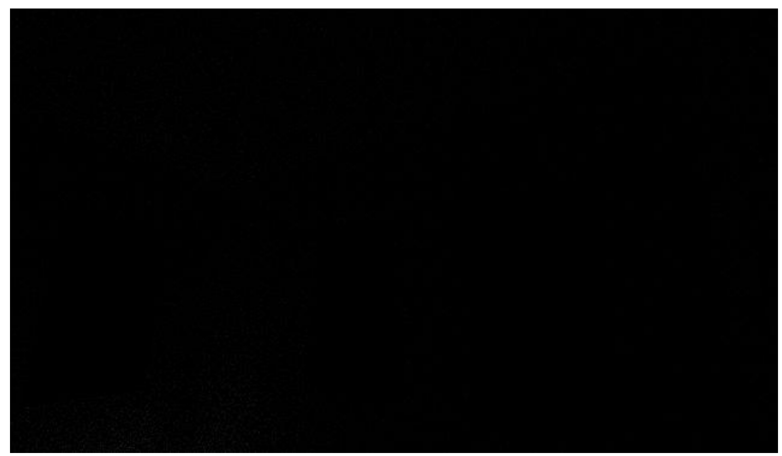
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

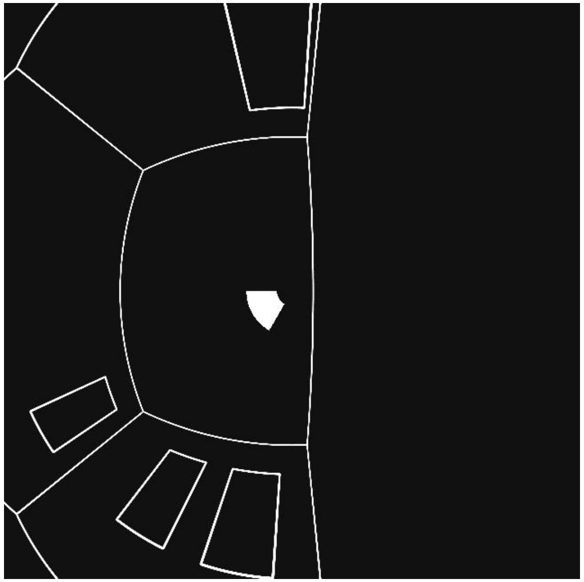
p140

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

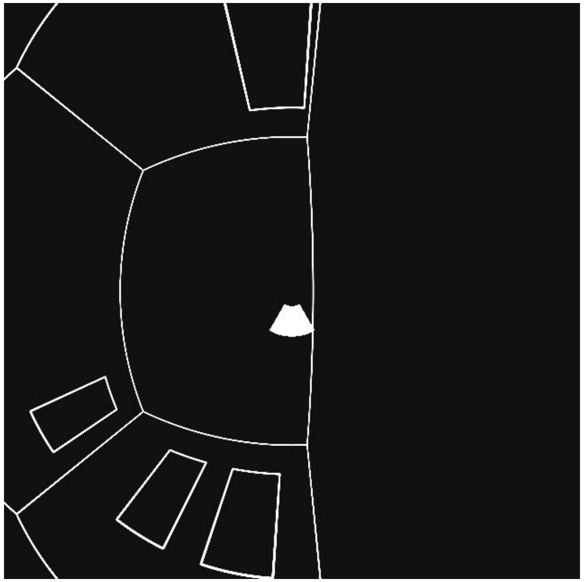
p141

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

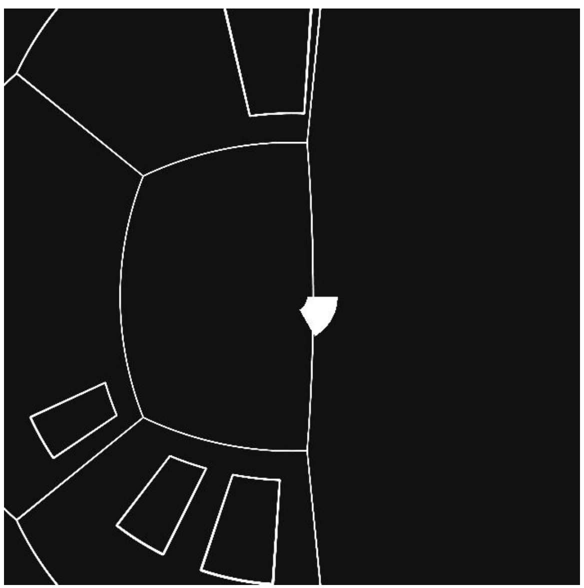
p142

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

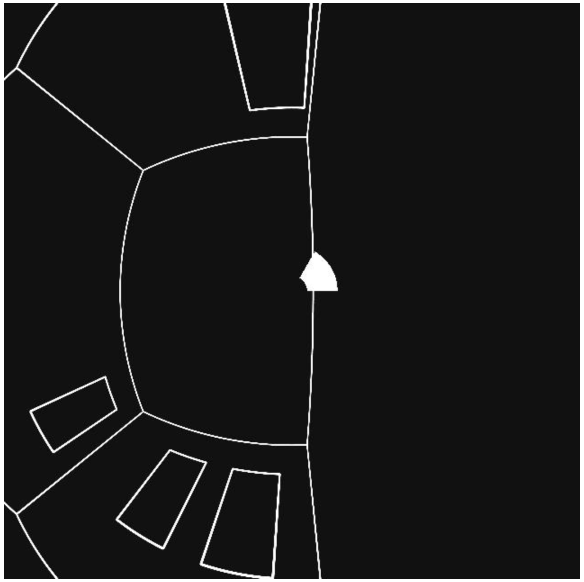
p143

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.



ab=2
ad=4096
lw=0.0005

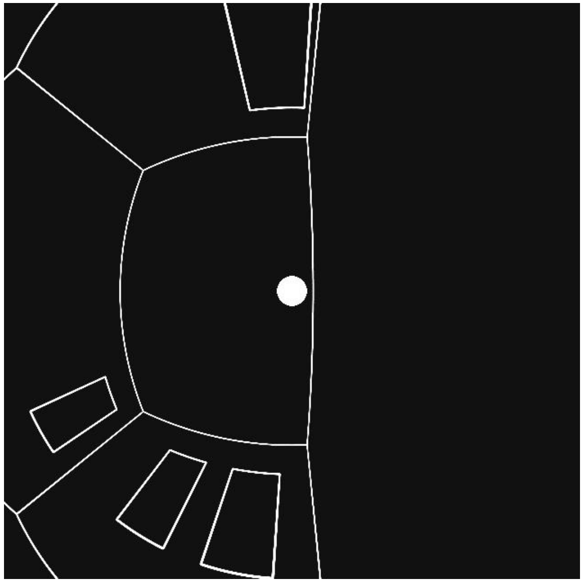
p144

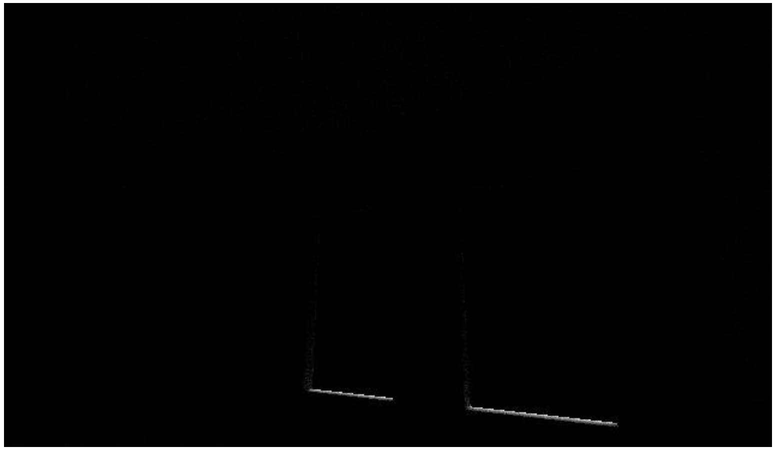
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.





ab=2
ad=4096
lw=0.0005

p145

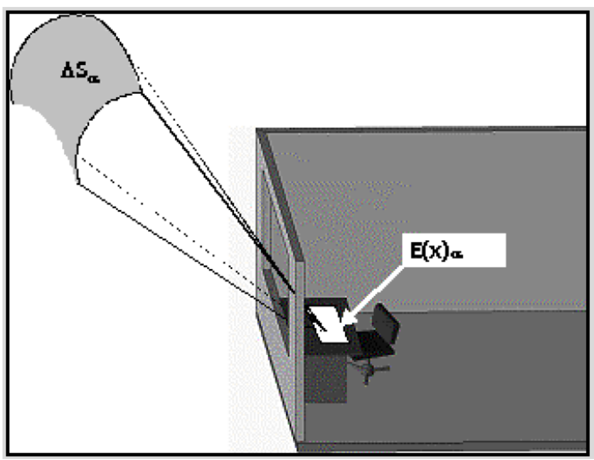
What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.

The figure below depicts the concepts of a daylight coefficient. Daylight coefficient DCα(x) describes the illuminance Eα (x) at point x in the building that is caused by sky segment Sα which is glowing with normalized luminance Lα.



Definition of a daylight coefficient

$$DC_{\alpha}(x) = \frac{E_{\alpha}(x)}{L_{\alpha}\Delta S_{\alpha}}$$

where

- x: point in a building
- S_{α}: sky segment P
- ΔS_{α}: angular size of S□
- $E_{\alpha}(x)$: illuminance at x due to S_{α}
- L_{α}: luminance of S□

What is a daylight coefficient?

The concept of daylight coefficients was originally proposed by Tregenza as a method to calculate indoor illuminance levels due to daylight under arbitrary sky conditions.

The underlying idea is to theoretically divide the celestial hemisphere into disjoint sky patches.

Afterwards the contribution to the total illuminance at a point in a building is calculated for each sky patch individually.

The figure below depicts the concepts of a daylight coefficient. Daylight coefficient $DC_\alpha(x)$ describes the illuminance $E_\alpha(x)$ at point x in the building that is caused by sky segment S_α which is glowing with normalized luminance L_α.

The key advantage of using a daylight coefficient approach is that once the daylight coefficients for all segments of the sky have been calculated for a reference point, the illuminance or luminance at the reference point can be calculated within seconds for any possible sky condition by combing the daylight coefficients with the luminous distribution of the sky.

What is a daylight coefficient?

The patch radiance averages for a the following sky:
(21st of March, 12:00, Stockholm, DNI=79800 & DHI=11500)

The key advantage of using a daylight coefficient approach is that once the daylight coefficients for all segments of the sky have been calculated for a reference point, the illuminance or luminance at the reference point can be calculated within seconds for any possible sky condition by combing the daylight coefficients with the luminous distribution of the sky.

What is a daylight coefficient?

The patch radiance averages for a the following sky:
(21st of March, 12:00, Stockholm, DNI=79800 & DHI=11500)

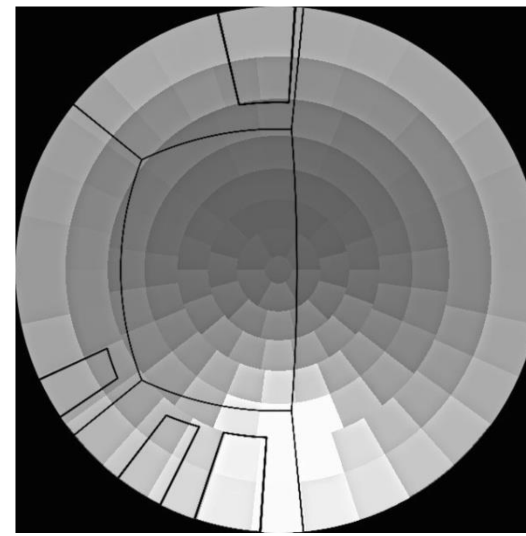
p1 x	2961.391	p31 x	5738.797	p61 x	3613.083	p91 x	1710.648	p121 x	3577.973
p2 x	5888.167	p32 x	3726.645	p62 x	2316.333	p92 x	1872.527	p122 x	2557.172
p3 x	5905.702	p33 x	3395.875	p63 x	2194.189	p93 x	2197.886	p123 x	1885.936
p4 x	5852.867	p34 x	3638.76	p64 x	2138.566	p94 x	2772.541	p124 x	1610.063
p5 x	5646.61	p35 x	3380.176	p65 x	2194.844	p95 x	3766.02	p125 x	1472.3
p6 x	5121.93	p36 x	3187.331	p66 x	2119.867	p96 x	5720.685	p126 x	1432.815
p7 x	4798.487	p37 x	2916.155	p67 x	2141.908	p97 x	8361.571	p127 x	1420.234
p8 x	4641.634	p38 x	3059.291	p68 x	2279.411	p98 x	11451.32	p128 x	1319.465
p9 x	4424.21	p39 x	3152.517	p69 x	2641.038	p99 x	9733.002	p129 x	1334.545
p10 x	4418.198	p40 x	3267.91	p70 x	3096.211	p100 x	6061.757	p130 x	1427.632
p11 x	5287.211	p41 x	3303.4	p71 x	4559.284	p101 x	4031.997	p131 x	1652.903
p12 x	5695.782	p42 x	4058.14	p72 x	6896.898	p102 x	2844.891	p132 x	2019.344
p13 x	7142.441	p43 x	5130.564	p73 x	14157.21	p103 x	2265.078	p133 x	2716.027
p14 x	9057.682	p44 x	7317.825	p74 x	1268190	p104 x	1927.284	p134 x	3223.286
p15 x	11583.09	p45 x	10791.12	p75 x	235668	p105 x	1747.234	p135 x	2823.77
p16 x	14946.88	p46 x	15757.06	p76 x	7942.385	p106 x	1684.811	p136 x	2132.934
p17 x	17825.06	p47 x	270302.1	p77 x	4900.18	p107 x	1689.437	p137 x	1655.595
p18 x	15545.95	p48 x	18497.8	p78 x	3232.38	p108 x	1680.676	p138 x	1410.467
p19 x	13018.08	p49 x	12172.27	p79 x	2745.862	p109 x	1735.795	p139 x	1335.748
p20 x	9173.521	p50 x	7860.583	p80 x	2270.829	p110 x	1410.223	p140 x	1376.438
p21 x	7529.375	p51 x	5603.414	p81 x	2055.807	p111 x	1414.281	p141 x	1470.759
p22 x	6024.941	p52 x	4406.438	p82 x	2099.4	p112 x	1409.399	p142 x	1749.631
p23 x	5321.537	p53 x	3697.276	p83 x	2157.548	p113 x	1471.854	p143 x	2078.254
p24 x	4702.28	p54 x	3076.751	p84 x	2140.851	p114 x	1580.397	p144 x	1721.71
p25 x	4659.952	p55 x	3091.734	p85 x	2297.073	p115 x	1888.925	p145 x	1473.525
p26 x	4726.441	p56 x	3080.268	p86 x	1686.482	p116 x	2355.051	p146 x	1577.694
p27 x	4990.338	p57 x	3181.161	p87 x	1696.978	p117 x	3519.24		
p28 x	5306.315	p58 x	3147.548	p88 x	1635.004	p118 x	4647.641		
p29 x	5387.029	p59 x	3386.663	p89 x	1641.934	p119 x	5845.07		
p30 x	5600.402	p60 x	3434.571	p90 x	1679.397	p120 x	4630.383		

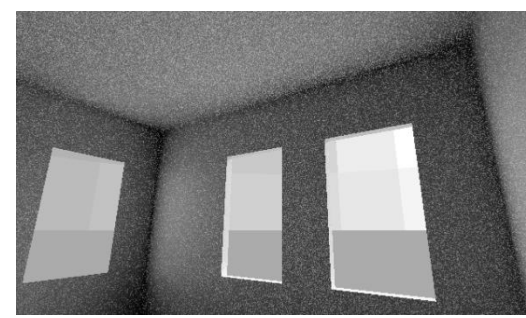
What is a daylight coefficient?

The patch radiance averages for a the following sky:

(21st of March, 12:00, Stockholm, DNI=79800 & DHI=11500)

p1 x 2961.391	p31 x 5738.797	p61 x 3613.083	p91 x 1710.648	p121 x 3577.973
p2 x 5888.167	p32 x 3726.645	p62 x 2316.333	p92 x 1872.527	p122 x 2557.172
p3 x 5905.702	p33 x 3395.875	p63 x 2194.189	p93 x 2197.886	p123 x 1885.936
p4 x 5852.867	p34 x 3638.76	p64 x 2138.566	p94 x 2772.541	p124 x 1610.063
p5 x 5646.61	p35 x 3380.176	p65 x 2194.844	p95 x 3766.02	p125 x 1472.3
p6 x 5121.93	p36 x 3187.331	p66 x 2119.867	p96 x 5720.685	p126 x 1432.815
p7 x 4798.487	p37 x 2916.155	p67 x 2141.908	p97 x 8361.571	p127 x 1420.234
p8 x 4641.634	p38 x 3059.291	p68 x 2279.411	p98 x 11451.32	p128 x 1319.465
p9 x 4424.21	p39 x 3152.517	p69 x 2641.038	p99 x 9733.002	p129 x 1334.545
p10 x 4418.198	p40 x 3267.91	p70 x 3096.211	p100 x 6061.757	p130 x 1427.632
p11 x 5287.211	p41 x 3303.4	p71 x 4559.284	p101 x 4031.997	p131 x 1652.903
p12 x 5695.782	p42 x 4058.14	p72 x 6896.898	p102 x 2844.891	p132 x 2019.344
p13 x 7142.441	p43 x 5130.564	p73 x 14157.21	p103 x 2265.078	p133 x 2716.027
p14 x 9057.682	p44 x 7317.825	p74 x 1268190	p104 x 1927.284	p134 x 3223.286
p15 x 11583.09	p45 x 10791.12	p75 x 235668	p105 x 1747.234	p135 x 2823.77
p16 x 14946.88	p46 x 15757.06	p76 x 7942.385	p106 x 1684.811	p136 x 2132.934
p17 x 17825.06	p47 x 270302.1	p77 x 4900.18	p107 x 1689.437	p137 x 1655.595
p18 x 15545.95	p48 x 18497.8	p78 x 3232.38	p108 x 1680.676	p138 x 1410.467
p19 x 13018.08	p49 x 12172.27	p79 x 2745.862	p109 x 1735.795	p139 x 1335.748
p20 x 9173.521	p50 x 7860.583	p80 x 2270.829	p110 x 1410.223	p140 x 1376.438
p21 x 7529.375	p51 x 5603.414	p81 x 2055.807	p111 x 1414.281	p141 x 1470.759
p22 x 6024.941	p52 x 4406.438	p82 x 2099.4	p112 x 1409.399	p142 x 1749.631
p23 x 5321.537	p53 x 3697.276	p83 x 2157.548	p113 x 1471.854	p143 x 2078.254
p24 x 4702.28	p54 x 3076.751	p84 x 2140.851	p114 x 1580.397	p144 x 1721.71
p25 x 4659.952	p55 x 3091.734	p85 x 2297.073	p115 x 1888.925	p145 x 1473.525
p26 x 4726.441	p56 x 3080.268	p86 x 1686.482	p116 x 2355.051	p146 x 1577.694
p27 x 4990.338	p57 x 3181.161	p87 x 1696.978	p117 x 3519.24	
p28 x 5306.315	p58 x 3147.548	p88 x 1635.004	p118 x 4647.641	
p29 x 5387.029	p59 x 3386.663	p89 x 1641.934	p119 x 5845.07	
p30 x 5600.402	p60 x 3434.571	p90 x 1679.397	p120 x 4630.383	





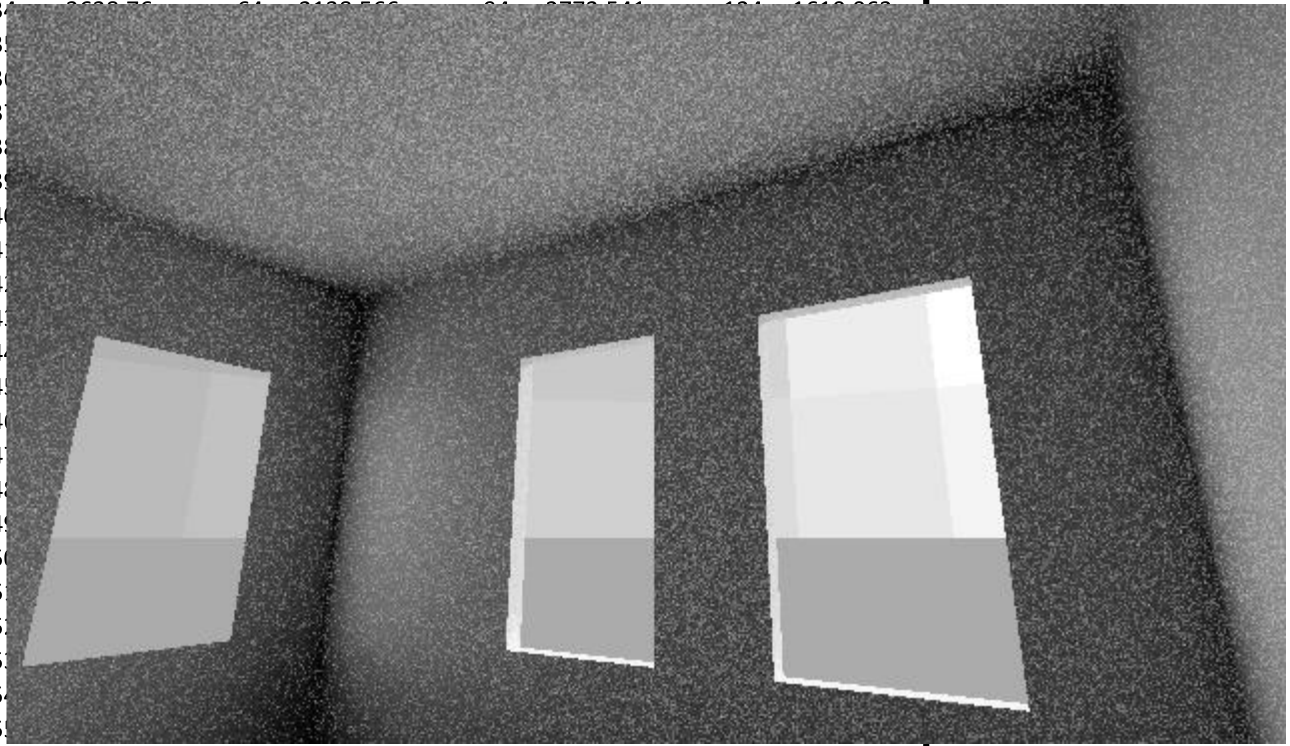
What is a daylight coefficient?

The patch radiance averages for a the following sky:

(21st of March, 12:00, Stockholm, DNI=79800 & DHI=11500)

p1 x 2961.391
p2 x 5888.167
p3 x 5905.702
p4 x 5852.867
p5 x 5646.61
p6 x 5121.93
p7 x 4798.487
p8 x 4641.634
p9 x 4424.21
p10 x 4418.198
p11 x 5287.211
p12 x 5695.782
p13 x 7142.441
p14 x 9057.682
p15 x 11583.09
p16 x 14946.88
p17 x 17825.06
p18 x 15545.95
p19 x 13018.08
p20 x 9173.521
p21 x 7529.375
p22 x 6024.941
p23 x 5321.537
p24 x 4702.28
p25 x 4659.952
p26 x 4726.441
p27 x 4990.338
p28 x 5306.315
p29 x 5387.029
p30 x 5600.402

p31 x 5738.797
p32 x 3726.645
p33 x 3395.875



p56 x 3080.268
p57 x 3181.161
p58 x 3147.548
p59 x 3386.663
p60 x 3434.571

p61 x 3613.083
p62 x 2316.333
p63 x 2194.189

p86 x 1686.482
p87 x 1696.978
p88 x 1635.004
p89 x 1641.934
p90 x 1679.397

p91 x 1710.648
p92 x 1872.527
p93 x 2197.886

p116 x 2355.051
p117 x 3519.24
p118 x 4647.641
p119 x 5845.07
p120 x 4630.383

p121 x 3577.973
p122 x 2557.172
p123 x 1885.936

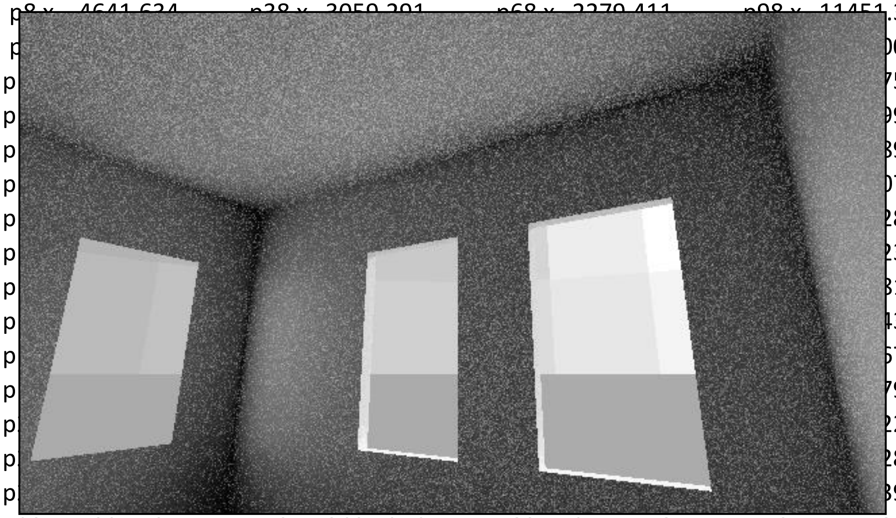
p146 x 1577.694

What is a daylight coefficient?

The patch radiance averages for a the following sky:

(21st of March, 12:00, Stockholm, DNI=79800 & DHI=11500)

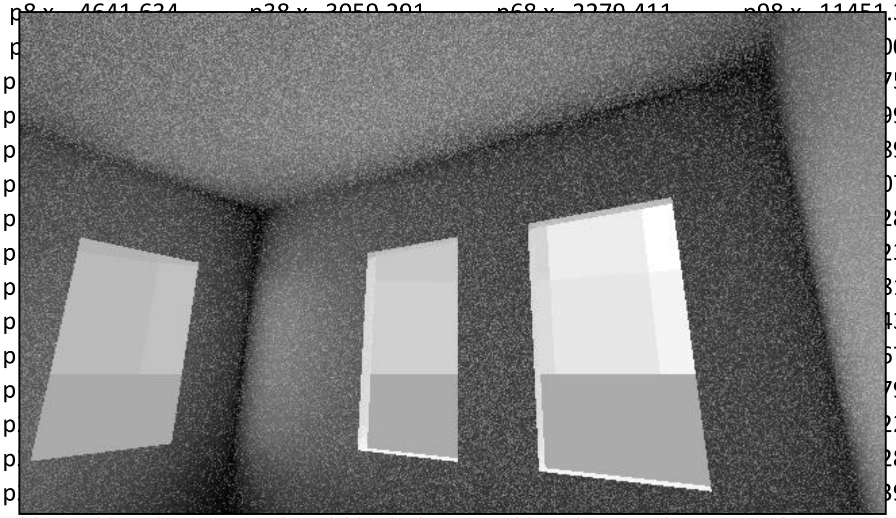
p1 x	2961.391	p31 x	5738.797	p61 x	3613.083	p91 x	1710.648	p121 x	3577.973
p2 x	5888.167	p32 x	3726.645	p62 x	2316.333	p92 x	1872.527	p122 x	2557.172
p3 x	5905.702	p33 x	3395.875	p63 x	2194.189	p93 x	2197.886	p123 x	1885.936
p4 x	5852.867	p34 x	3638.76	p64 x	2138.566	p94 x	2772.541	p124 x	1610.063
p5 x	5646.61	p35 x	3380.176	p65 x	2194.844	p95 x	3766.02	p125 x	1472.3
p6 x	5121.93	p36 x	3187.331	p66 x	2119.867	p96 x	5720.685	p126 x	1432.815
p7 x	4798.487	p37 x	2916.155	p67 x	2141.908	p97 x	8361.571	p127 x	1420.234
p8 x	4641.634	p38 x	3050.291	p68 x	2270.411	p98 x	11451.32	p128 x	1319.465
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]002	p129 x	1334.545
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]757	p130 x	1427.632
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]997	p131 x	1652.903
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]391	p132 x	2019.344
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]078	p133 x	2716.027
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]284	p134 x	3223.286
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]234	p135 x	2823.77
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]311	p136 x	2132.934
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]437	p137 x	1655.595
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]576	p138 x	1410.467
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]795	p139 x	1335.748
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]223	p140 x	1376.438
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]281	p141 x	1470.759
p[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]399	p142 x	1749.631
p23 x	5321.537	p53 x	3697.276	p83 x	2157.548	p113 x	1471.854	p143 x	2078.254
p24 x	4702.28	p54 x	3076.751	p84 x	2140.851	p114 x	1580.397	p144 x	1721.71
p25 x	4659.952	p55 x	3091.734	p85 x	2297.073	p115 x	1888.925	p145 x	1473.525
p26 x	4726.441	p56 x	3080.268	p86 x	1686.482	p116 x	2355.051	p146 x	1577.694
p27 x	4990.338	p57 x	3181.161	p87 x	1696.978	p117 x	3519.24		
p28 x	5306.315	p58 x	3147.548	p88 x	1635.004	p118 x	4647.641		
p29 x	5387.029	p59 x	3386.663	p89 x	1641.934	p119 x	5845.07		
p30 x	5600.402	p60 x	3434.571	p90 x	1679.397	p120 x	4630.383		



What is a daylight coefficient?

The patch radiance averages for a the following sky:
(21st of March, 12:00, Stockholm, DNI=79800 & DHI=11500)

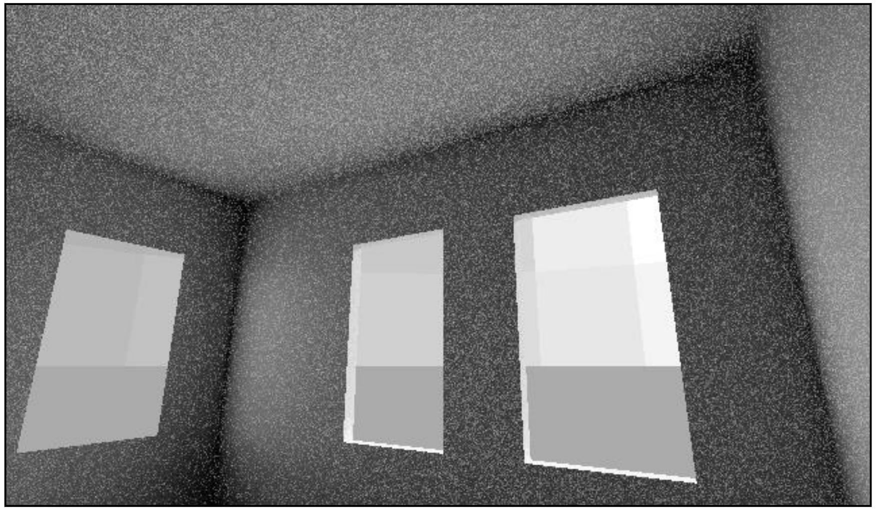
p1 x	2961.391	p31 x	5738.797	p61 x	3613.083	p91 x	1710.648	p121 x	3577.973
p2 x	5888.167	p32 x	3726.645	p62 x	2316.333	p92 x	1872.527	p122 x	2557.172
p3 x	5905.702	p33 x	3395.875	p63 x	2194.189	p93 x	2197.886	p123 x	1885.936
p4 x	5852.867	p34 x	3638.76	p64 x	2138.566	p94 x	2772.541	p124 x	1610.063
p5 x	5646.61	p35 x	3380.176	p65 x	2194.844	p95 x	3766.02	p125 x	1472.3
p6 x	5121.93	p36 x	3187.331	p66 x	2119.867	p96 x	5720.685	p126 x	1432.815
p7 x	4798.487	p37 x	2916.155	p67 x	2141.908	p97 x	8361.571	p127 x	1420.234
p8 x	4641.634	p38 x	3059.291	p68 x	2270.411	p98 x	11451.32	p128 x	1319.465
p							002		
p							757		
p							997		
p							891		
p							078		
p							284		
p							234		
p							311		
p							437		
p							576		
p							795		
p							223		
p							281		
p							399		
p23 x	5321.537	p53 x	3697.276	p83 x	2157.548	p113 x	1471.854	p143 x	2078.254
p24 x	4702.28	p54 x	3076.751	p84 x	2140.851	p114 x	1580.397	p144 x	1721.71
p25 x	4659.952	p55 x	3091.734	p85 x	2297.073	p115 x	1888.925	p145 x	1473.525
p26 x	4726.441	p56 x	3080.268	p86 x	1686.482	p116 x	2355.051	p146 x	1577.694
p27 x	4990.338	p57 x	3181.161	p87 x	1696.978	p117 x	3519.24		
p28 x	5306.315	p58 x	3147.548	p88 x	1635.004	p118 x	4647.641		
p29 x	5387.029	p59 x	3386.663	p89 x	1641.934	p119 x	5845.07		
p30 x	5600.402	p60 x	3434.571	p90 x	1679.397	p120 x	4630.383		



What is a daylight coefficient?

The patch radiance averages for a the following sky:

(21st of March, 12:00, Stockholm, DNI=79800 & DHI=11500)

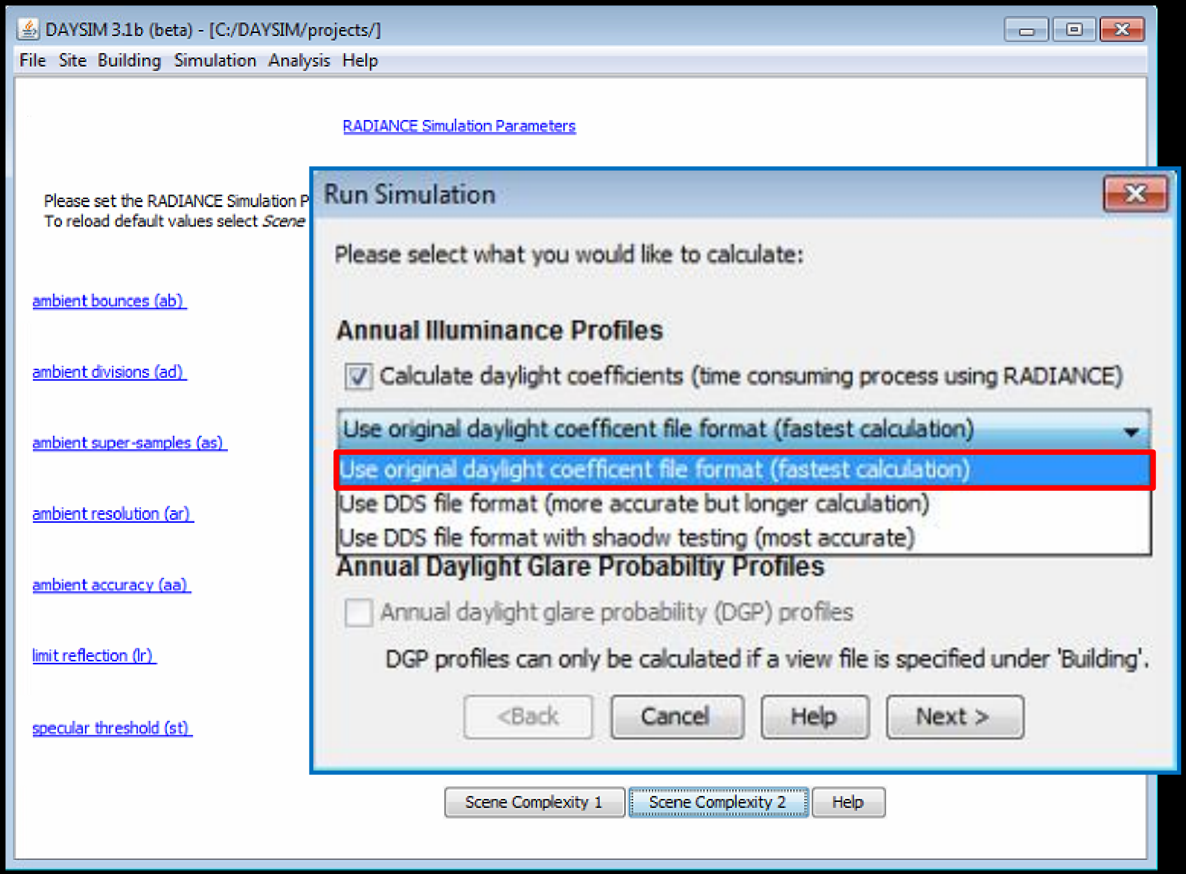


Based on Daylight Coefficient algorithm in Radiance

Normal created in Radiance

Dynamic daylight simulation:

Daysim:

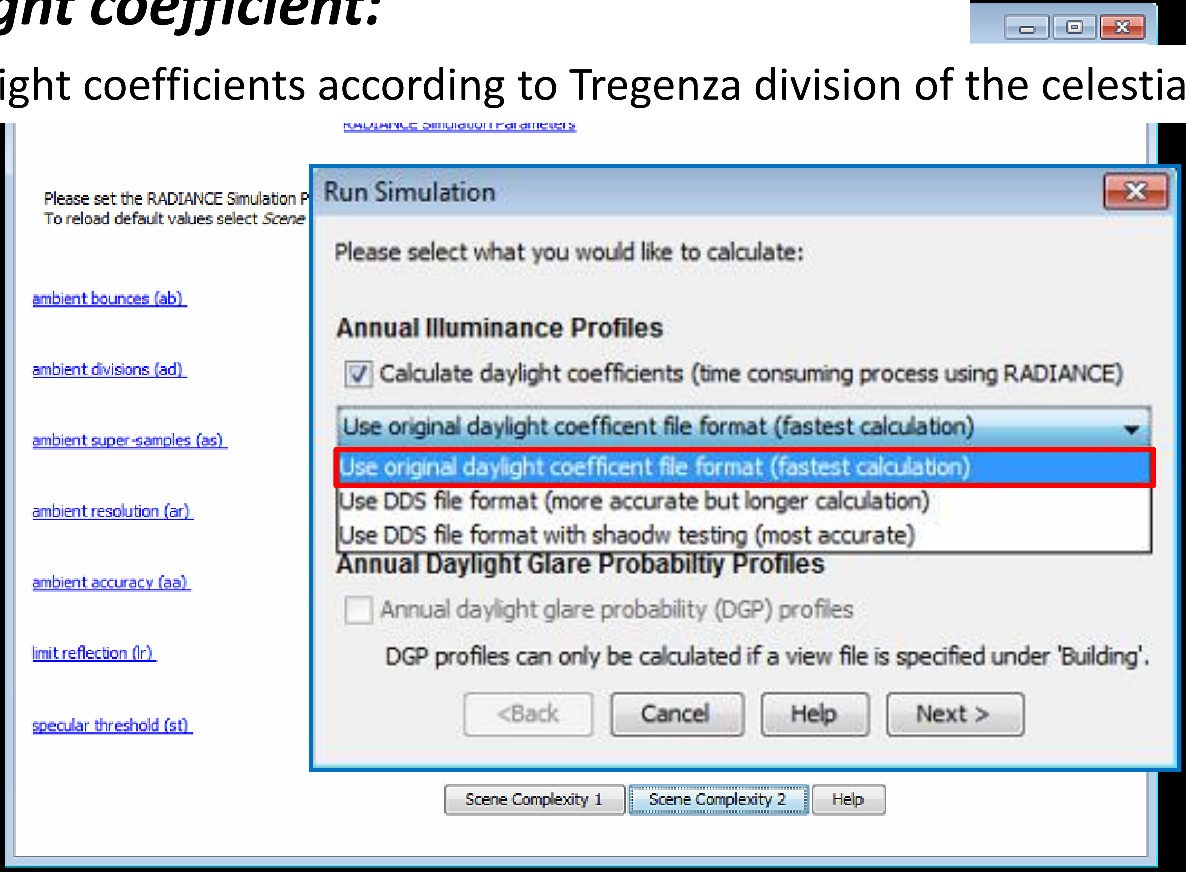


Dynamic daylight simulation:

Daysim:

Original daylight coefficient:

- 145 diffuse daylight coefficients according to Tregenza division of the celestial hemisphere.

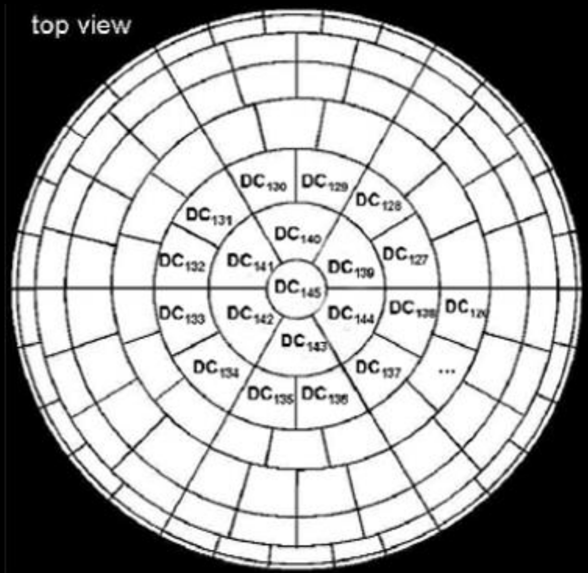


Dynamic daylight simulation:

Daysim:

Original daylight coefficient:

- 145 diffuse daylight coefficients according to Tregenza division of the celestial hemisphere.



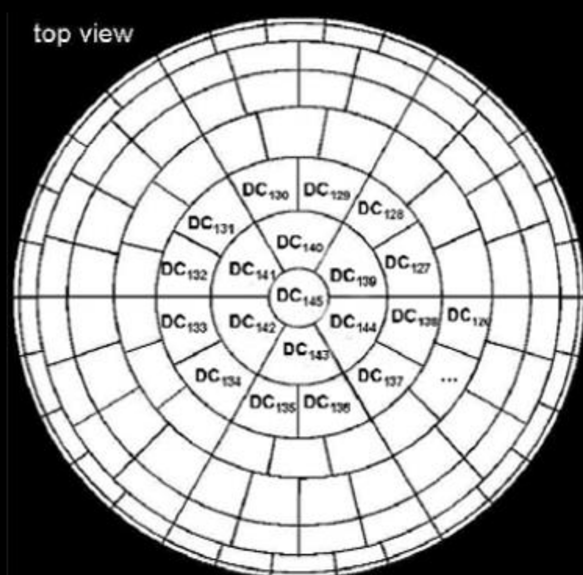
A standard daylight coefficient model for dynamic daylighting simulations, D. Bourgeois, C.F. Reinhart , G. Ward

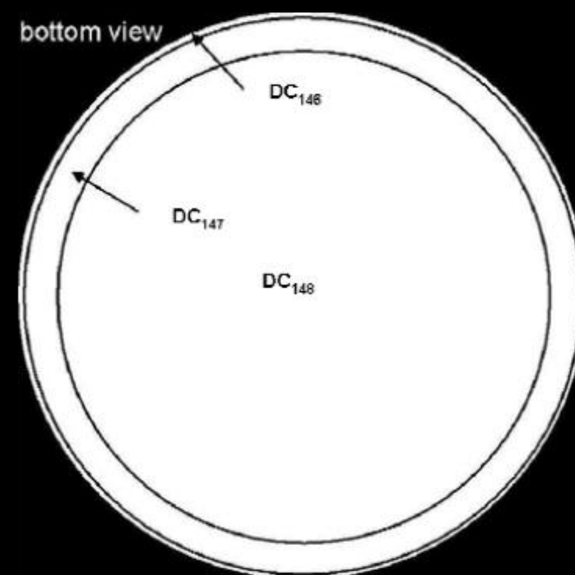
Dynamic daylight simulation:

Daysim:

Original daylight coefficient:

- 145 diffuse daylight coefficients according to Tregenza division of the celestial hemisphere.
- 3 ground daylight coefficients.





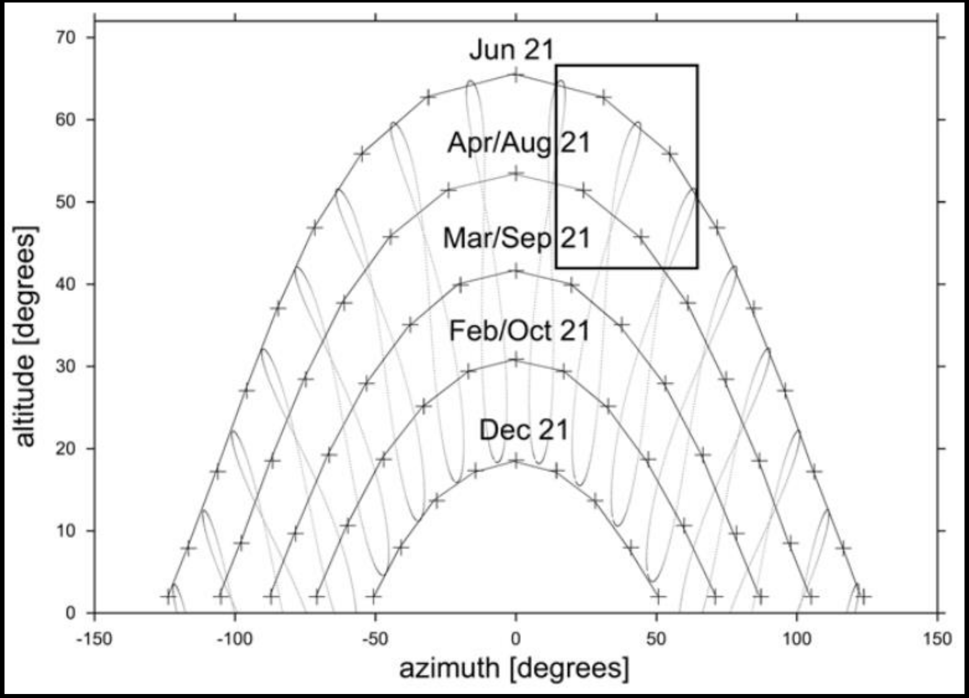
A standard daylight coefficient model for dynamic daylighting simulations, D. Bourgeois, C.F. Reinhart , G. Ward

Dynamic daylight simulation:

Daysim:

Original daylight coefficient:

- 145 diffuse daylight coefficients according to Tregenza division of the celestial hemisphere.
- 3 ground daylight coefficients.
- 65 direct daylight coefficients; this number may vary depending on the latitude of the investigated building.



The dotted lines mark all possible hourly mean solar positions for Freiburg, Germany (47.98°N). The crosses mark the 65 representative Daysim solar positions for which direct daylight coefficients are calculated for that site.

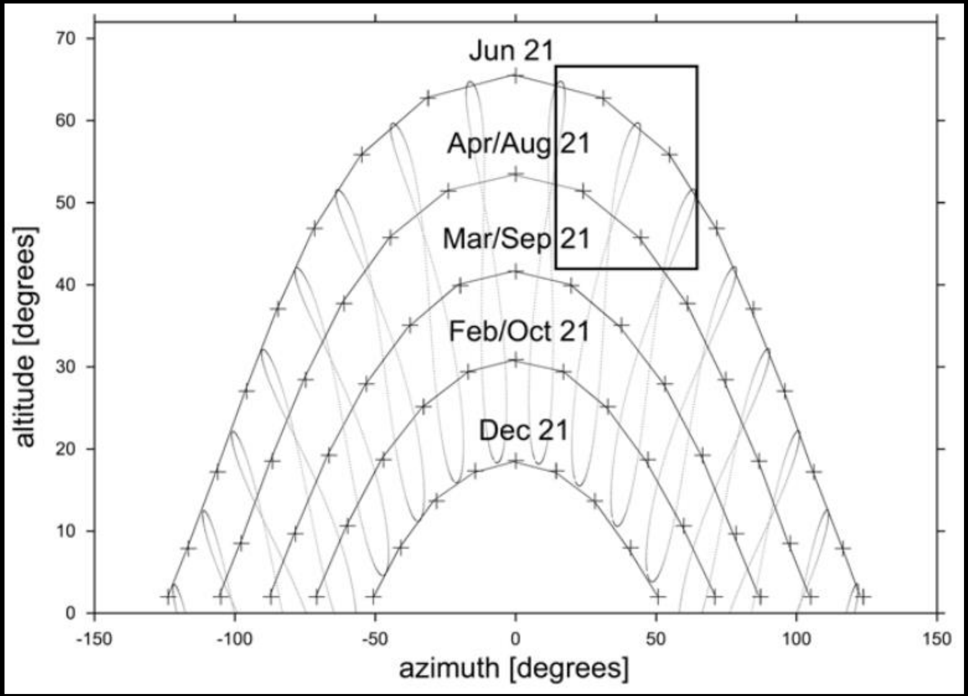
A standard daylight coefficient model for dynamic daylighting simulations, D. Bourgeois, C.F. Reinhart , G. Ward

Dynamic daylight simulation:

Daysim:

Original daylight coefficient:

- 145 diffuse daylight coefficients according to Tregenza division of the celestial hemisphere.
- 3 ground daylight coefficients.
- 65 direct daylight coefficients; this number may vary depending on the latitude of the investigated building.



The box in the figure surrounds four representative solar positions which correspond to the actual solar positions at 13:00 and 14:00 solar time on June and April/August 21st

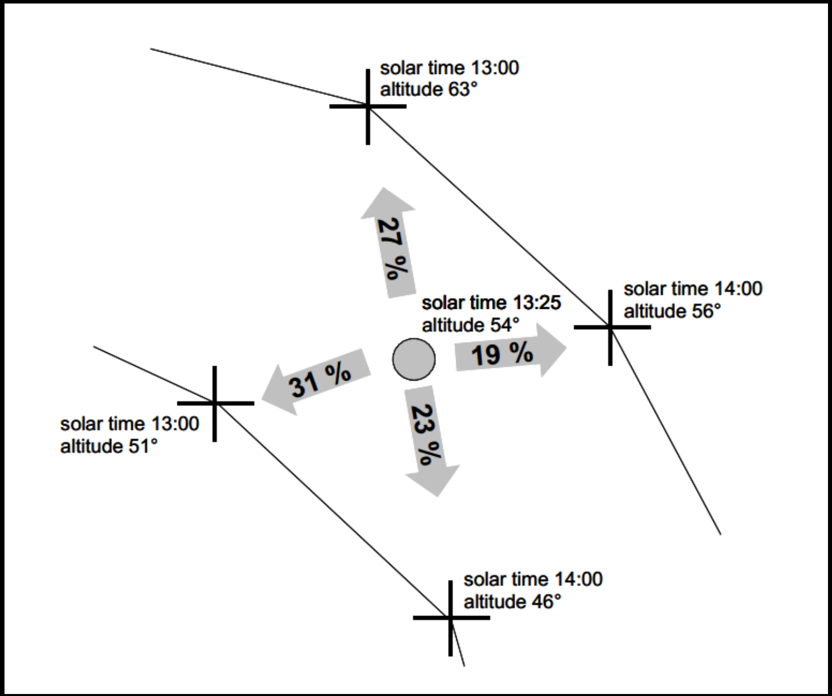
A standard daylight coefficient model for dynamic daylighting simulations, D. Bourgeois, C.F. Reinhart , G. Ward

Dynamic daylight simulation:

Daysim:

Original daylight coefficient:

- 145 diffuse daylight coefficients according to Tregenza division of the celestial hemisphere.
- 3 ground daylight coefficients.
- 65 direct daylight coefficients; this number may vary depending on the latitude of the investigated building.



Visualization of the interpolation algorithm to assign direct solar luminances to the four representative solar positions for Freiburg, Germany (47.98°N). The four crosses correspond to those within the box marked in the figure in the previous page.

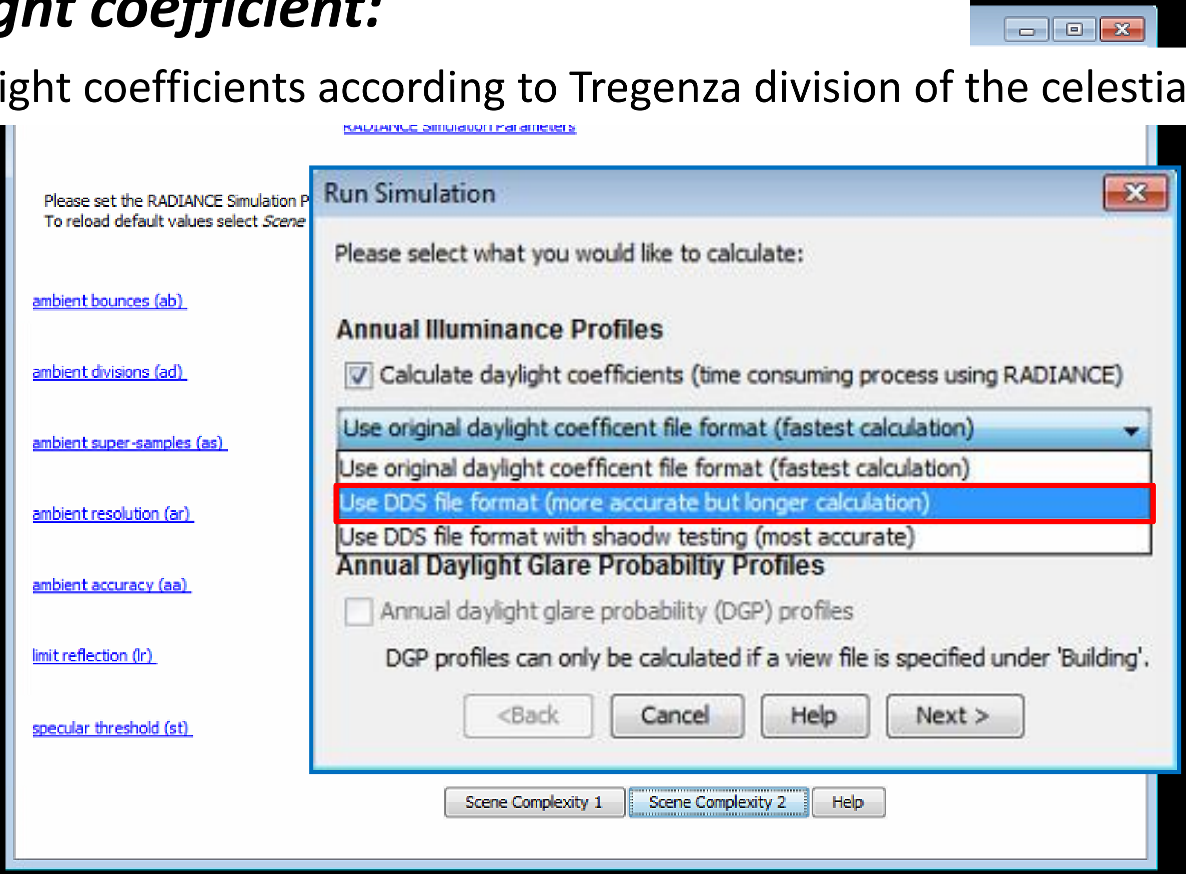
A standard daylight coefficient model for dynamic daylighting simulations, D. Bourgeois, C.F. Reinhart , G. Ward

Dynamic daylight simulation:

Daysim:

Original daylight coefficient:

- 145 diffuse daylight coefficients according to Tregenza division of the celestial hemisphere.

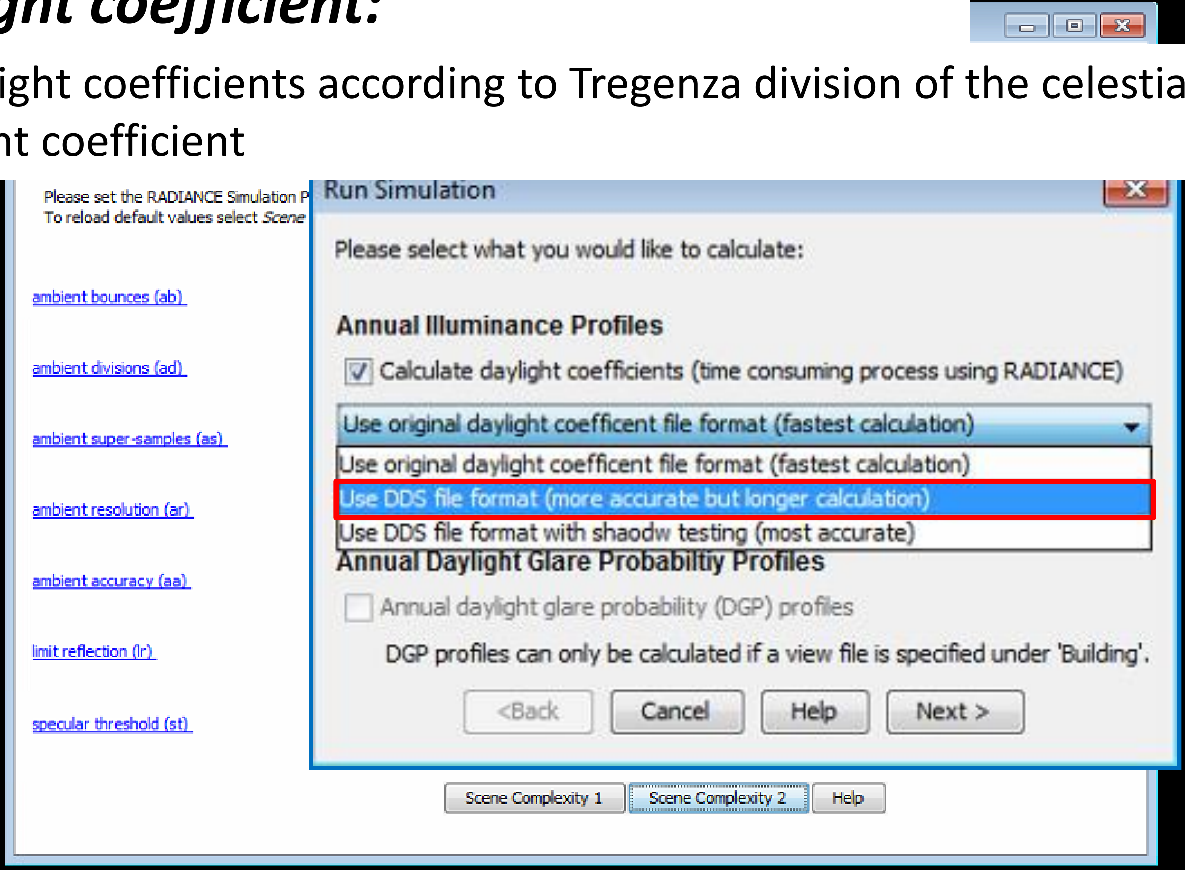


Dynamic daylight simulation:

Daysim:

Original daylight coefficient:

- 145 diffuse daylight coefficients according to Tregenza division of the celestial hemisphere.
- 1 ground daylight coefficient

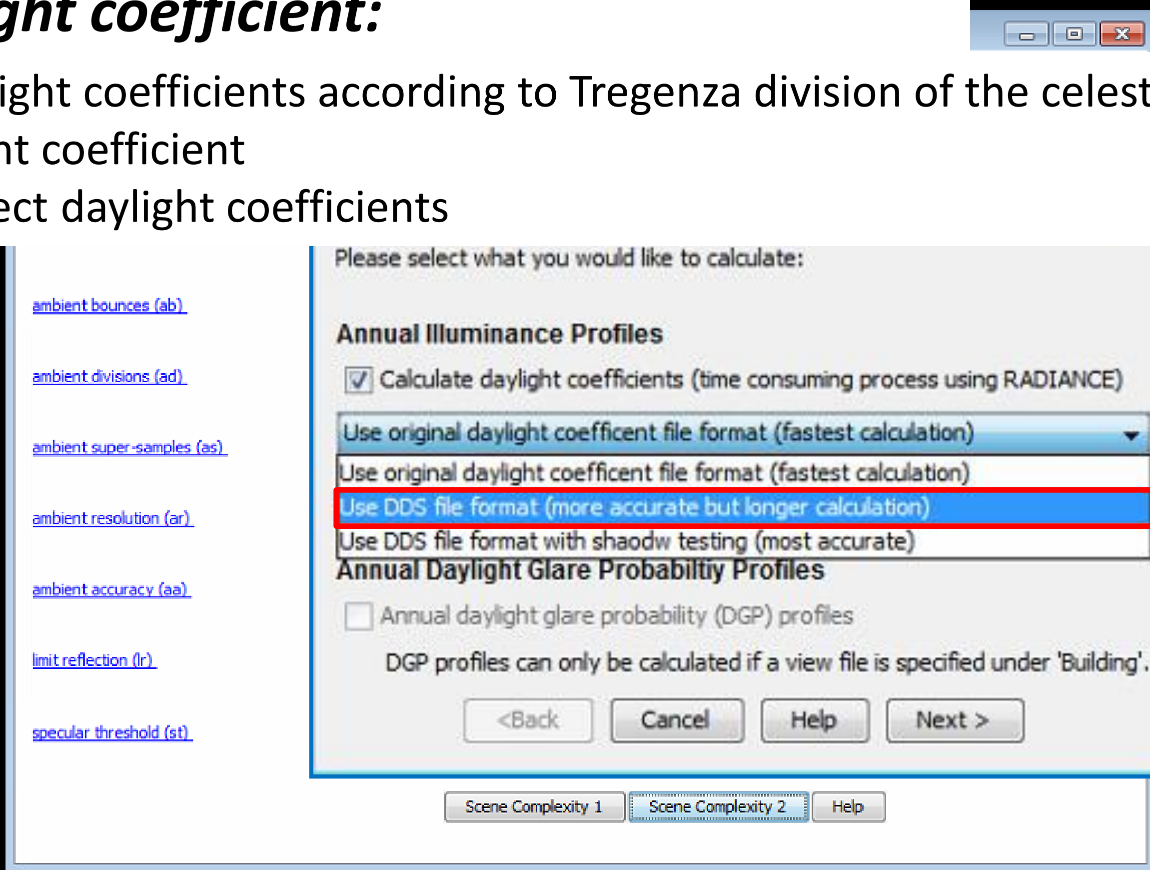


Dynamic daylight simulation:

Daysim:

Original daylight coefficient:

- 145 diffuse daylight coefficients according to Tregenza division of the celestial hemisphere.
- 1 ground daylight coefficient
- 145 direct-indirect daylight coefficients

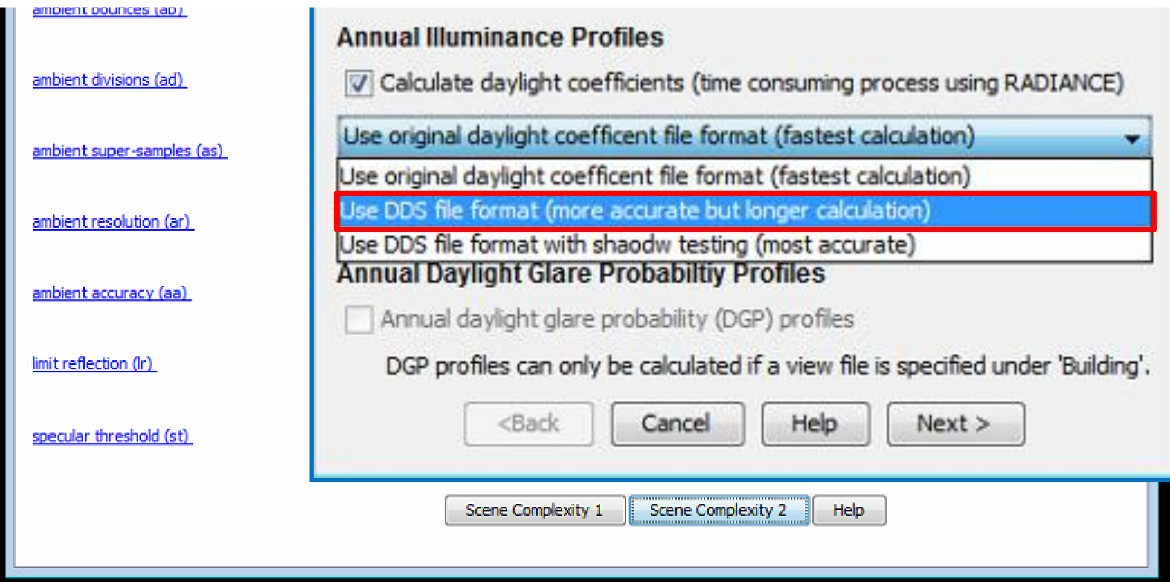


Dynamic daylight simulation:

Daysim:

Original daylight coefficient:

- 145 diffuse daylight coefficients according to Tregenza division of the celestial hemisphere.
- 1 ground daylight coefficient
- 145 direct-indirect daylight coefficients
- 2305 direct-direct daylight coefficients

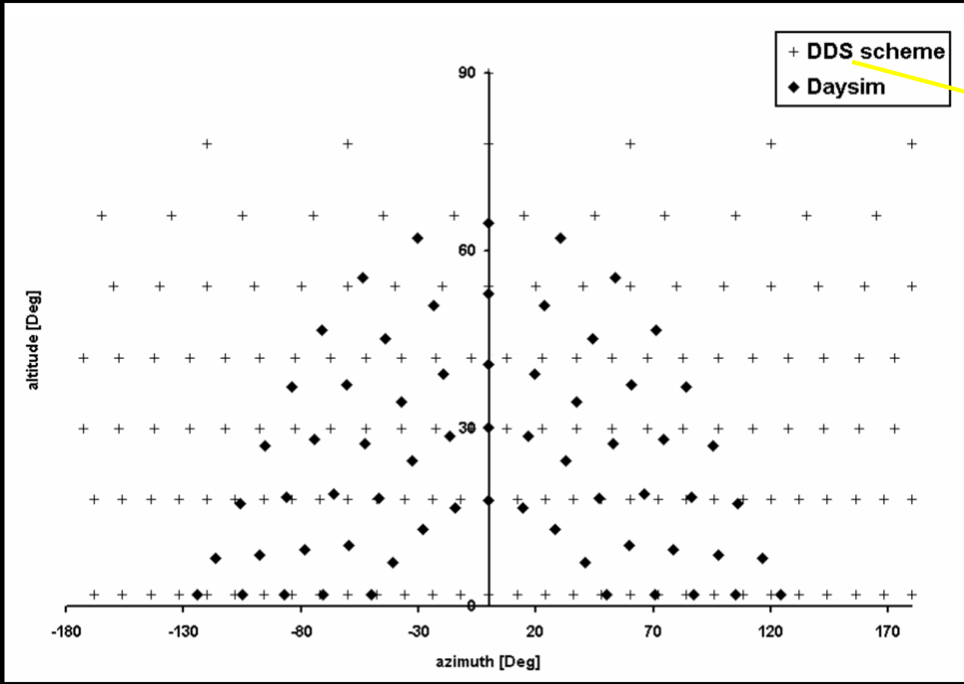


Dynamic daylight simulation:

Daysim:

Original daylight coefficient:

- 145 diffuse daylight coefficients according to Tregenza division of the celestial hemisphere.
- 1 ground daylight coefficient
- 145 direct-indirect daylight coefficients
- 2305 direct-direct daylight coefficients



latitude and orientation independent

Comparison of the distribution of DDS indirect solar positions versus the 65 Daysim altitude-dependent solar positions for Freiburg (47.98 °N)

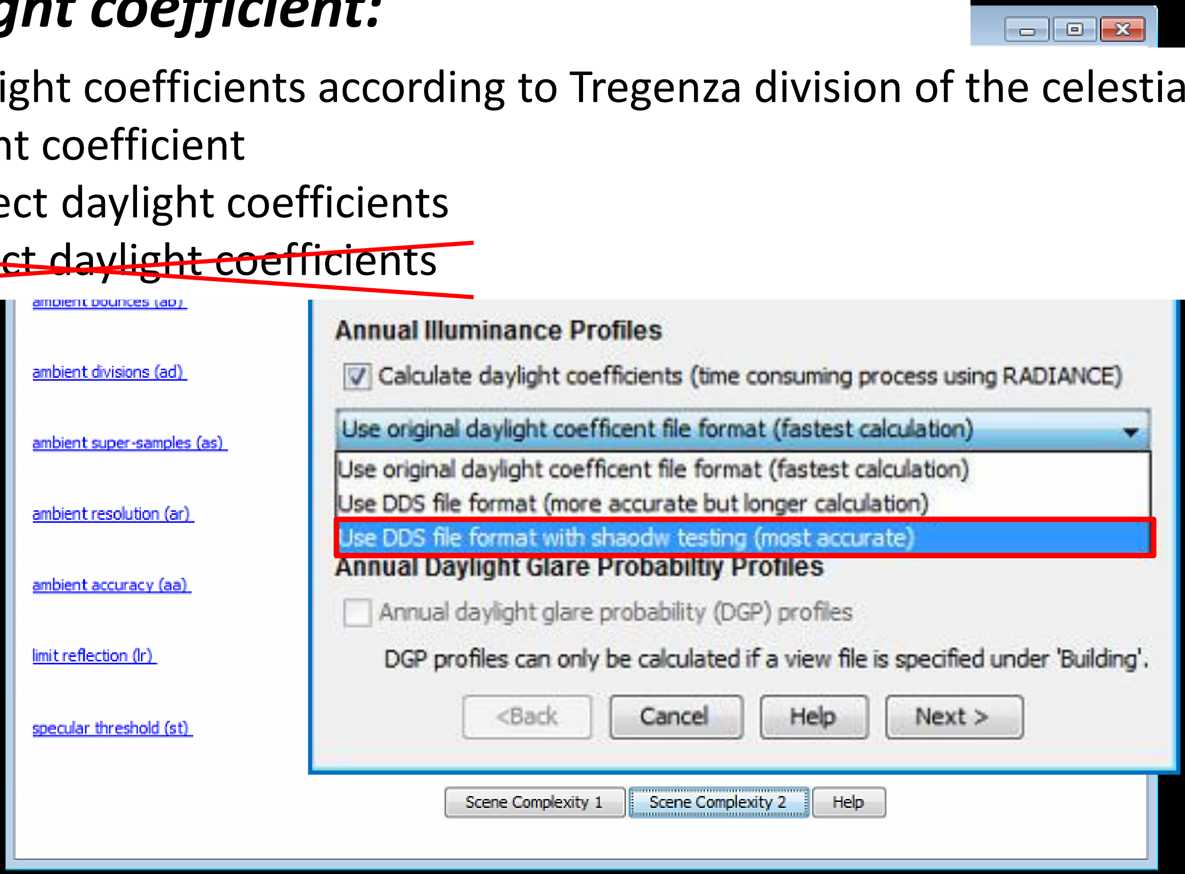
A standard daylight coefficient model for dynamic daylighting simulations, D. Bourgeois, C.F. Reinhart , G. Ward

Dynamic daylight simulation:

Daysim:

Original daylight coefficient:

- 145 diffuse daylight coefficients according to Tregenza division of the celestial hemisphere.
- 1 ground daylight coefficient
- 145 direct-indirect daylight coefficients
- ~~2305 direct-direct daylight coefficients~~

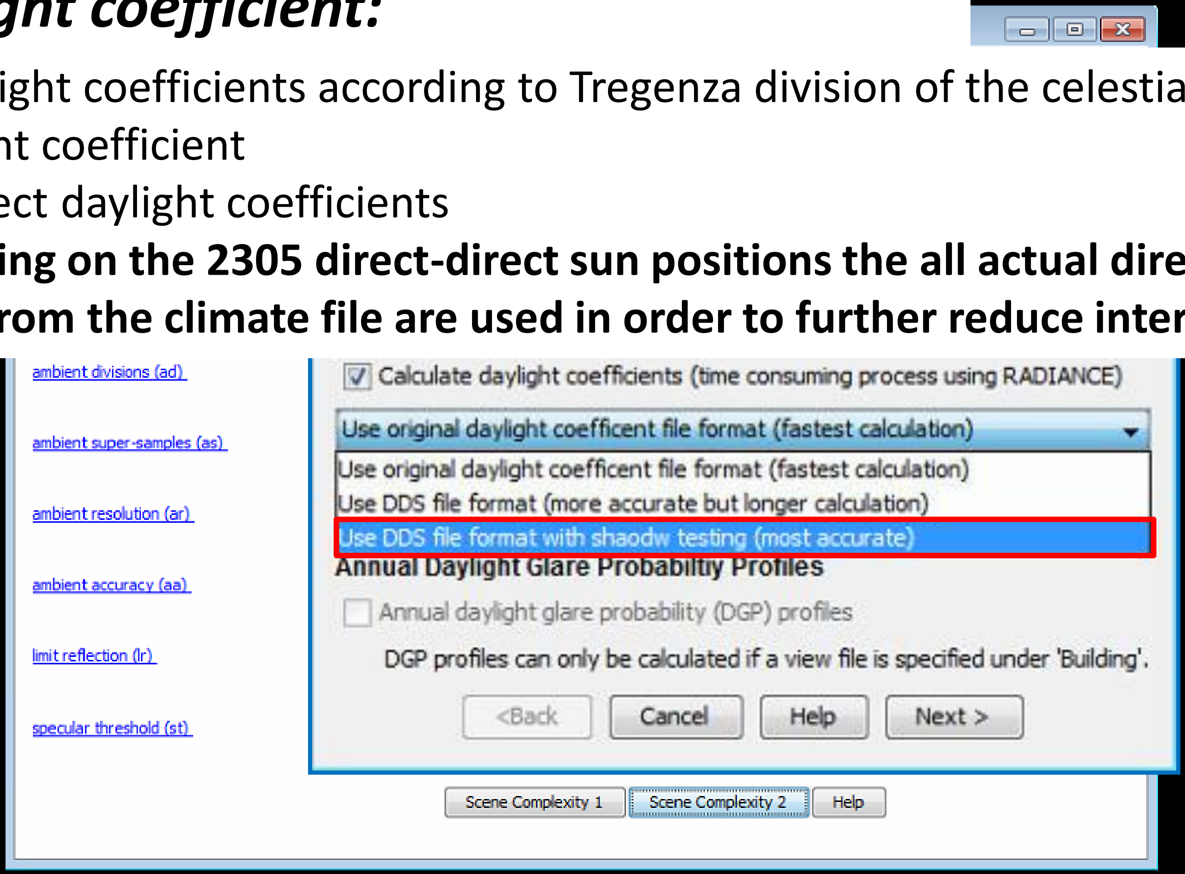


Dynamic daylight simulation:

Daysim:

Original daylight coefficient:

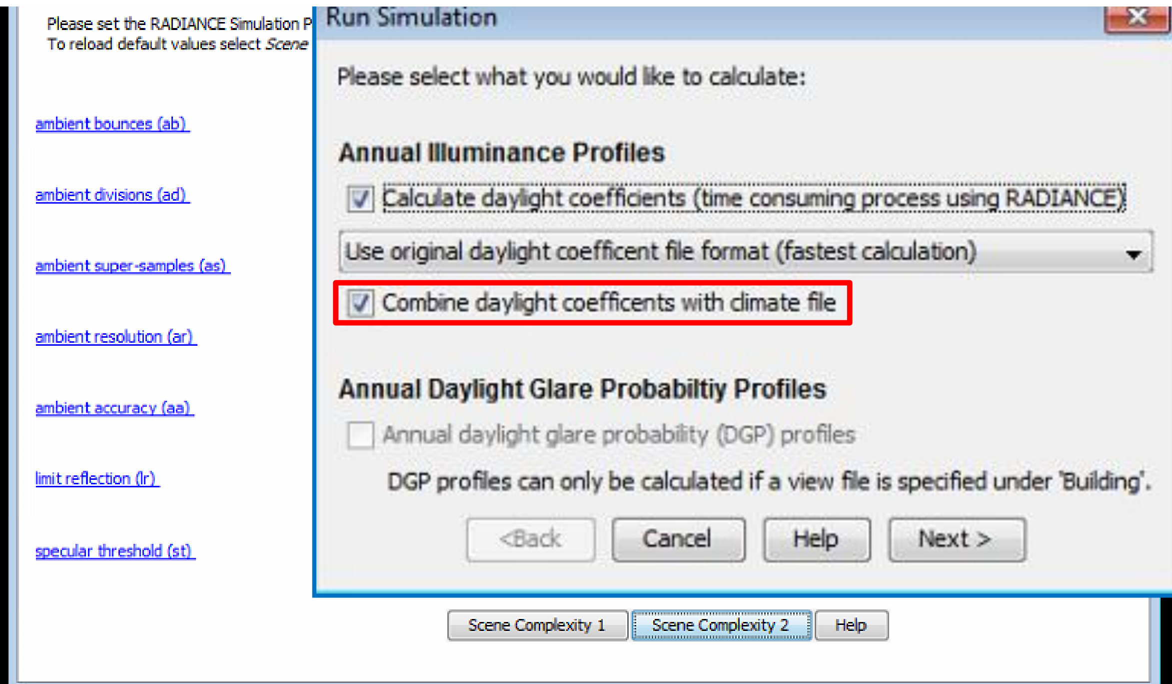
- 145 diffuse daylight coefficients according to Tregenza division of the celestial hemisphere.
- 1 ground daylight coefficient
- 145 direct-indirect daylight coefficients
- **Instead of relaying on the 2305 direct-direct sun positions the all actual direct sun positions that are taken from the climate file are used in order to further reduce interpolation errors.**



Dynamic daylight simulation:

Daysim:

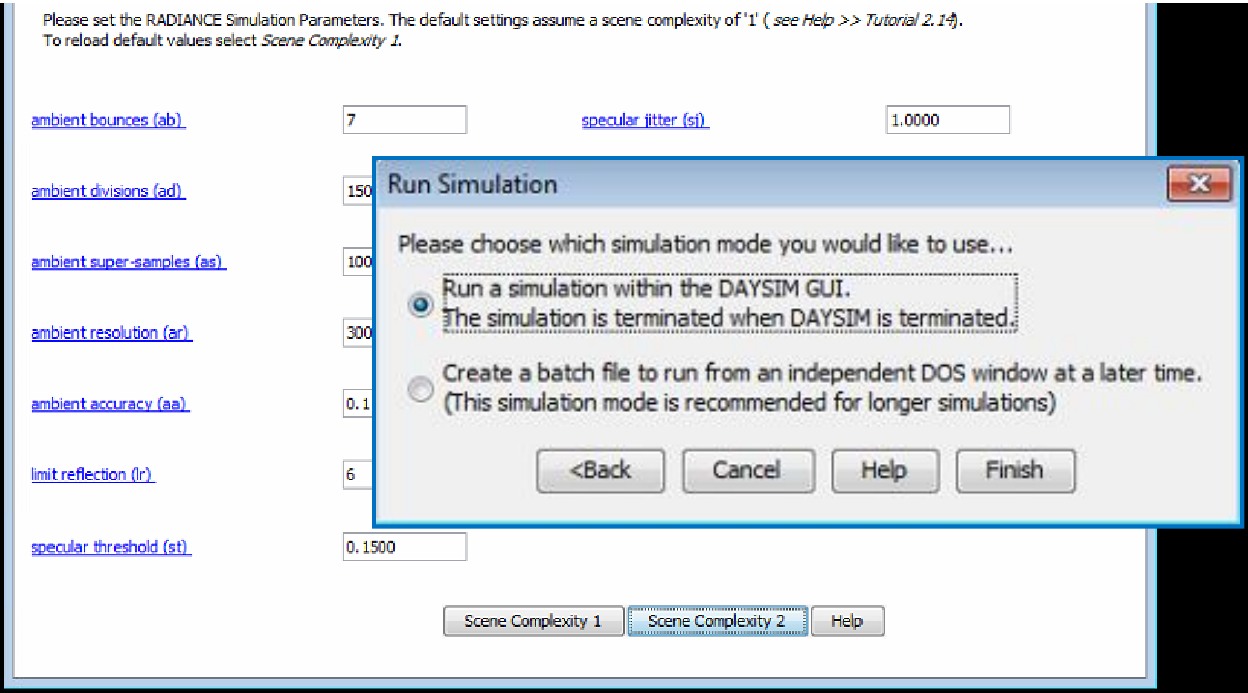
It combines the daylight coefficients with the project climate file to yield annual indoor illuminance profiles for all sensor points.



Dynamic daylight simulation:

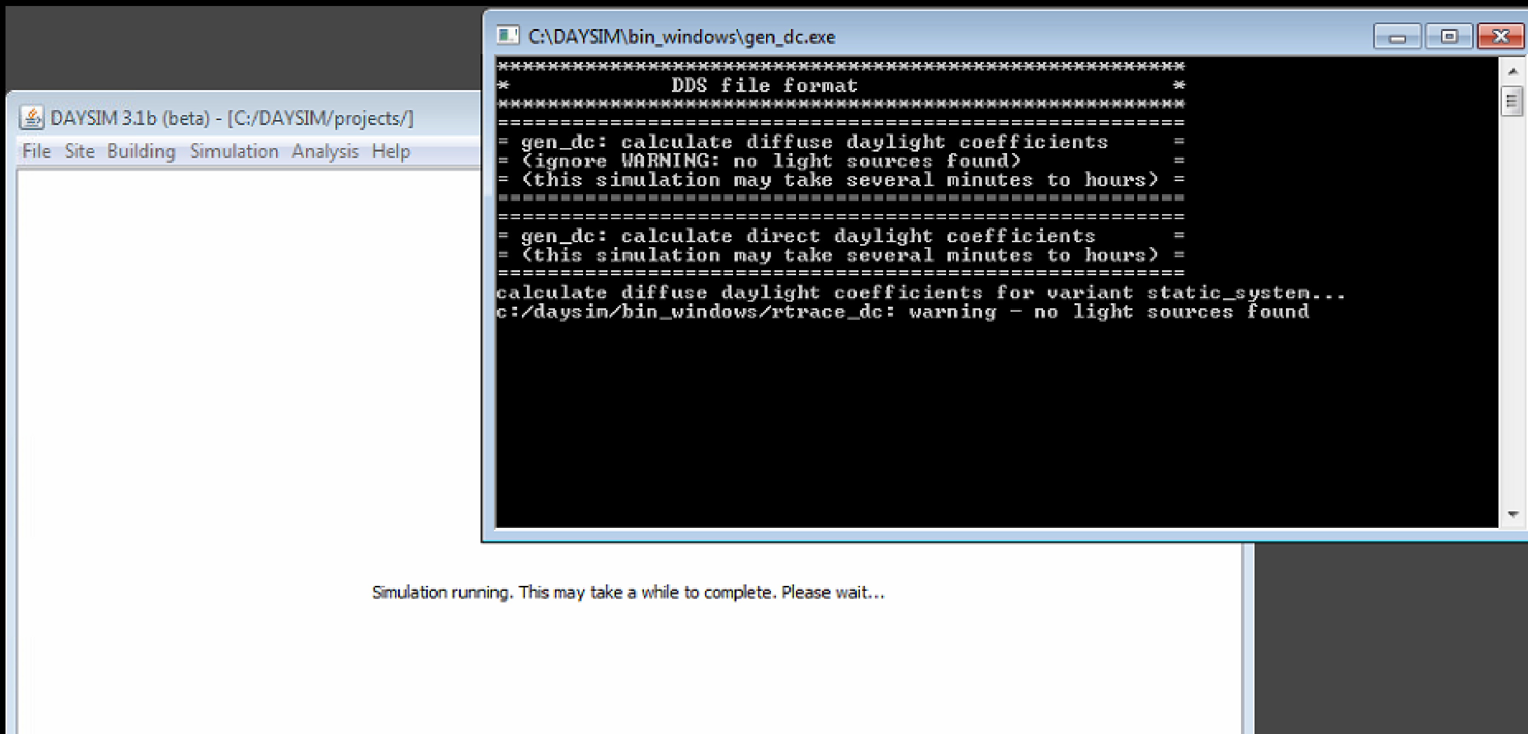
Daysim:

These options allow us to start the simulation either from within the DAYSIM GUI or independently as a batch file.



Dynamic daylight simulation:

Daysim:

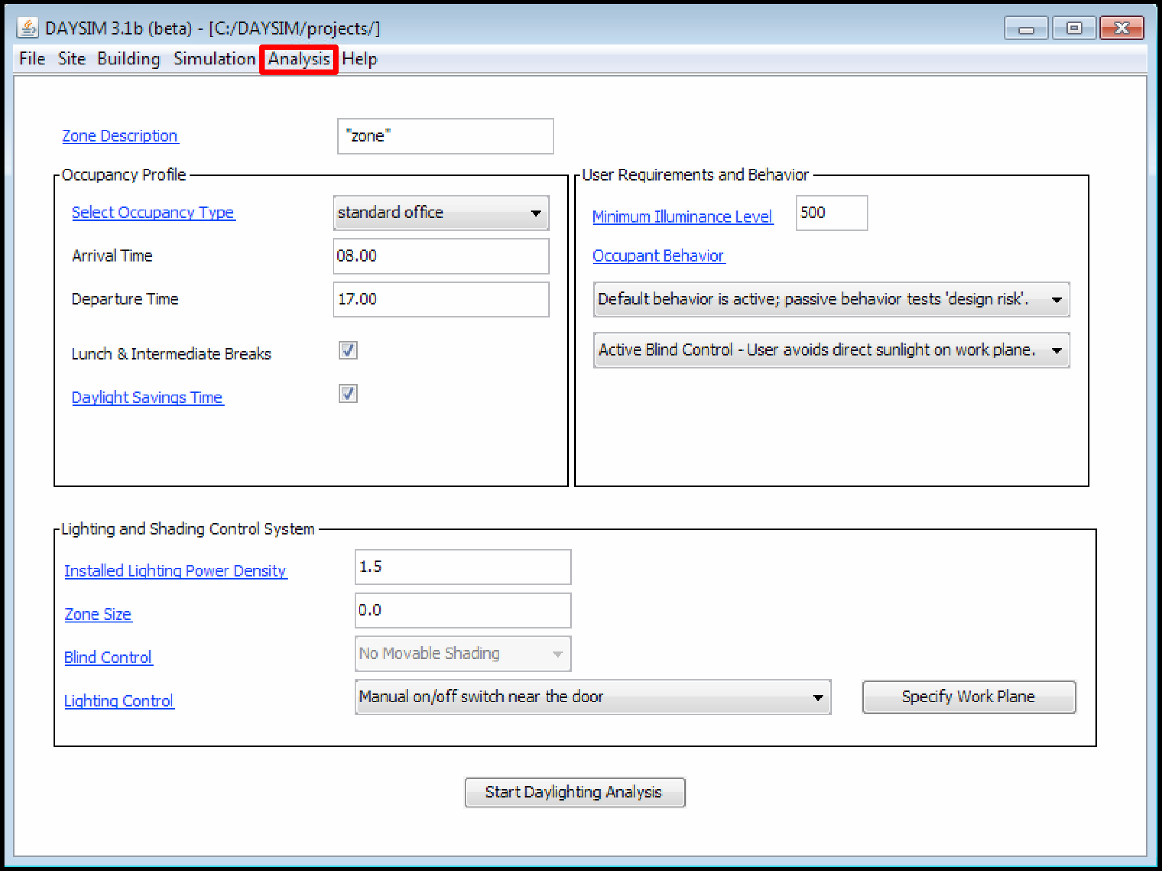


Any increase in direct solar discretisation resolution, the number of sensors or time step frequency increases calculation time, in some cases quite substantially, and so should be consistent with respect to the simulation objective.

Simulation running. This may take a while to complete. Please wait…

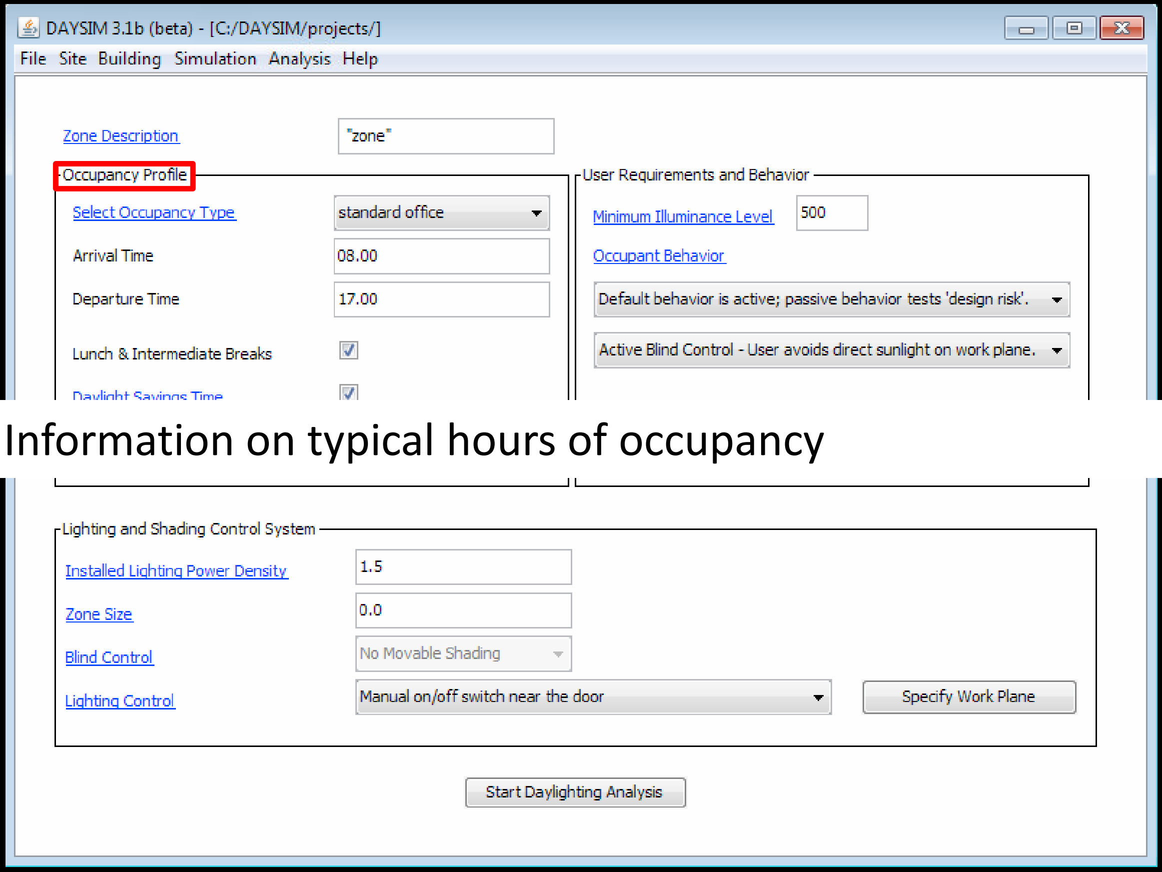
Dynamic daylight simulation:

Daysim:



Dynamic daylight simulation:

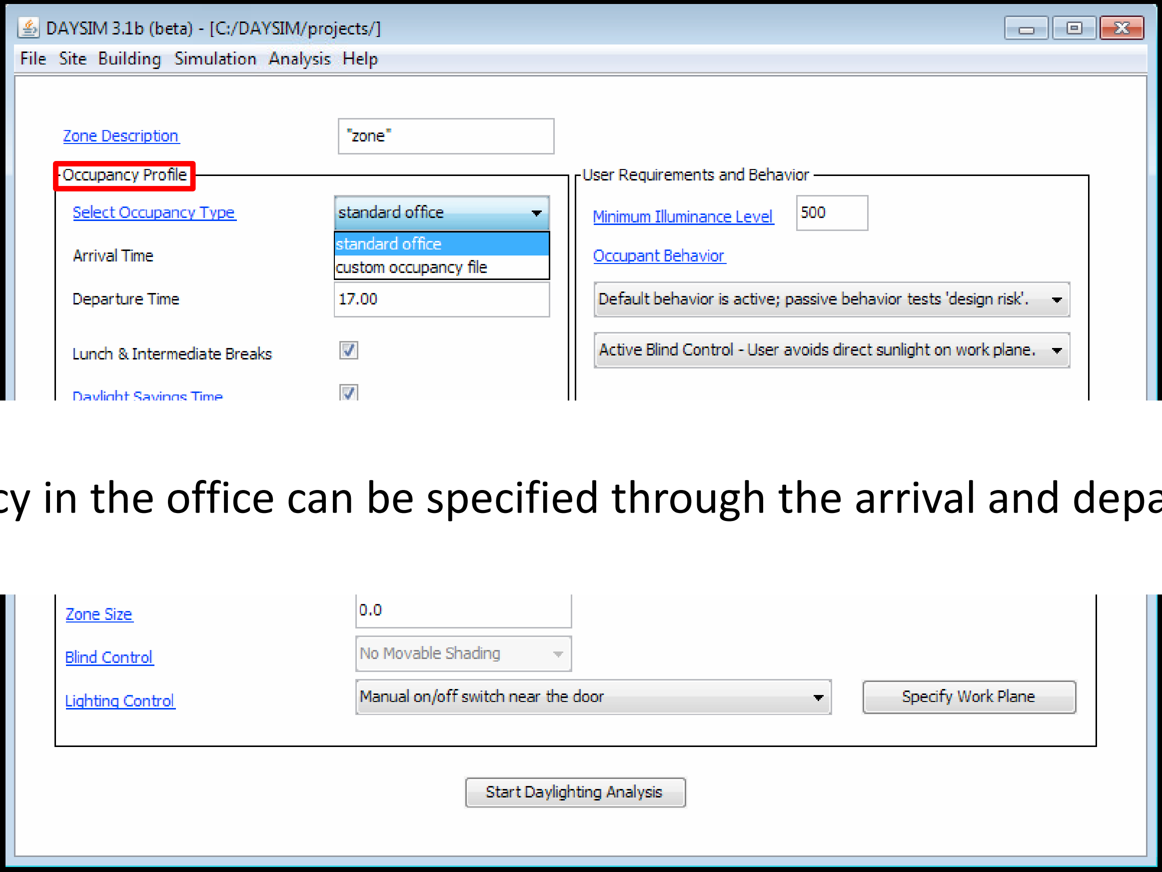
Daysim:



Occupancy Profile: Information on typical hours of occupancy

Dynamic daylight simulation:

Daysim:

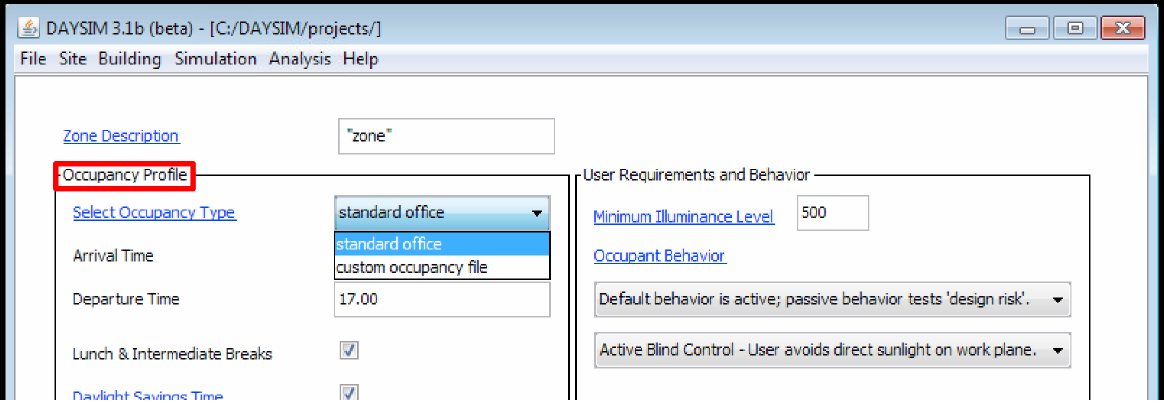


Standard office:

User occupancy in the office can be specified through the arrival and departure time on week days.

Dynamic daylight simulation:

Daysim:

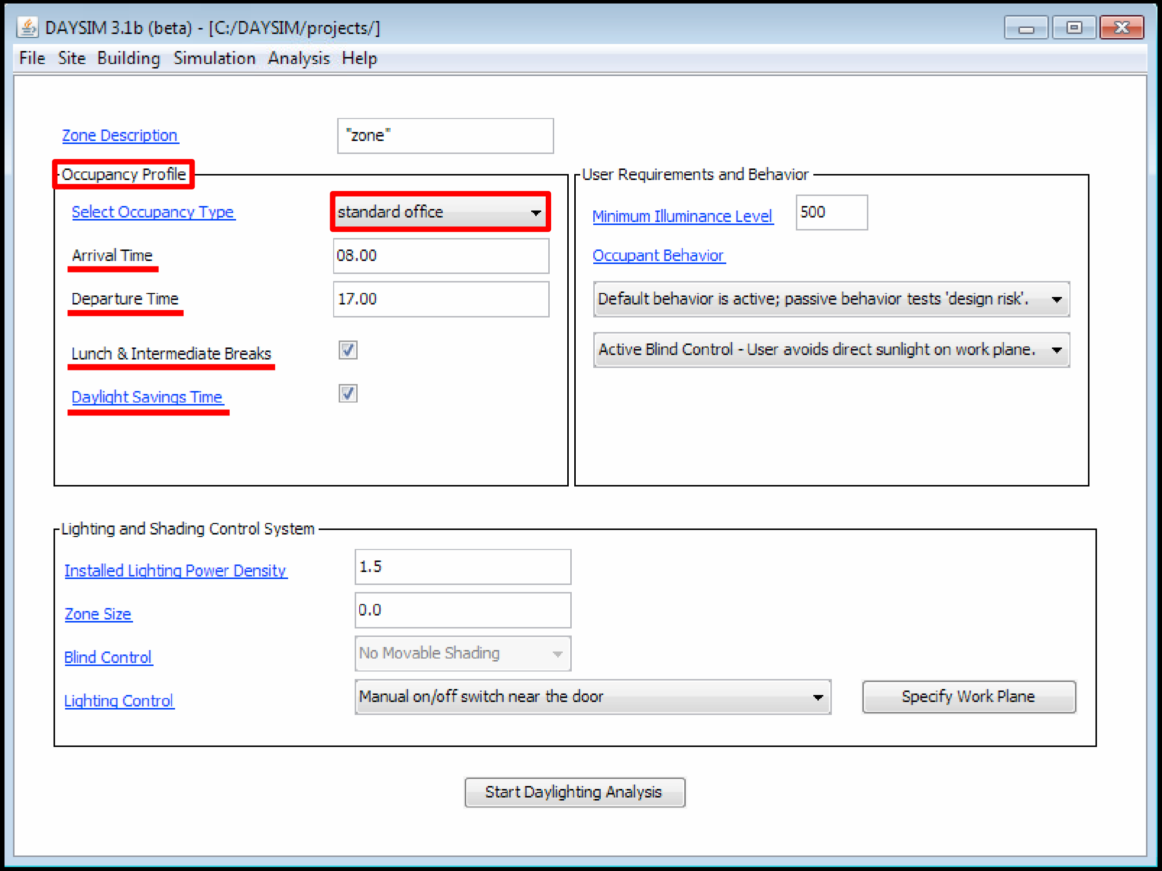


Model Assumptions

- The model assumes that the work place is only occupied on weekdays, i.e. Monday to Friday.
- The user arrives and leaves for the day within a plus/minus 15 minutes with respect to the input arrival and departure times.
- If the working day is less than 3 hours long, the user leaves the work place once for a 15 minute break.
- If the working day is between 3 and 6 hours leaves, the user leaves the work place twice for 15 minute breaks.
- If the working day is longer than 6 hours, the user leaves for two 15 minute breaks and a 60 minute lunch break.
- Daylight savings time start on April 1st and ends on October 31st. Example

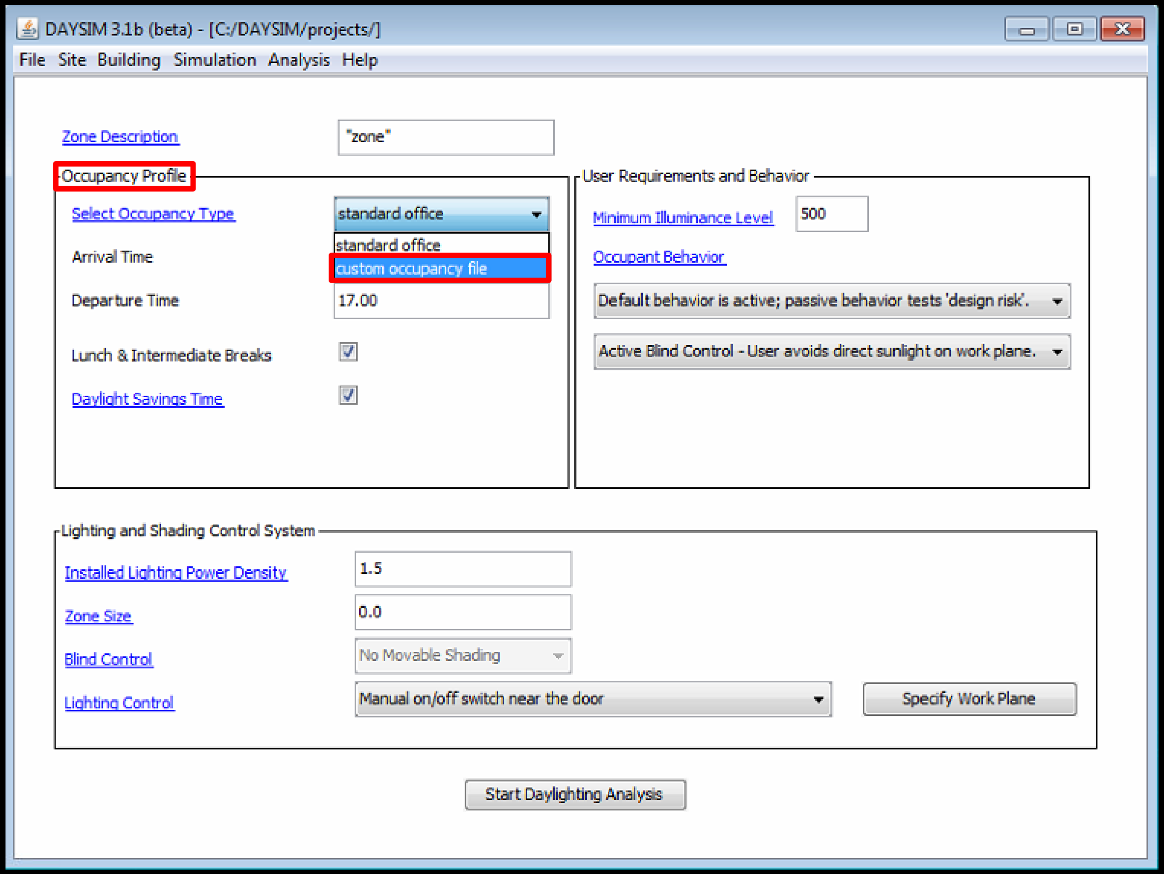
Dynamic daylight simulation:

Daysim:



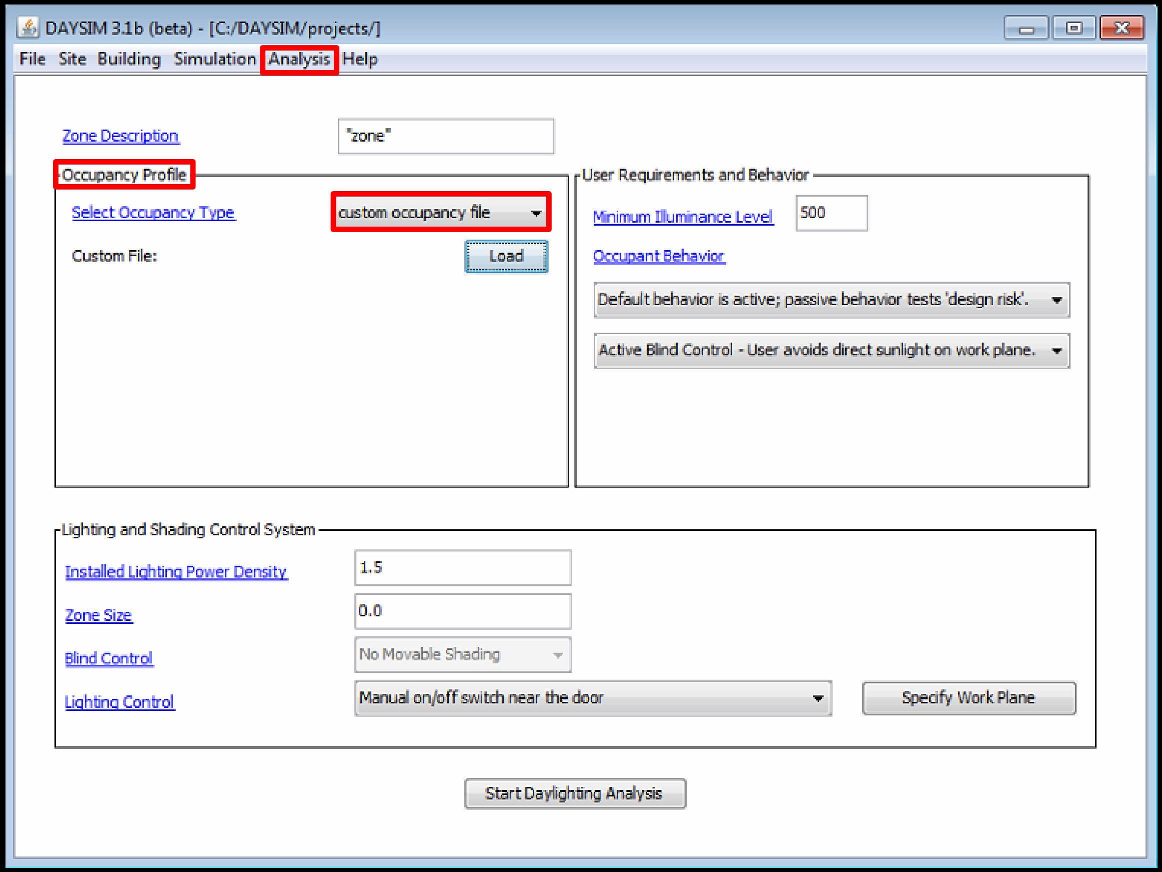
Dynamic daylight simulation:

Daysim:



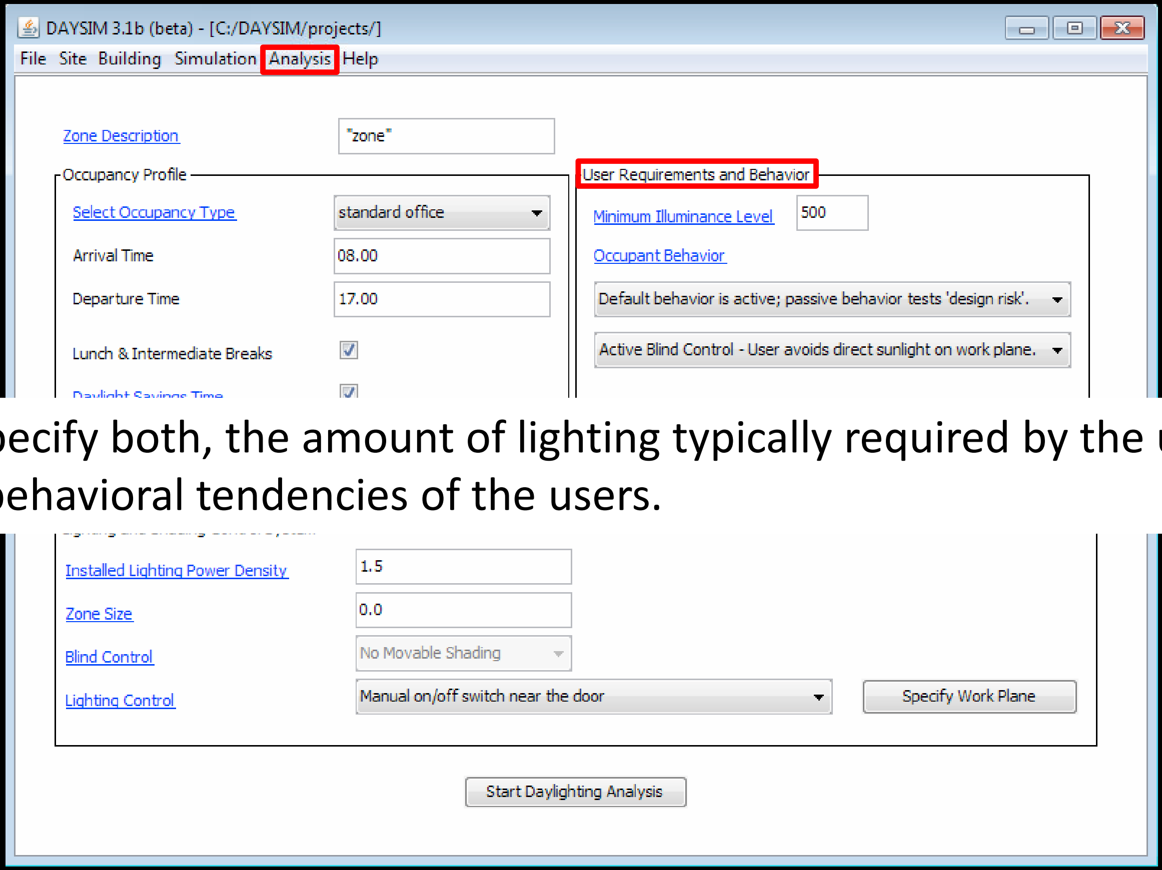
Dynamic daylight simulation:

Daysim:



Dynamic daylight simulation:

Daysim:



Here we need to specify both, the amount of lighting typically required by the users of the space as well as general behavioral tendencies of the users.

Dynamic daylight simulation:

Daysim:

Active User:

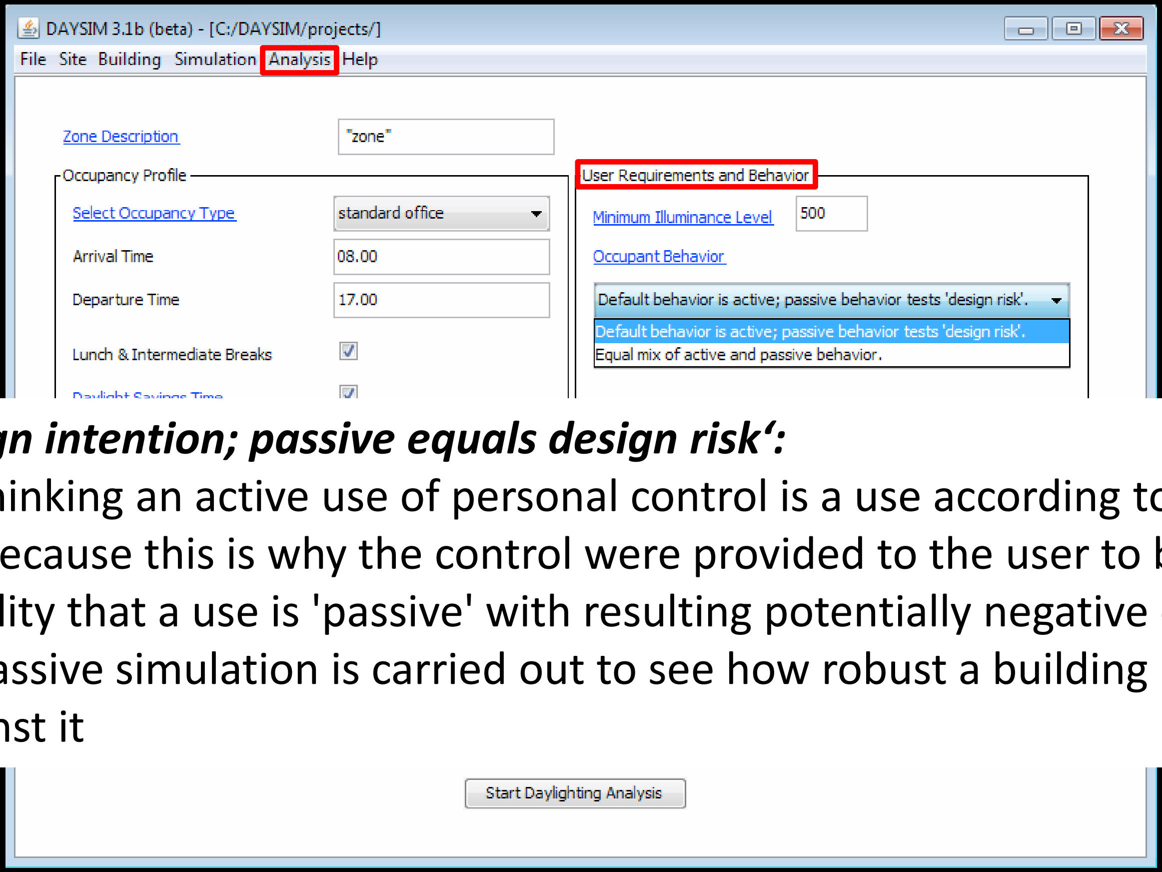
An active user is who opens the blinds in the morning and after a lunch break (or just in the morning) and close them either when direct sunlight is incident on the workplace or predicted DGP (Daylight Glare Probability) becomes disturbing.

Passive User:

A passive user is who keeps the blinds lowered throughout the year.

Dynamic daylight simulation:

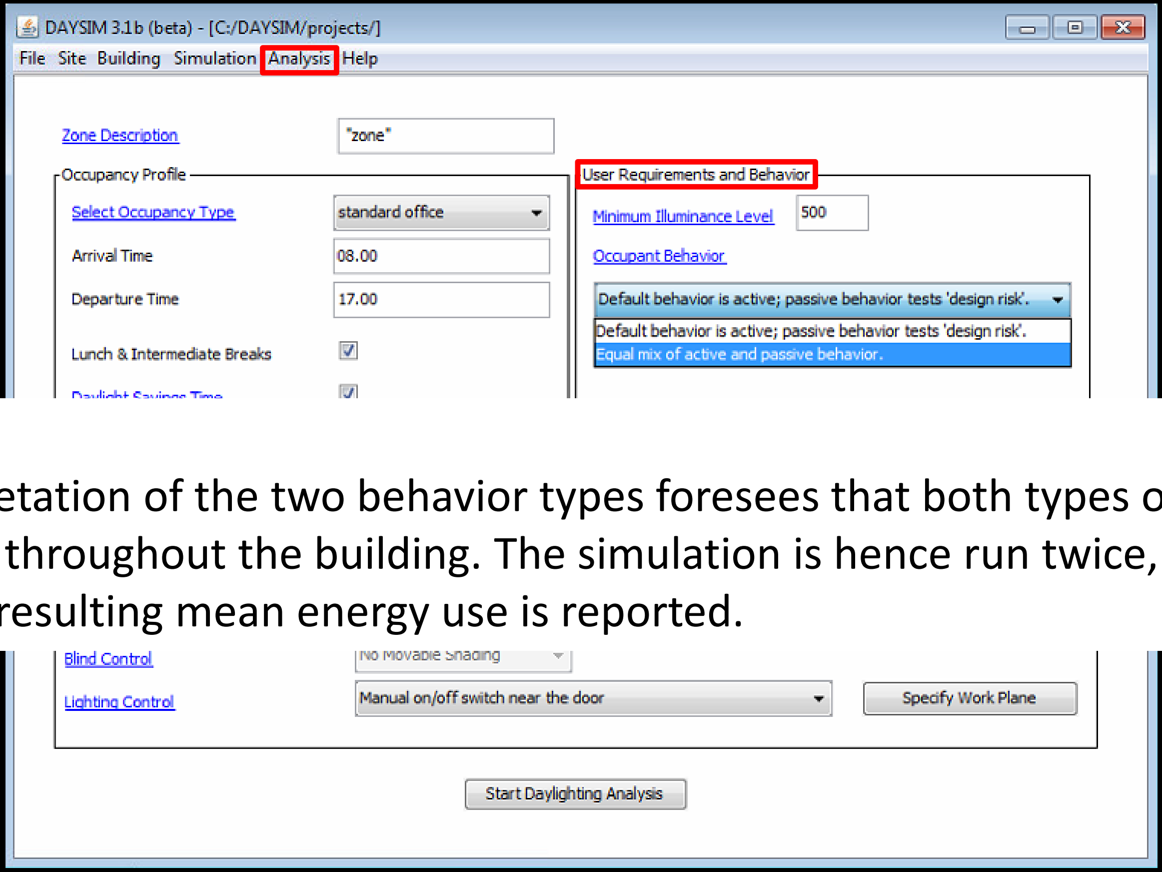
Daysim:



Active equals design intention; passive equals design risk':
According to this thinking an active use of personal control is a use according to the original design intentions because this is why the control were provided to the user to begin with. As there is the possibility that a use is 'passive' with resulting potentially negative energy implications, the passive simulation is carried out to see how robust a building design is against users working against it

Dynamic daylight simulation:

Daysim:

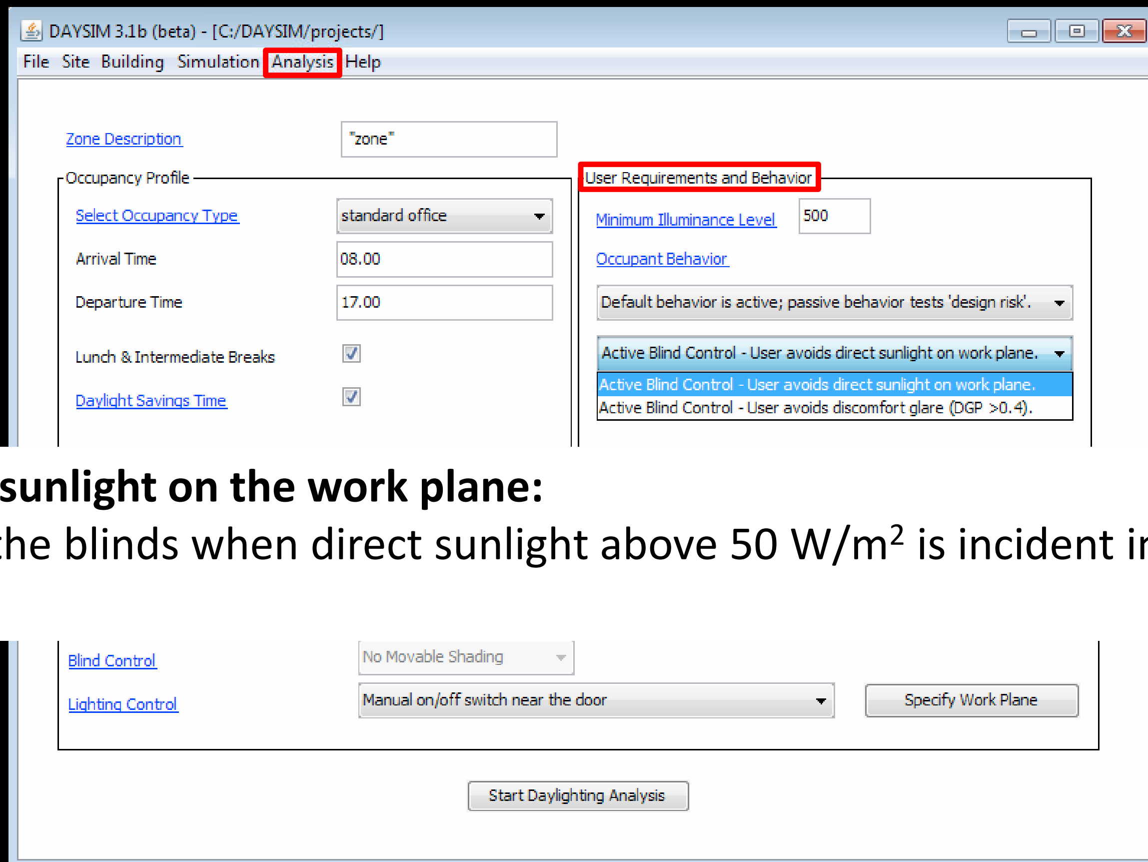


Mixed use:

This (older) interpretation of the two behavior types foresees that both types of users will be equally distributed throughout the building. The simulation is hence run twice, once for each user type, and the resulting mean energy use is reported.

Dynamic daylight simulation:

Daysim:

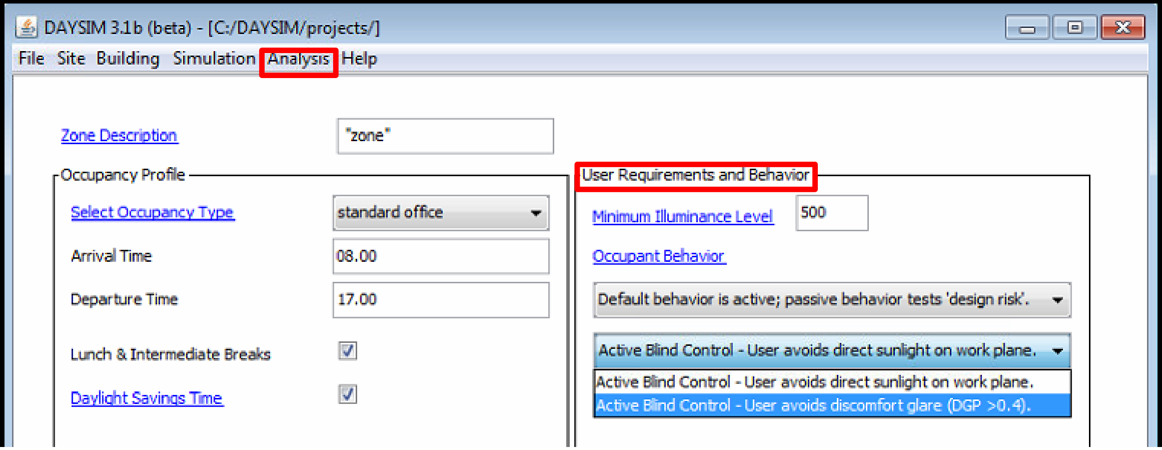


User avoids direct sunlight on the work plane:

A user that closes the blinds when direct sunlight above 50 W/m^2 is incident in the work plane sensors.

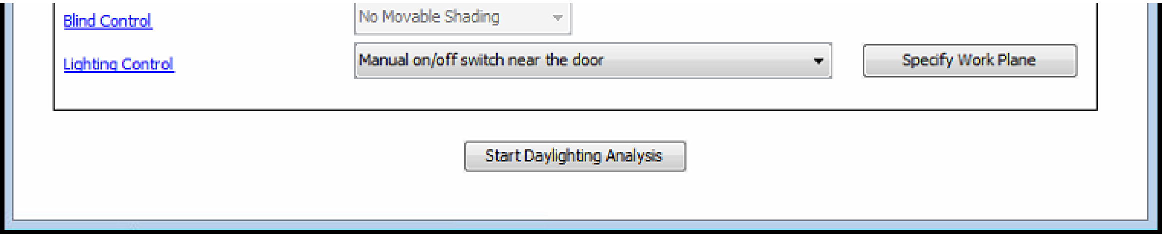
Dynamic daylight simulation:

Daysim:



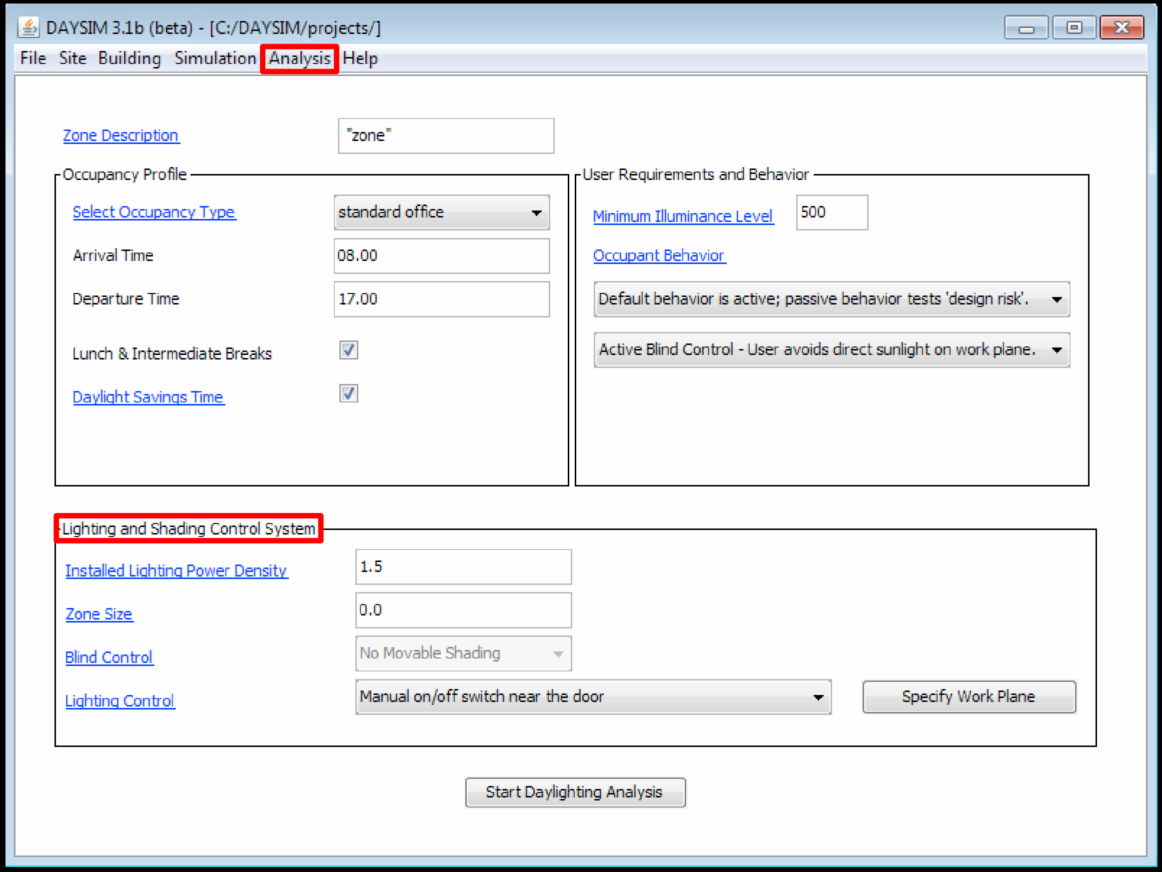
User avoids discomfort glare (DGP > 0.4):

A user that closes the blinds when the daylight glare probability at the user's typical view point exceeds 40%.



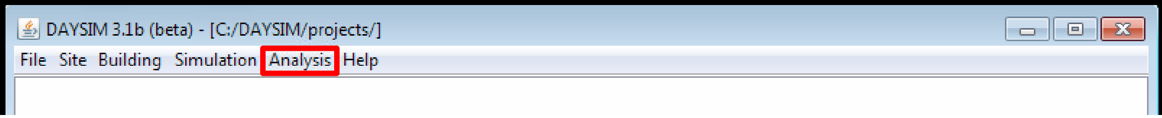
Dynamic daylight simulation:

Daysim:



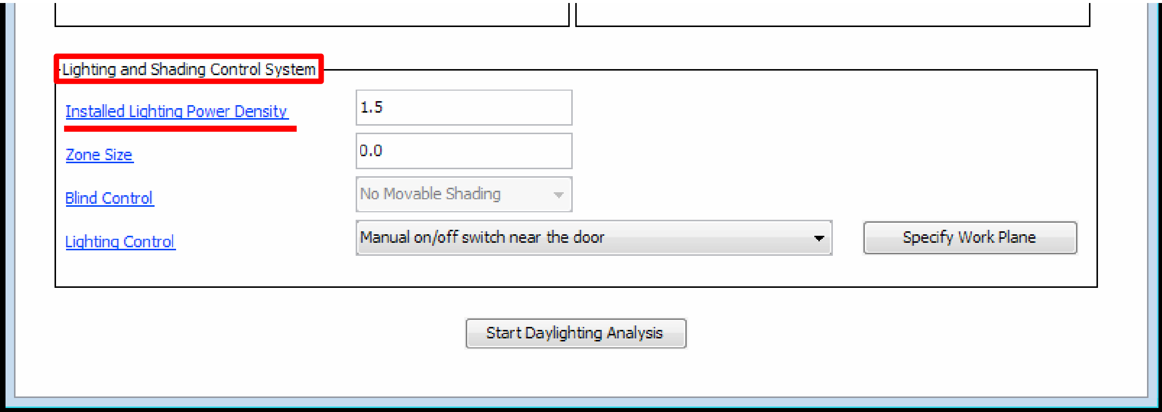
Dynamic daylight simulation:

Daysim:



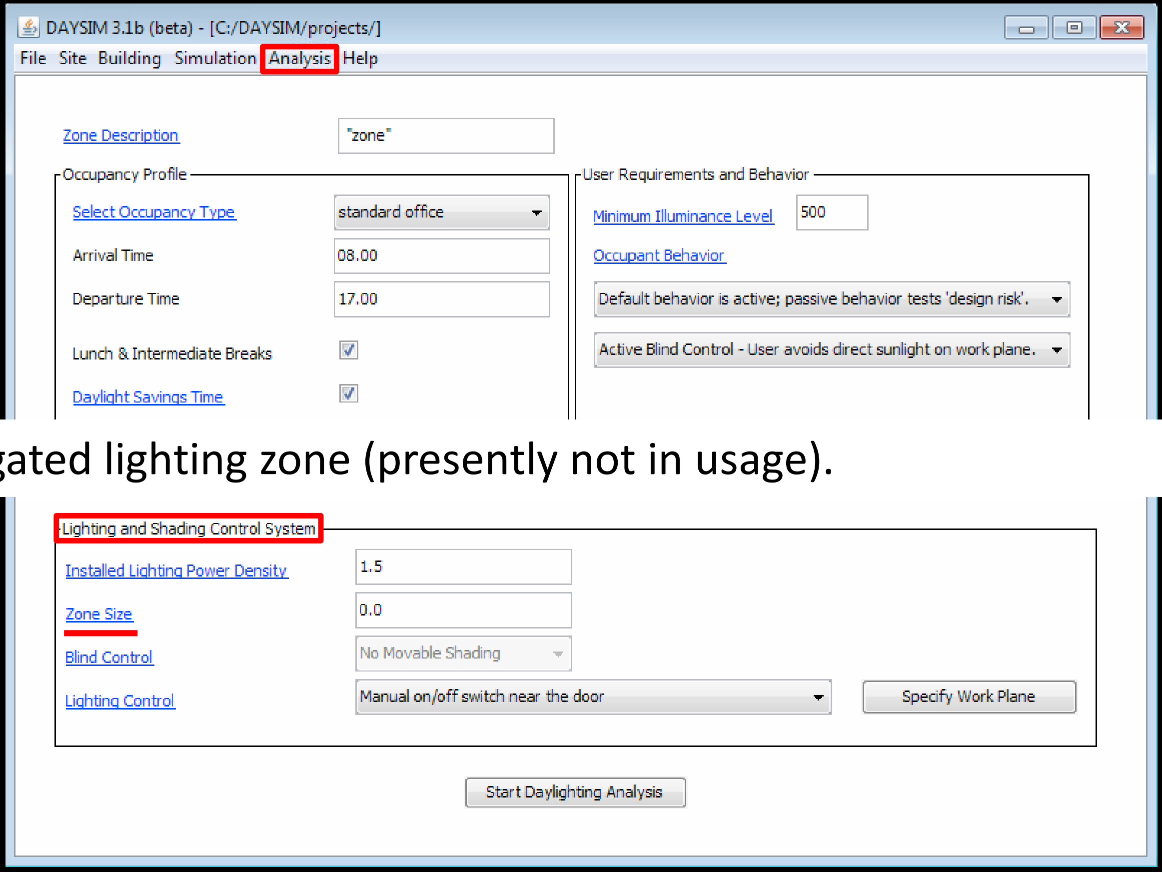
The ***installed electric lighting power*** corresponds to the power requirement at full lighting output of all luminaries in an office. It is measured in Watt.

Example
The electric lighting system in an example office consists of four direct/indirect Louvre luminaries with 2 x T5 35W lamps. The resulting installed power for electric lighting without lighting controls is 4 x 2 x 35 W =280 W



Dynamic daylight simulation:

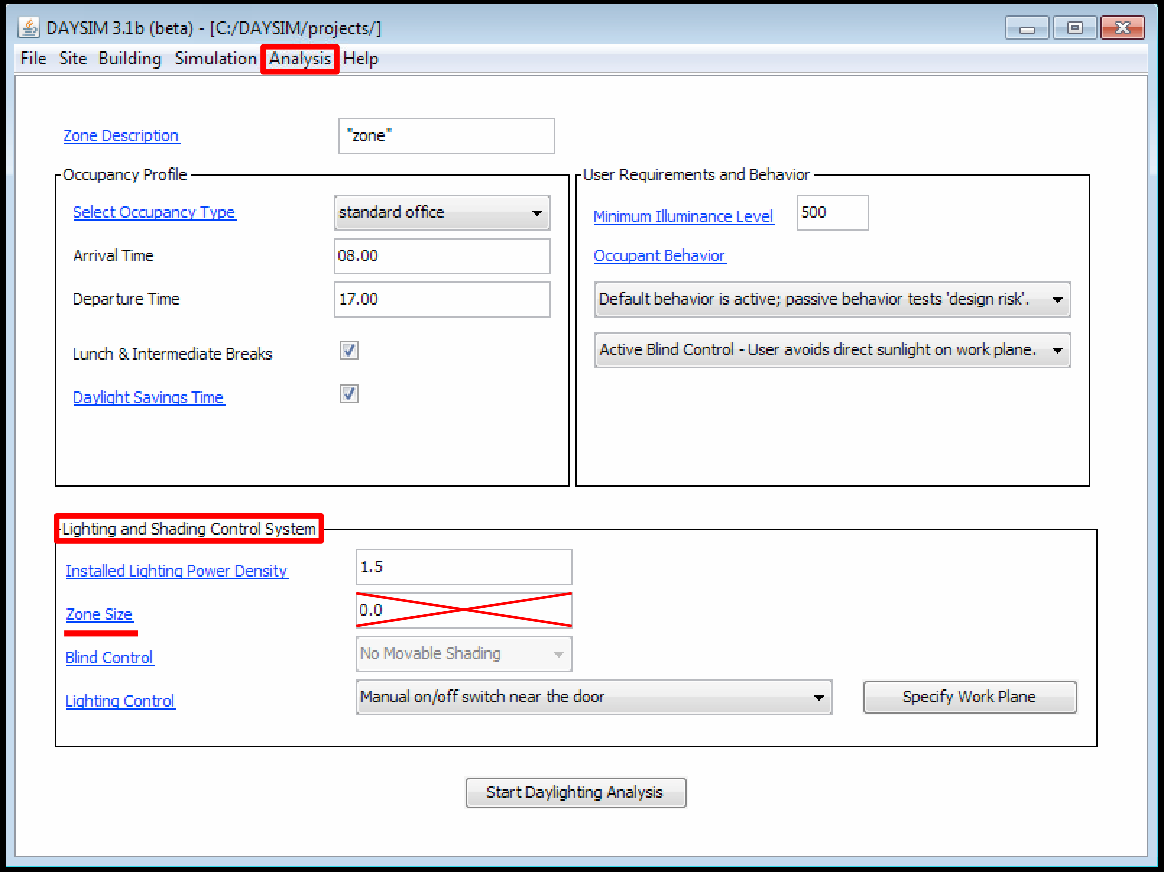
Daysim:



Area of the investigated lighting zone (presently not in usage).

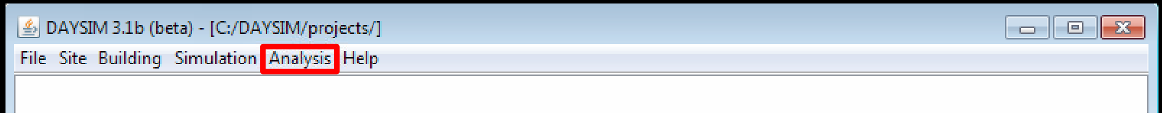
Dynamic daylight simulation:

Daysim:

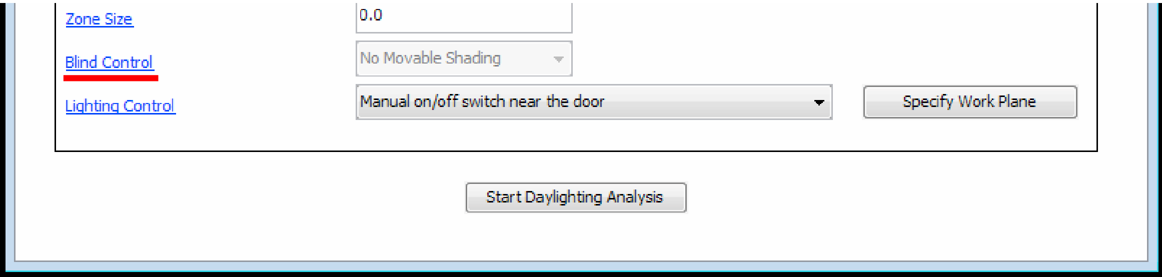


Dynamic daylight simulation:

Daysim:

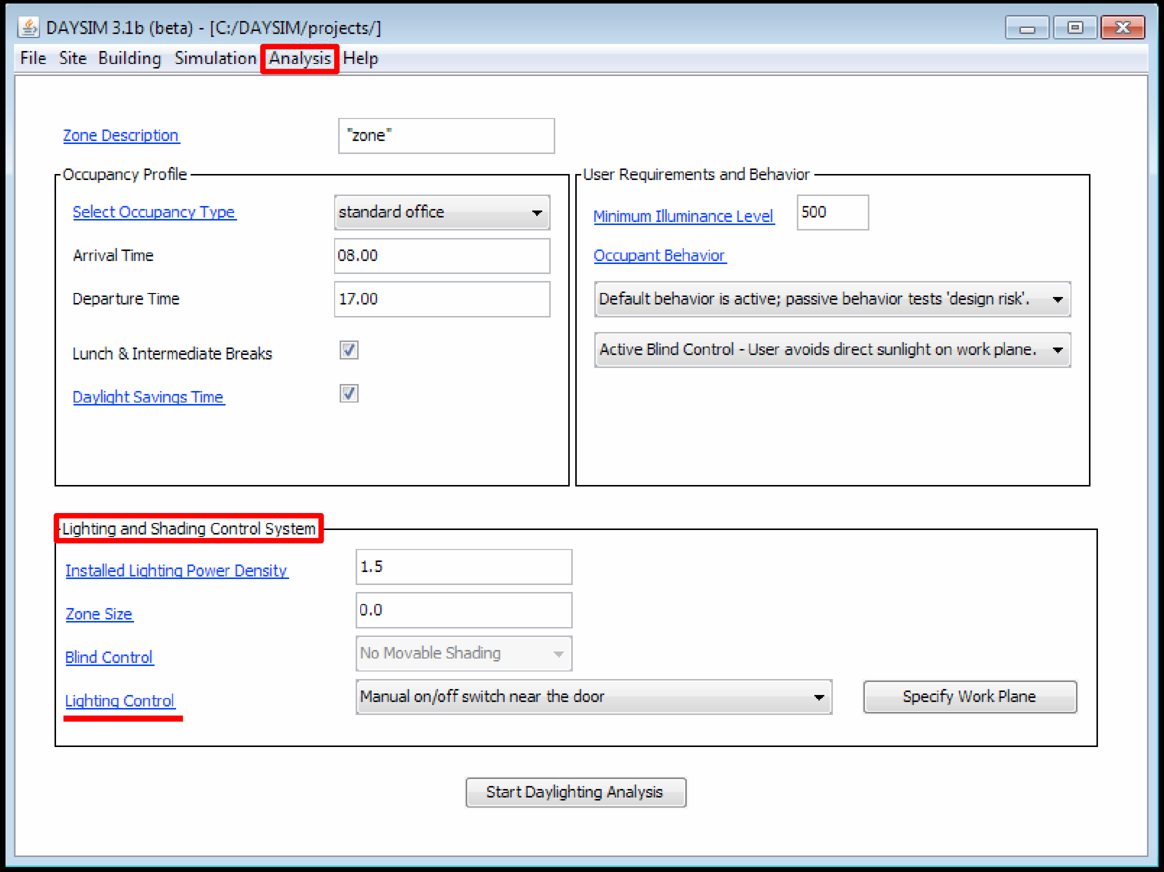


Manually Operated Blinds: For a manually operated blinds, it depends on how and when building occupants are adjusting them (based on having passive or active users).
Automated Blinds: Ideally commissioned automated blind system. The blinds are fully lowered to avoid glare as soon as direct sunlight above 50 W/m^2 hits the work place. The blinds are re-opened as soon as the glare criteria is no longer met.
No Blinds: This scenario is unrealistic in most office settings as blinds or comparable devices are usually necessary to provide glare protection from direct sunlight. Please choose this option thoughtfully.



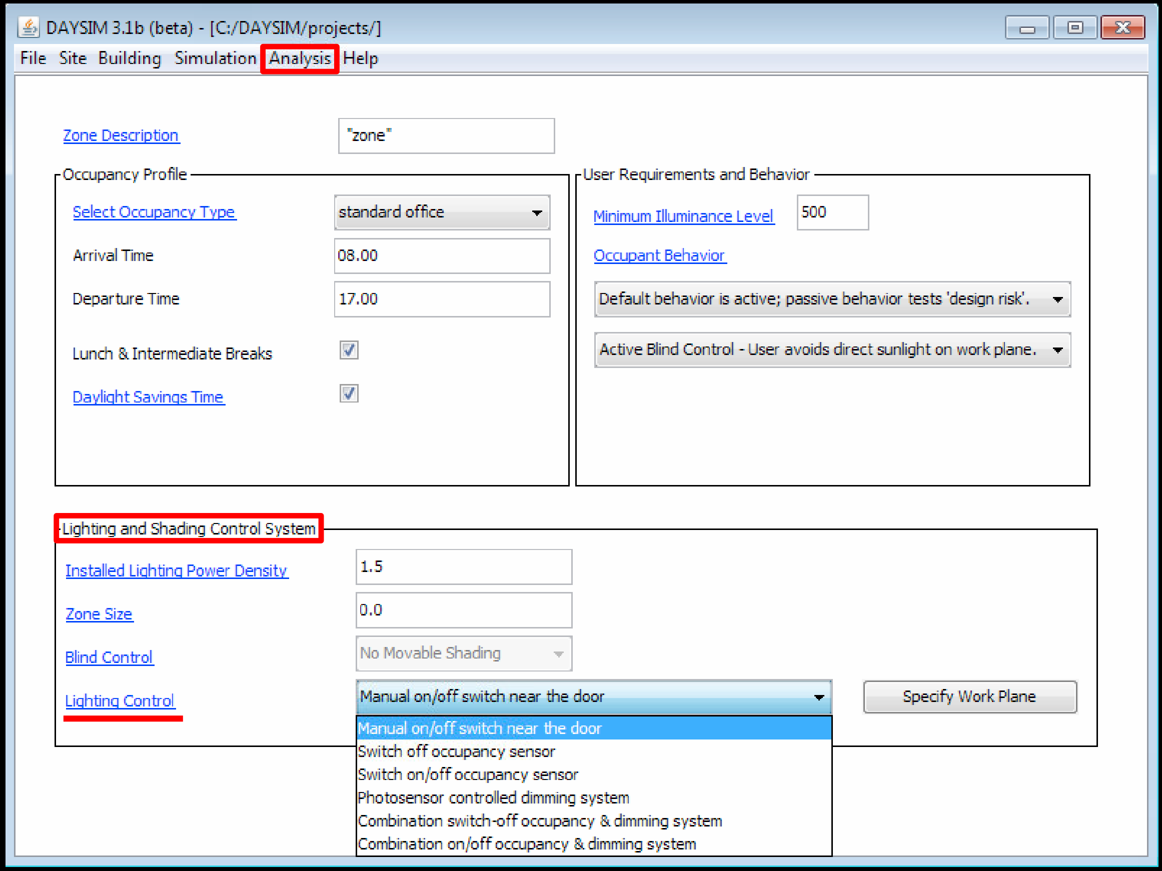
Dynamic daylight simulation:

Daysim:



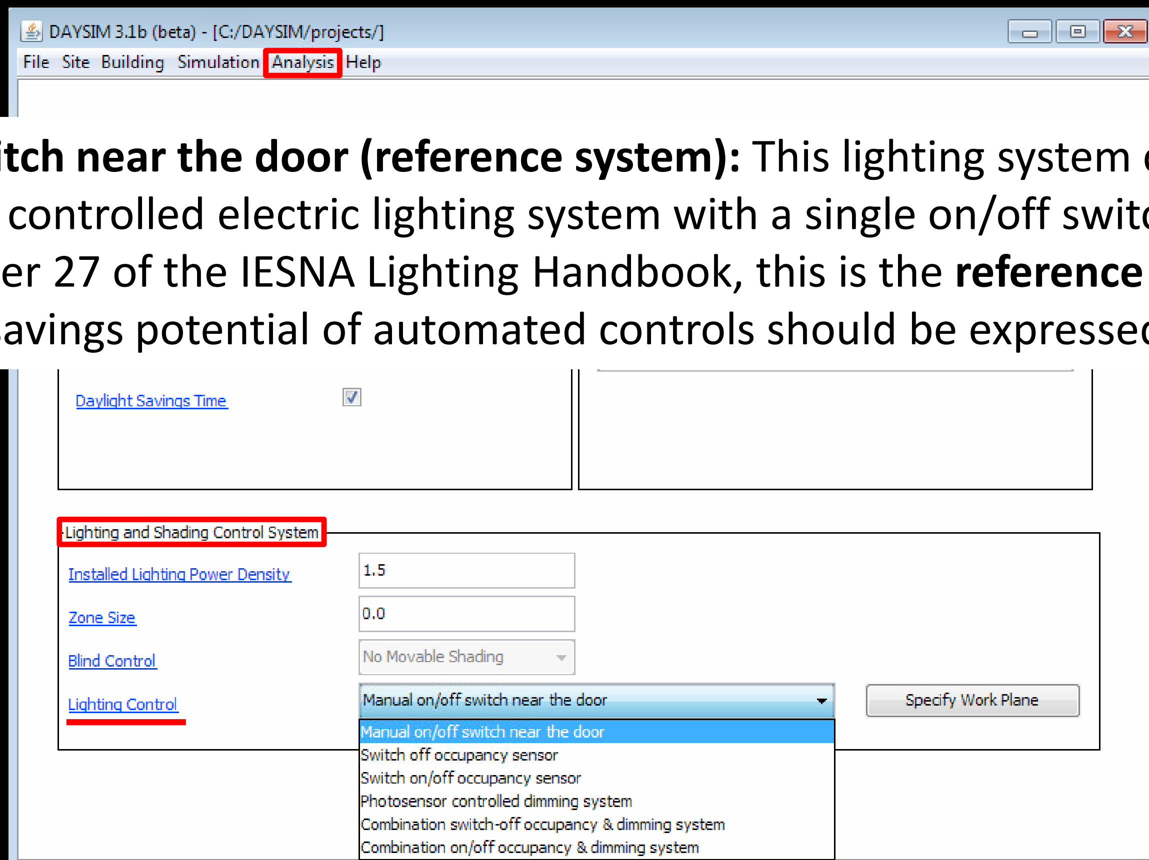
Dynamic daylight simulation:

Daysim:



Dynamic daylight simulation:

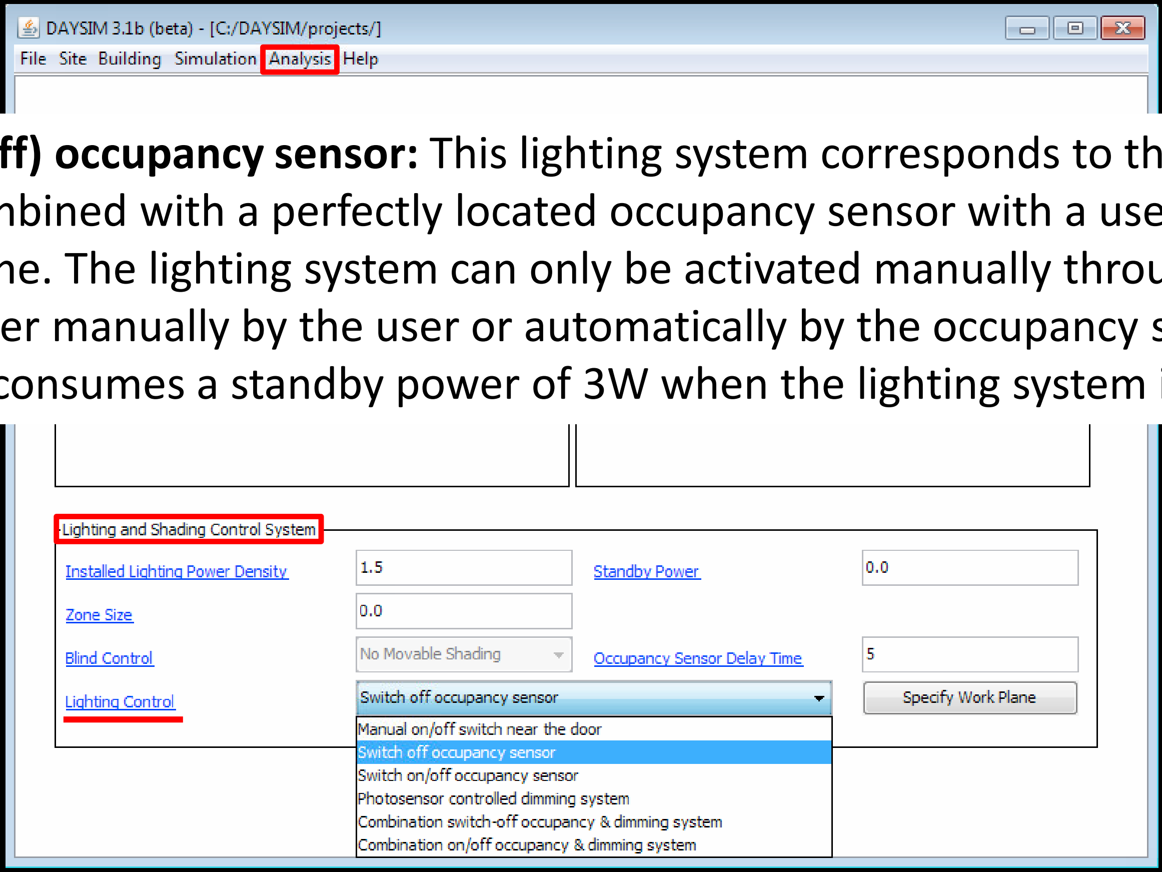
Daysim:



Manual on/off switch near the door (reference system): This lighting system corresponds to a standard manually controlled electric lighting system with a single on/off switch near the door. According to chapter 27 of the IESNA Lighting Handbook, this is the **reference system** relative to which the energy savings potential of automated controls should be expressed.

Dynamic daylight simulation:

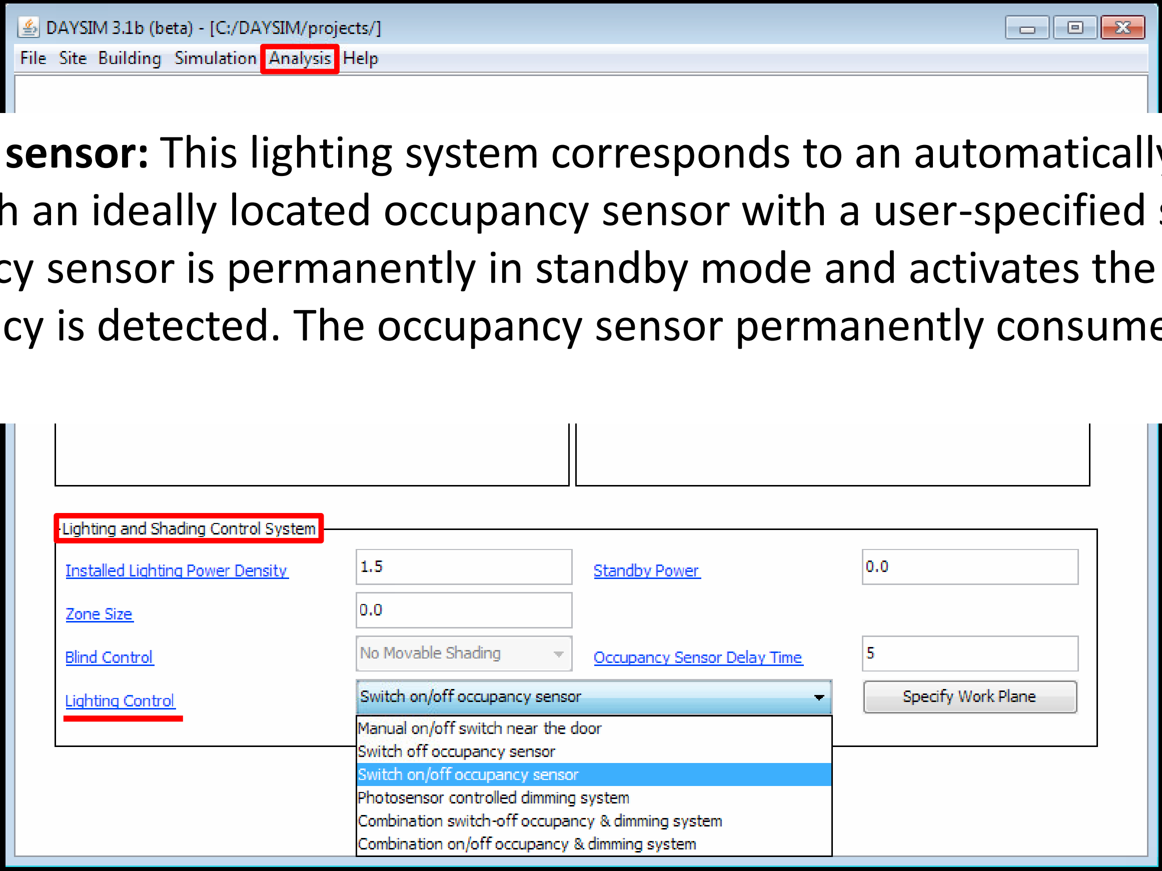
Daysim:



Energy-efficient (off) occupancy sensor: This lighting system corresponds to the reference lighting system combined with a perfectly located occupancy sensor with a user-specified switch-off delay time. The lighting system can only be activated manually through the switch. It is switched off either manually by the user or automatically by the occupancy sensor. The occupancy sensor consumes a standby power of 3W when the lighting system is switched on.

Dynamic daylight simulation:

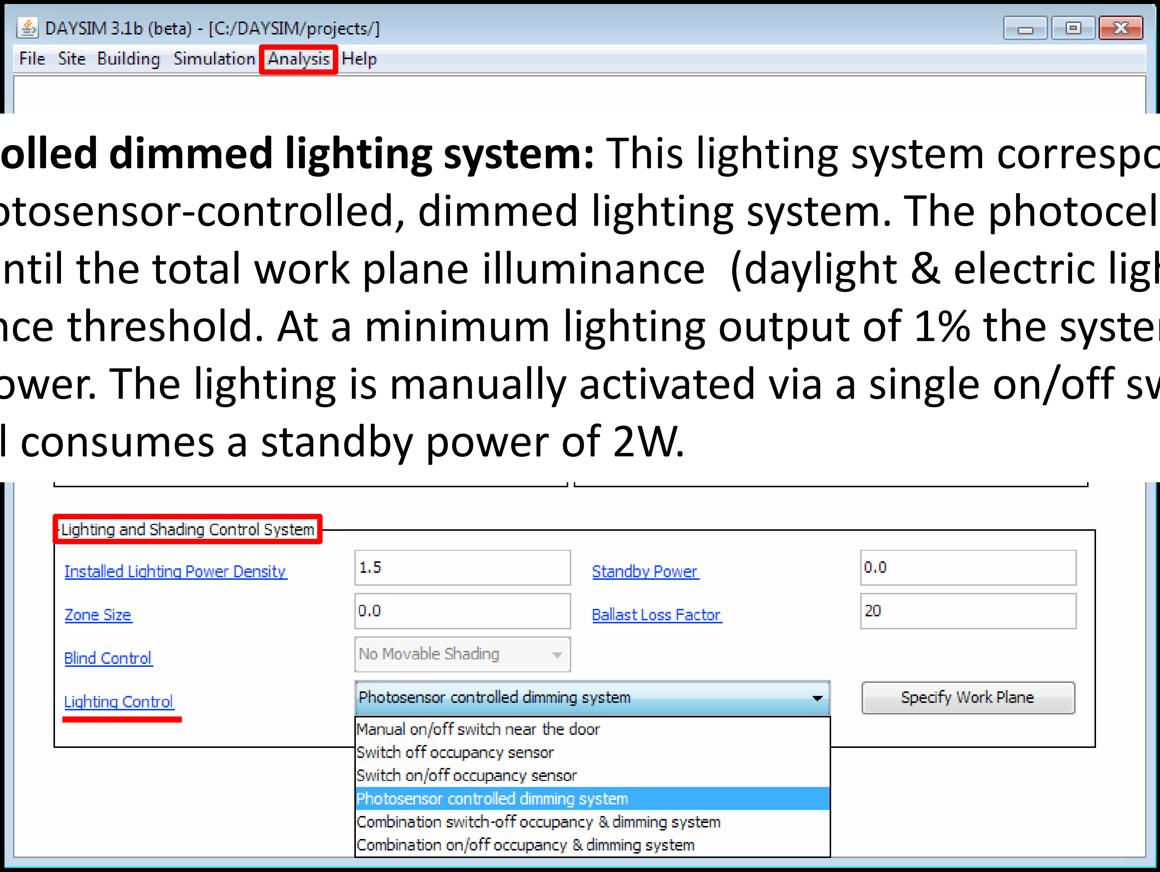
Daysim:



On/Off occupancy sensor: This lighting system corresponds to an automatically controlled lighting system with an ideally located occupancy sensor with a user-specified switch-off delay time. The occupancy sensor is permanently in standby mode and activates the lighting whenever occupancy is detected. The occupancy sensor permanently consumes a standby power of 3W.

Dynamic daylight simulation:

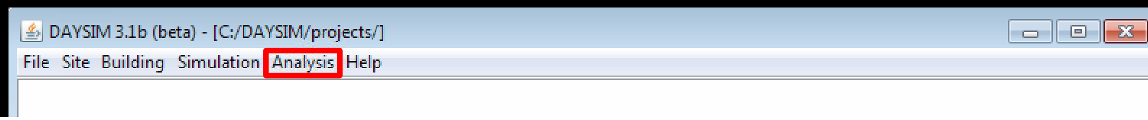
Daysim:



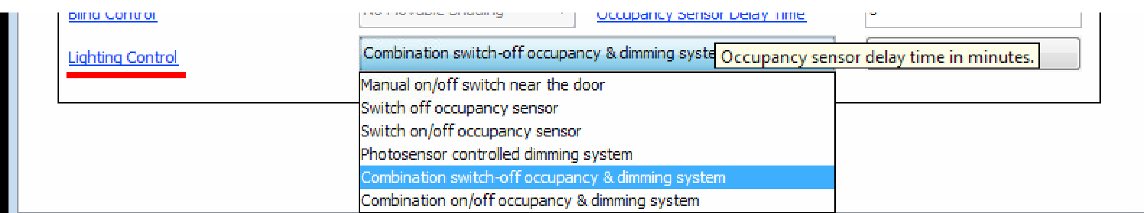
Photosensor-controlled dimmed lighting system: This lighting system corresponds to an ideally commissioned, photosensor-controlled, dimmed lighting system. The photocell dims the activated lighting until the total work plane illuminance (daylight & electric light) reaches the minimum illuminance threshold. At a minimum lighting output of 1% the system consumes 15% of its full electric power. The lighting is manually activated via a single on/off switch near the door. The photocell consumes a standby power of 2W.

Dynamic daylight simulation:

Daysim:

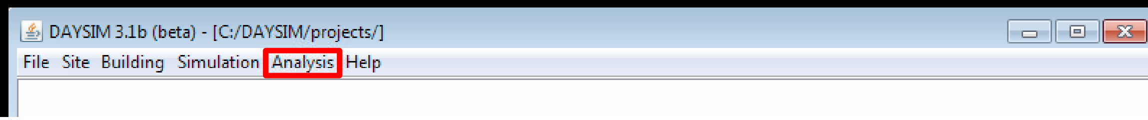


Dimmed lighting system with an energy-efficient occupancy sensor: This lighting system corresponds to an ideally commissioned, photosensor-controlled, dimmed lighting system combined with an on/off switch and a perfectly located occupancy sensor. The occupancy sensor has a user-specified switch-off delay time. The photocell dims the activated lighting until the total work plane illuminance (daylight & electric light) reaches the minimum illuminance threshold. At a minimum lighting output of 1% the system consumes 15% of its full electric power. The lighting system can only be activated manually through the switch. It is switched off either manually by the user or automatically by the occupancy sensor. The lighting control module consumes a standby power of 5W when the lighting system is switched on.

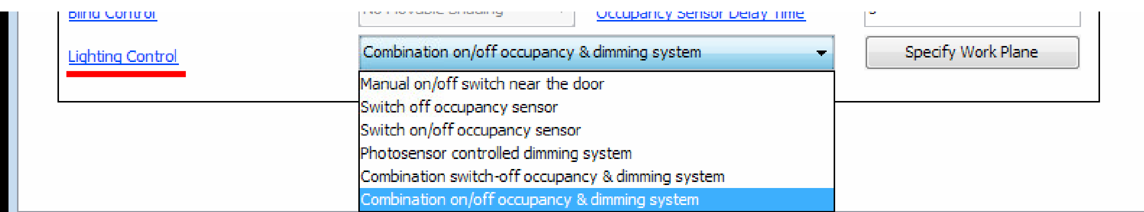


Dynamic daylight simulation:

Daysim:



Dimmed lighting system with an energy-efficient occupancy sensor: This lighting system corresponds to an ideally commissioned, photosensor-controlled, dimmed lighting system combined with an on/off switch and a perfectly located occupancy sensor. The occupancy sensor has a user-specified switch-off delay time. The photocell dims the activated lighting until the total work plane illuminance (daylight & electric light) reaches the minimum illuminance threshold. At a minimum lighting output of 1% the system consumes 15% of its full electric power. The lighting system can only be activated manually through the switch. It is switched off either manually by the user or automatically by the occupancy sensor. The lighting control module consumes a standby power of 5W when the lighting system is switched on.



Daysim

Reading results from Daysim:

DAYSIM Simulation Output ×

file:///C:/New_Experiment/Daysim/Blind/res/test.el.htm

Daysim Simulation Report

In short...

- Daylight Factor (DF) Analysis: 96% of all illuminance sensors have a daylight factor of 2% or higher. If the sensors are evenly distributed across 'all spaces occupied for critical visual tasks', the investigated lighting zone should qualify for the LEED-NC 2.1 daylighting credit 8.1 (see www.usgbc.org/LEED/).
- Daylight Autonomy (DA) Analysis: The daylight autonomies for all core workplane sensors lie between 65% and 82% for an active user and 16% and 70% for a passive user .
- Useful Daylight Index (UDI) Analysis: The Useful Daylight Indices for the Lighting Zone are $UDI_{<100}$=24%, $UDI_{100-2000}$=11%, $UDI_{>2000}$=64% for an active user and $UDI_{<100}$=45%, $UDI_{100-2000}$=41%, $UDI_{>2000}$=14% for a passive user .
- Continuous Daylight Autonomy (DA_{con})and DA_{max} Analysis: 100% of all illuminance sensors have a DA_{con} above 60% for an active user and 100% of all sensors have a DA_{con} above 40% for a passive user . 65% of all illuminance sensors have a DA_{max} above 5% for an active user and 0% of all sensors have a DA_{max} above 5% for a passive user .

Simulation Assumptions

Site Description: The investigated building is located in StockholmArlanda (59.70 N/ 18.00 E). Daylight savings time lasts from April 1st to October 31st.

User Description: The zone is occupied Monday through Friday from 8:00 to 18:00. The occupant leaves the office three times during the day (30 minutes in the morning, 1 hour at midday, and 30 minutes in the afternoon). The total annual hours of occupancy at the work place are 2080.0.The occupant performs a task that requires a minimum illuminance level of 300 lux. Lighting and Blind Control: A simplified shading device model is used that assumes that the lowered blinds block all direct sunlight and transmit 25 percent of all diffuse daylight. (This simplified model is adequate for the initial design phase.) The shading device remains fully retracted throughout the year (unrealistic scenario!).

Detailed Simulation Results

The table below shows the daylight factor and various climate-based daylighting metrics for all sensor points individually. Definitions of these metrics can be found here. To guide the reader's eye, the following color code is used:

- Coordinates of core workplane sensors are shown in **blue** .
- Daylight factor levels over 2% are shown in green.
- Annual light exposure levels of medium and high sensitivity (CIE Categories III and IV) are shown in **dark green** and **light green** .

x	y	z	DF [%]	DA [%] (active)	DA [%] (passive)	DA_{con} [%] (active)	DA_{con} [%] (passive)	DA_{max} [%] (active)	DA_{max} [%] (passive)	$UDI_{<100}$ [%] (active)	$UDI_{<100}$ [%] (passive)	$UDI_{100-2000}$ [%] (active)	$UDI_{100-2000}$ [%] (passive)	$UDI_{>2000}$ [%] (active)	$UDI_{>2000}$ [%] (passive)	DSP [%] (active)	DSP [%] (passive)	annual light exposure [luxh]
6.904	3.600	0.800	2.8	68	18	76	49	5	0	23	41	61	59	16	0	62	3	4259694
7.112	3.600	0.800	5.0	73	33	79	59	12	0	19	33	54	67	28	0	64	21	5531416
7.319	3.600	0.800	7.6	75	45	81	65	20	0	17	29	48	71	35	0	63	33	6760091
7.527	3.600	0.800	8.6	76	49	82	67	24	0	16	28	45	73	39	0	62	36	7320661
7.735	3.600	0.800	8.6	76	49	82	67	27	0	16	27	44	73	40	0	65	36	7762346
7.942	3.600	0.800	8.8	77	49	82	67	28	0	16	27	43	73	41	0	65	36	7815484
8.150	3.600	0.800	8.7	76	49	82	67	28	0	16	28	43	73	41	0	65	36	7871145
8.358	3.600	0.800	8.7	77	49	82	67	28	0	16	28	43	73	40	0	65	36	7868303
8.565	3.600	0.800	8.7	76	49	82	67	28	0	16	28	44	72	40	0	64	36	7906601
8.773	3.600	0.800	8.5	76	49	82	67	25	0	16	28	46	72	38	0	64	35	7594644
8.981	3.600	0.800	7.7	75	45	81	65	23	0	17	29	49	71	34	0	65	30	7271998
9.188	3.600	0.800	5.0	73	33	79	59	15	0	19	33	53	67	28	0	67	16	6121780
9.396	3.600	0.800	2.9	68	19	76	49	7	0	22	41	59	59	19	0	65	4	4738687


Thank you
Ramsar, Iran