

# The Adaptation of Daylight Glare Probability to Dynamic Metrics in a Computational Setting

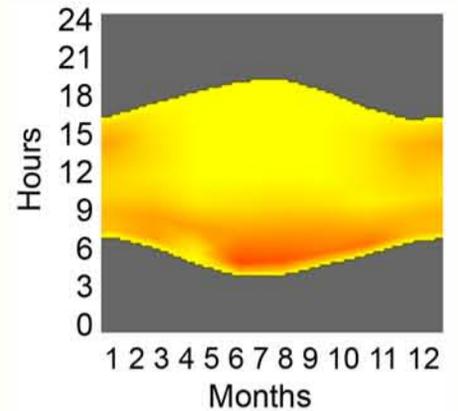


## Daylight Glare Probability

- Evalglare software by Jan Wienold
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- DGP = % occupants disturbed
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- pixel analysis of Radiance image
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- glare sources colored in output

## Temporal Graphic Data

- X-axis = year, Y-axis = day
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- RED = % sensors > 40% DGP
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- 224 simulations for each viewpoint
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- pixel analysis is not fast enough



## Adapting DGP for annual simulations requires an approximation method...

There is a linear, vertical illuminance approximation for DGP (DGPs) which performs well for high luminance glare. But the model itself can be used to estimate the full DGP.

### Model Information

The object file...

- Geometry
- Patch position
- Patch normal
- Materials
- Reflectivity
- Transmissivity
- Tags for GLASS and SENSOR

Can be used to find...

- Possible glare source patches (glass)
- Position Index of possible sources
- Solid Angle of patches

Full DGP requires... A way to identify the glare sources, **POSITION INDEX**, **LUMINANCE**, and **SOLID ANGLE** of sources, and **VERTICAL ILLUMINANCE** at sensor.



### Vertical Illuminance Simulation

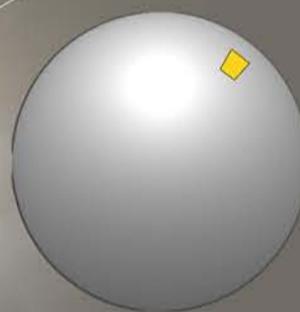
Illuminance is calculated at vertical sensor patches.

### Source Luminance

The sky behind each glass patch is a potential glare source.

Sky luminance found using the equations for CIE clear, clear-turbid (polluted), and overcast skies and Matsuura intermediate sky.

Multiplied by window transmissivity, this is the luminance of the potential source.



Annual illuminance simulation needs far less computation power than pixel analysis.



### Validation of DGP Approximation Method

Percent error from evalglare measured DGP

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Model-based approximation error (pink) compared to DGPs error (blue)

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- Four models: Classroom with vertical windows
- Classroom with skylights
- Room inspired by Corbusier (left/right)
- Room with dark, heavy frame (above)

○  
Model-based approximation outperforms DGPs

