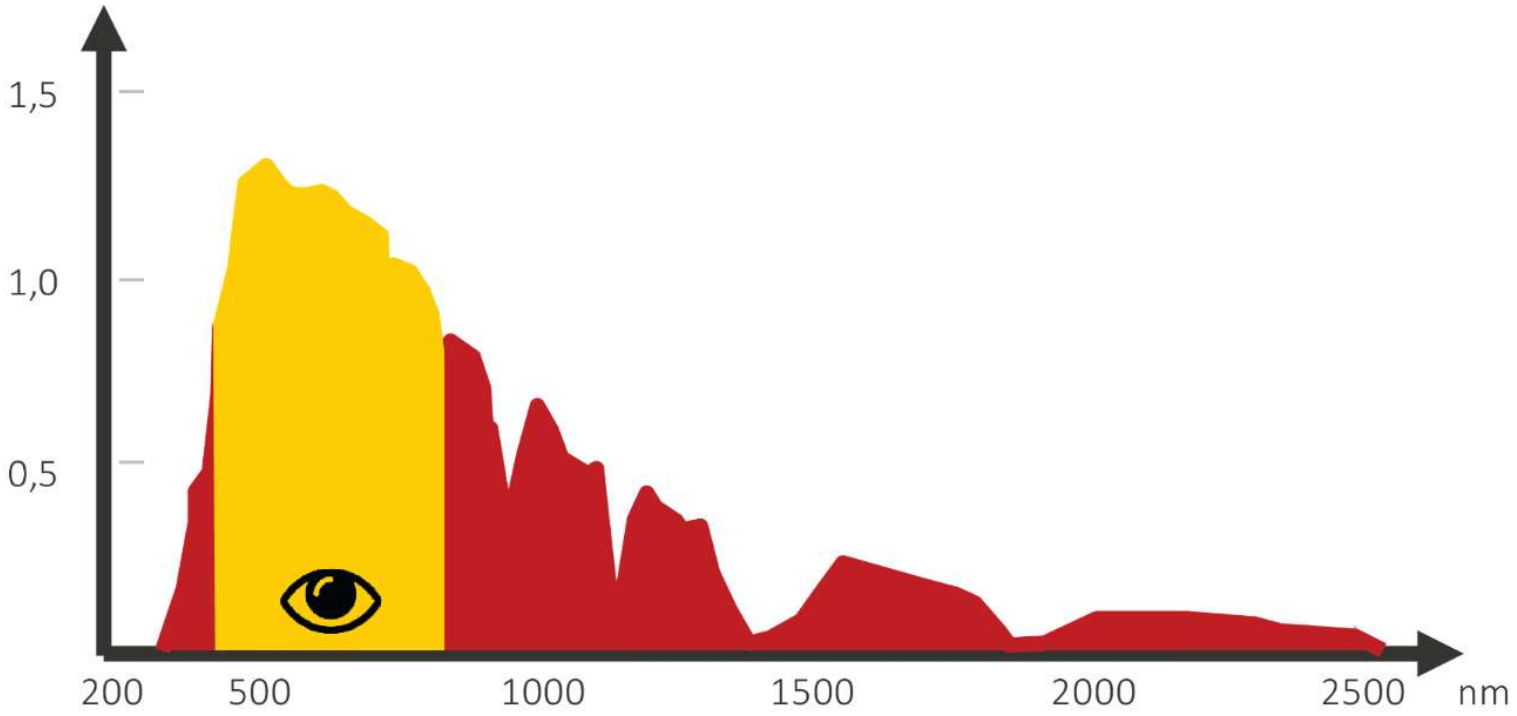
Daylight metrics

Max Tillberg

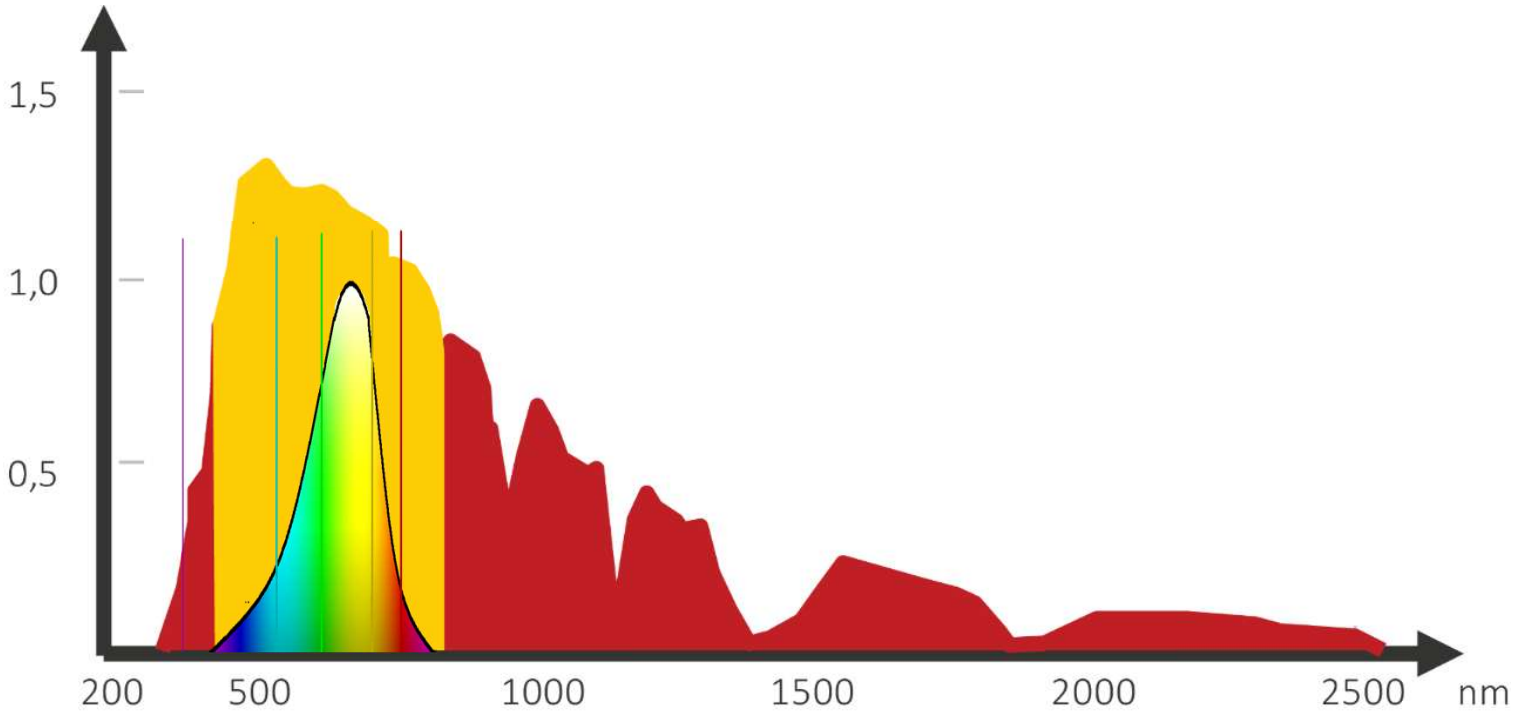
EQUA

Spectral irradiance [W/m²nm]



EQUA

Spectral irradiance [W/m²nm]



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Photometric quantities

Photometry	**SI-unit**		**Radiometry**	**SI-unit**	
Luminous flux	lumen (cd·sr)	lm	Radiant flux	watt	W
Illuminance	lux (lm/m^2)	lx	Irradiance	watt per m2	$W \cdot m^2$
Luminous intensity	candela (lm/sr)	cd	Radiant intensity	watt per steradian	$W \cdot sr^{-1}$
Luminance	candela per m2	cd/m^2	Radiance	watt per steradian per m2	$W \cdot sr^{-1} \cdot m^{-2}$
Luminous efficacy	lumen per watt	lm/W	-	-	-

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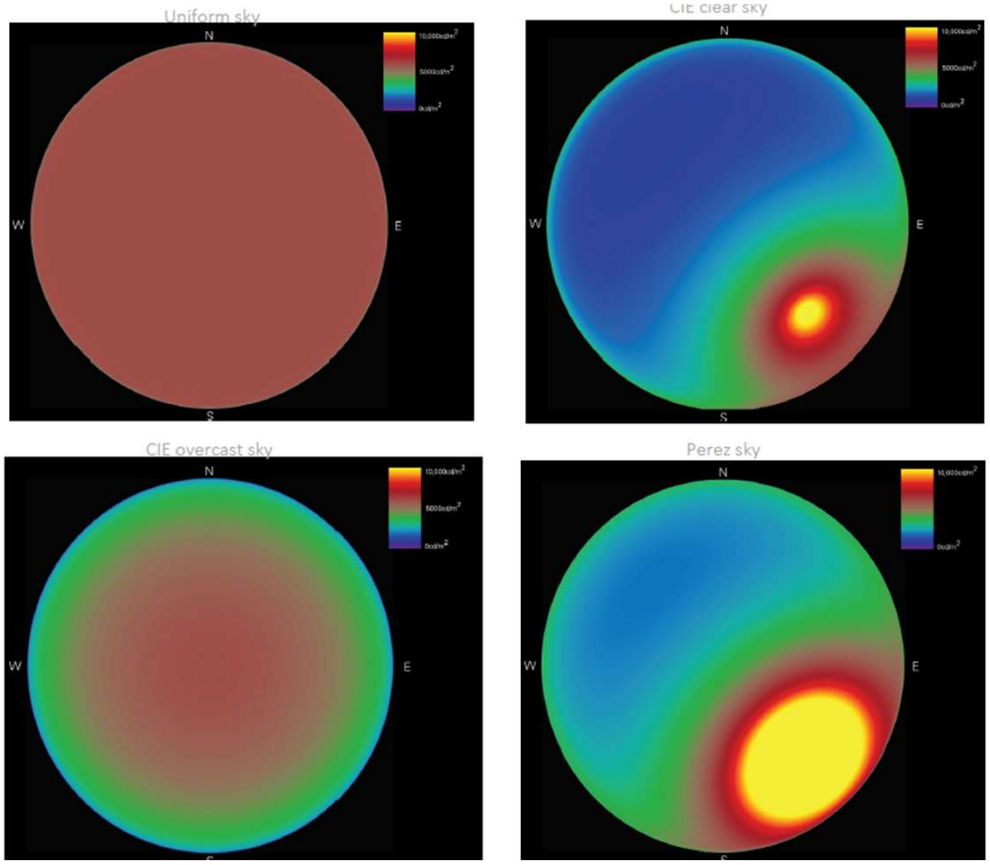
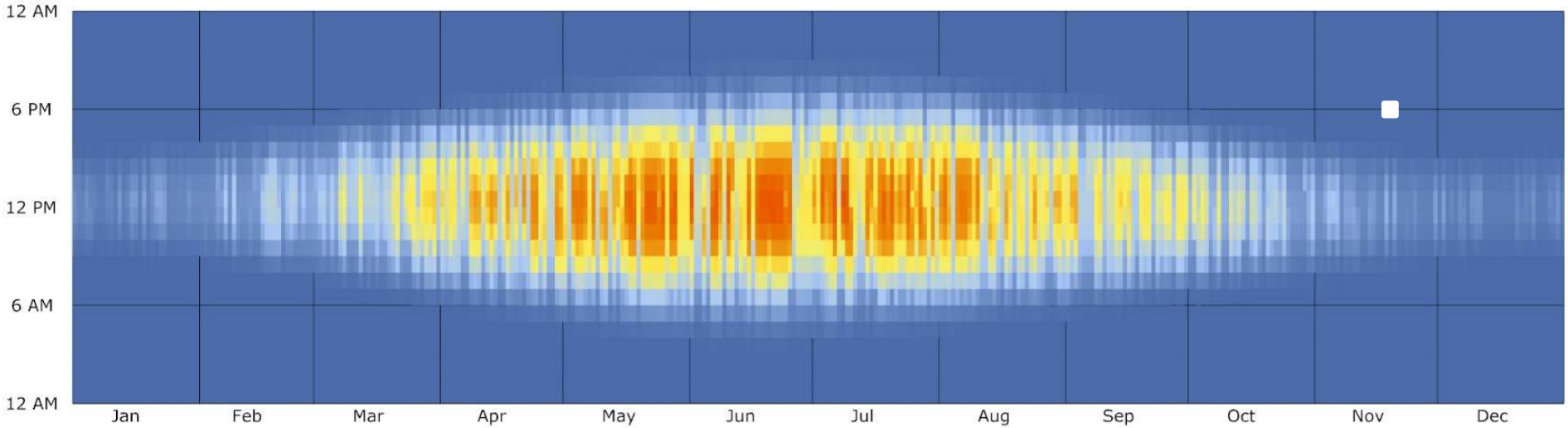
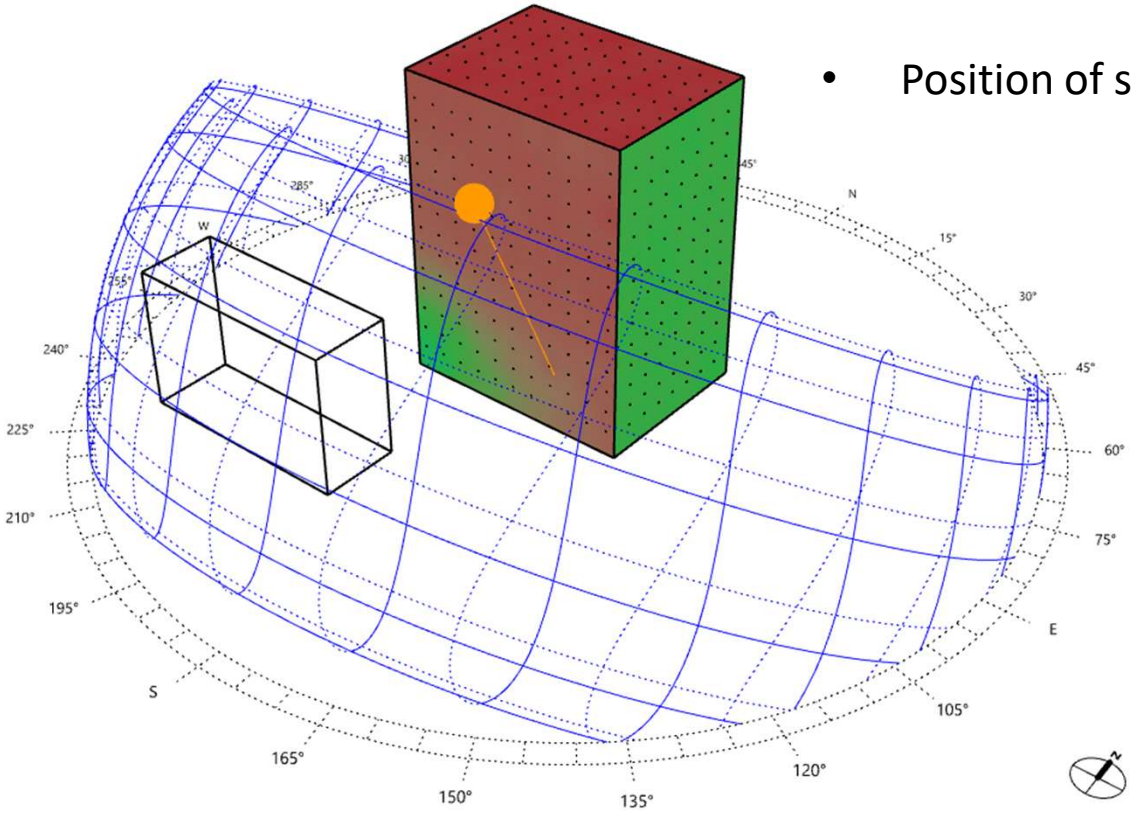
Sky models



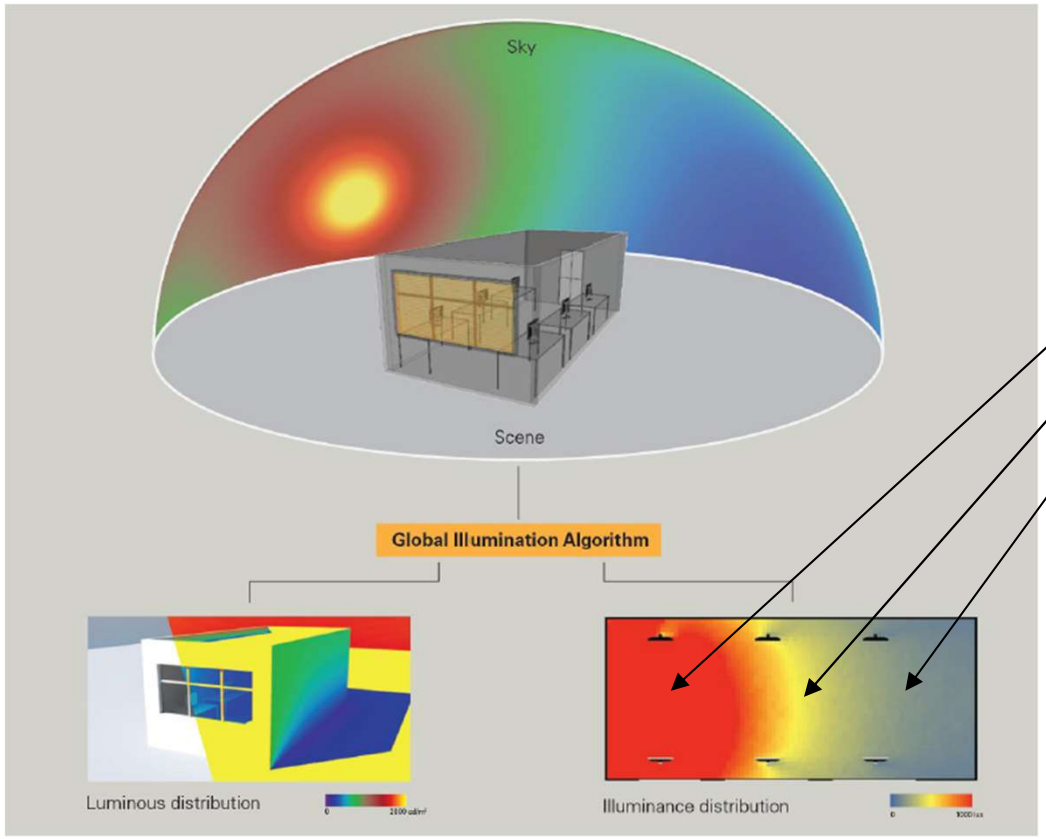


Global Horizontal Illuminance (lux) - Hourly
GOTEBORG_ LANDVETTER_SWE
1 JAN 1:00 - 31 DEC 24:00

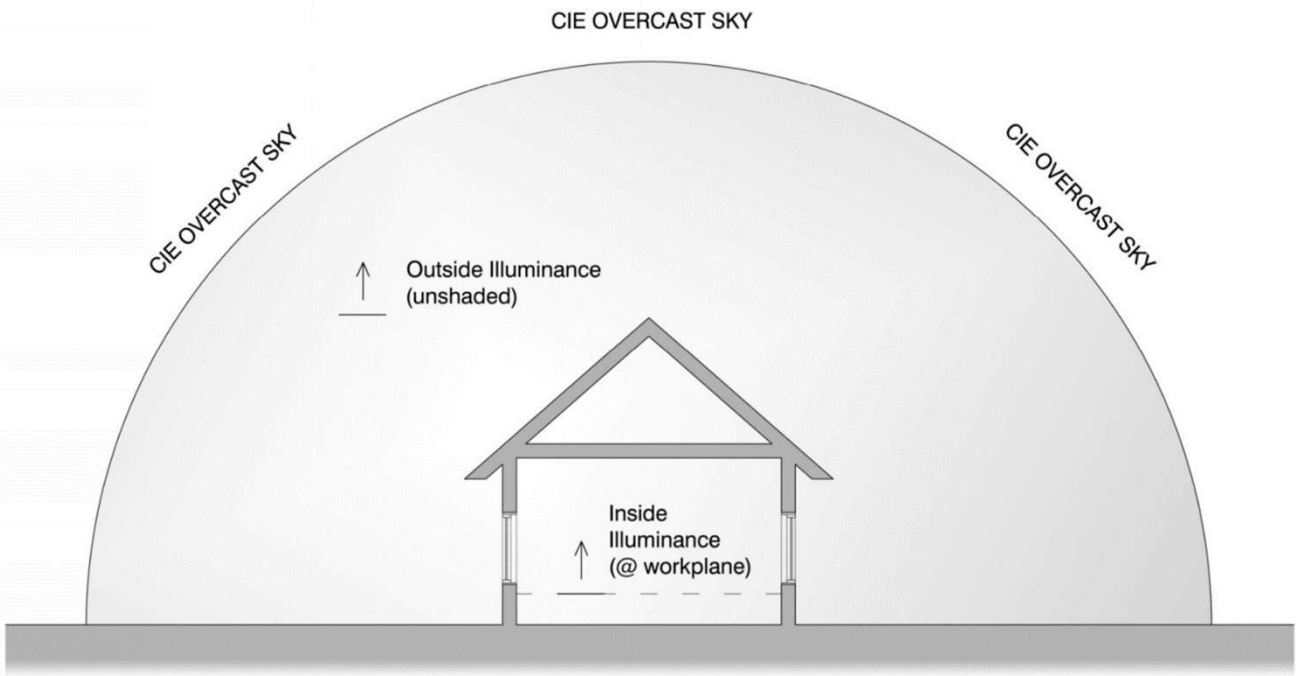


- Position of sun in sky

Sky-ray tracing-room



Daylight factor



$$\text{Daylight Factor} = \frac{\text{Inside Illuminance}}{\text{Outside Illuminance}} \times 100$$

Climate based daylight metrics

- Aggregation over space
- Aggregation over time
- Spatial daylight (EN 17037 and lm-83)
- Daylight autonomy
- Useful daylight analysis

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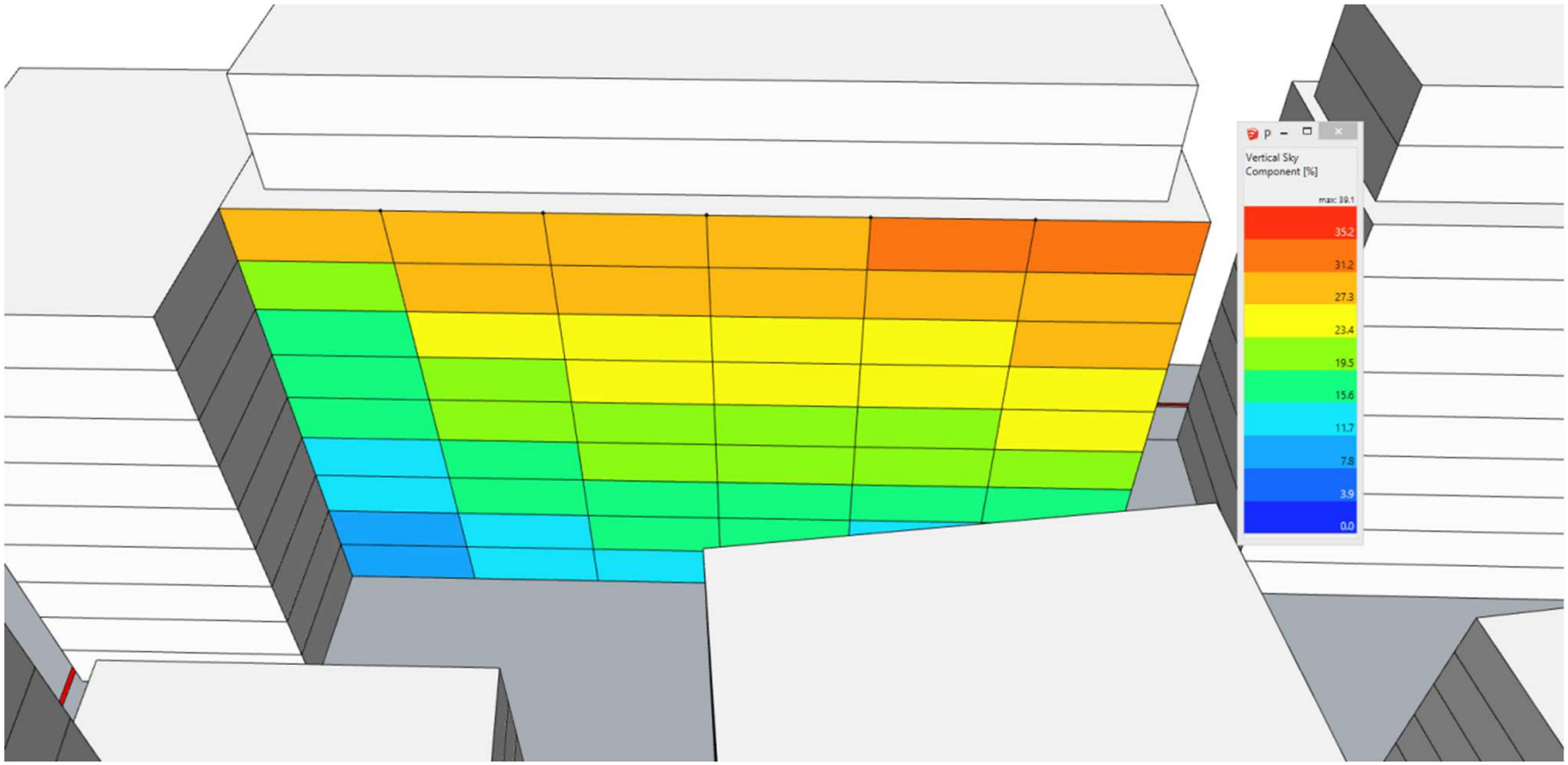
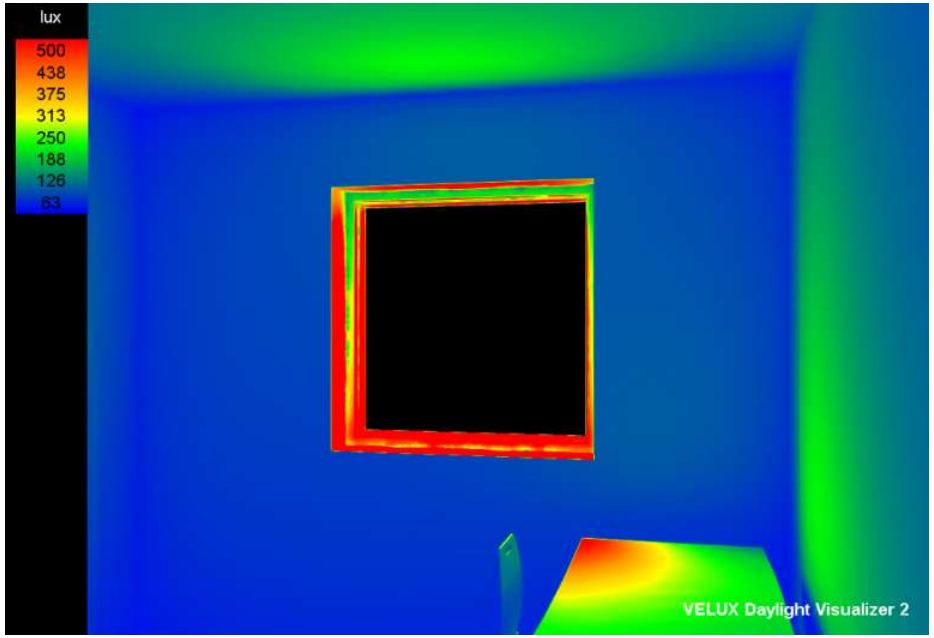
UDI

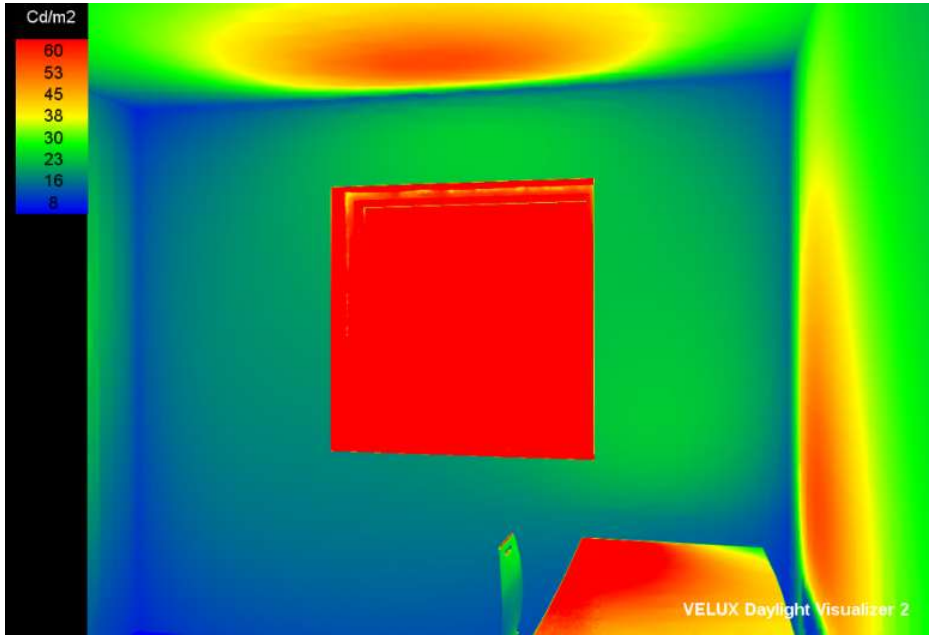
- Useful Daylight Illuminance (UDI) is a modification of Daylight Autonomy.
- It provides full credit to values between 300 lux and 3000 lux suggesting that horizontal illumination values outside of this range are not useful.

Vertical Sky illuminace



Luminance vs Luminance





DAYLIGHT GLARE PROBABILITY (DGP)

$$DGP = 5.87 \cdot 10^{-5} \cdot E_v + 9.18 \cdot 10^{-2} \cdot \log\left(1 + \sum_i \frac{L_{s,i}^2 \cdot \omega_{s,i}}{E_v^{1.87} \cdot P_i^2}\right) + 0.16$$

DGP	Score
<35%	4
35-40%	3
40-45%	2
45-50%	1
>50%	0

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