

# What's New in *Radiance* for 2021

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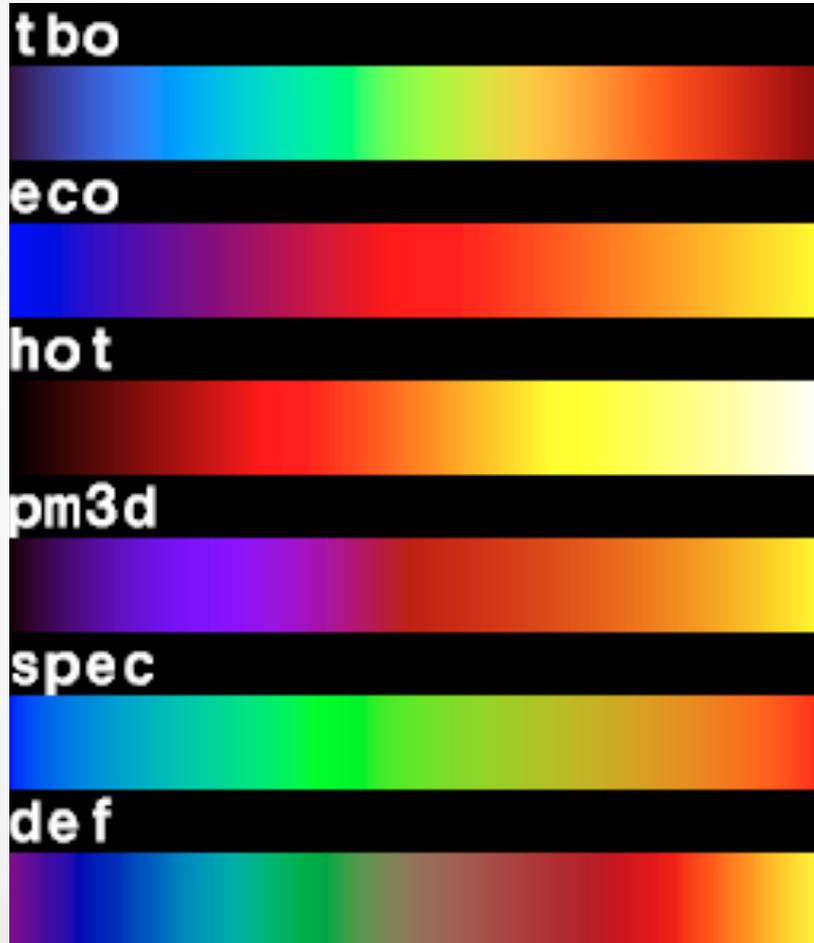
# Minor Improvements

- Added `-rf` and `-rb` options to **rmtxop** to load front or back reflectance from BSDF input
- Added `-t` option to report progress in **rcontrib** and **rfluxmtx**
- Removed upper limit on number of modifiers in **rcontrib**
- Limit dynamic memory usage in high-resolution tensor trees to 250MB per BSDF during rendering
- Made ray intersection behavior more consistent for coincident surfaces

# More Significant Additions

- Added new “turbo” palette to **falsecolor**
- Added `-y` option to **gensky** and **gendaylit** to input year for more accurate solar position
- Added blocking facility to **rcollate**
- Created **robjutil** for manipulating Wavefront OBJ
- Added new options and OBJ output capabilities to **genbox**
- Added a number of new options to **gendaymtx**

# falsecolor Palettes

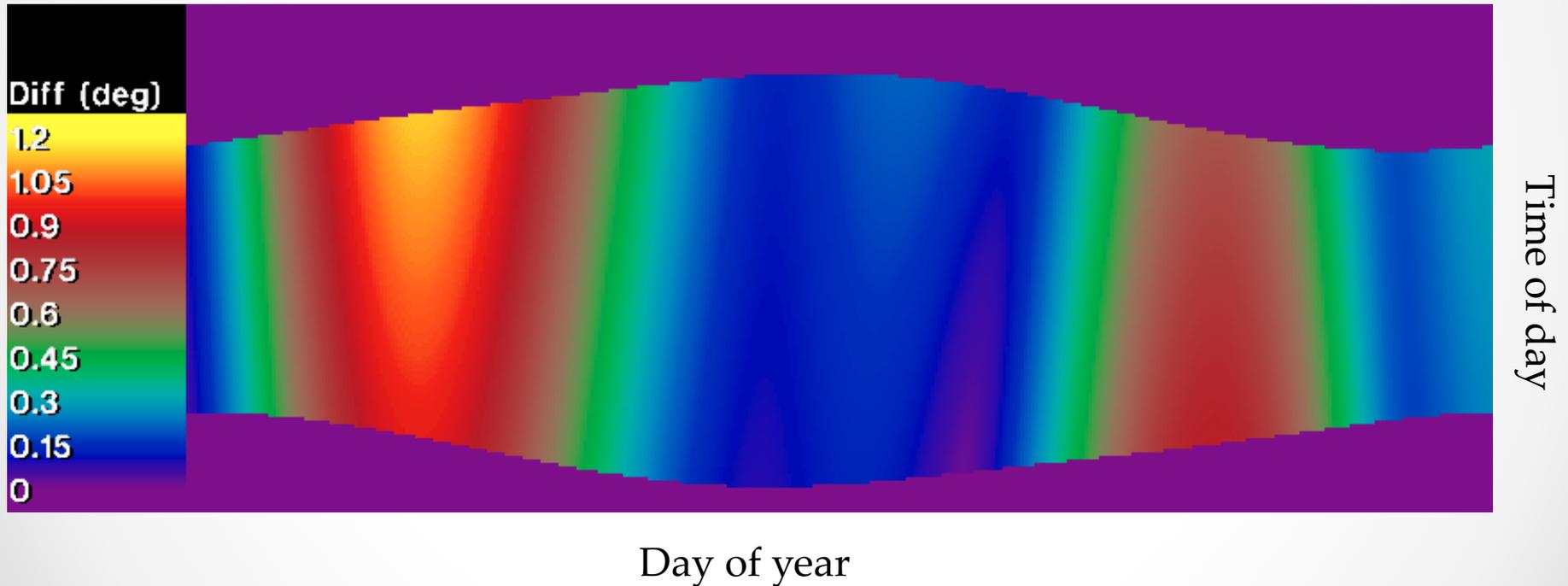


New turbo palette is more perceptually uniform spectral map

- [ai.googleblog.com/2019/08/turbo-improved-rainbow-colormap-for.html](https://ai.googleblog.com/2019/08/turbo-improved-rainbow-colormap-for.html) •

# Michalsky Solar Angle Calculation

Difference between standard solar angle calculation and Michalsky



Year 2021 in San Francisco, CA

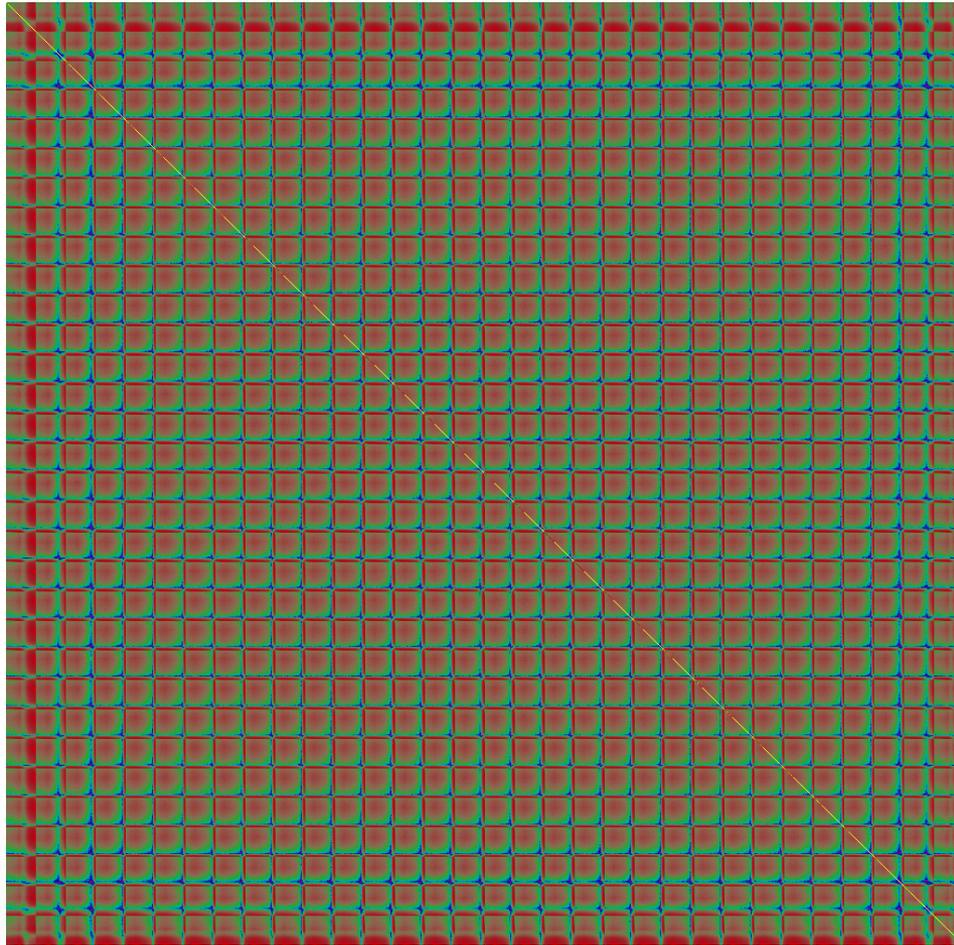
- Michalsky, Joseph J., "The Astronomical Almanac's Algorithm for Approximate Solar Position (1950-2050) Solar Energy, 40(3), 1988.

# Blocking Feature in **rcollate** (1)

- Normally, **rcollate** keeps elements in the same order as input, unless **-t** (transpose) option is applied
- New **-o** option allows data to be regrouped, so a regular tensor can be visualized more naturally
  - By default, a tensor (e.g., a matrix inside a matrix) is going to have the “inside loop” matrix all in a row, followed by the next matrix in the next row
  - Reblocking the output allows us to see a 2-D array of 2-D matrices
- This can be extended to any number of nested matrices (i.e., any tensor dimensionality)
- The output is usually then passed to **rmtxop** to convert to an HDR image for viewing

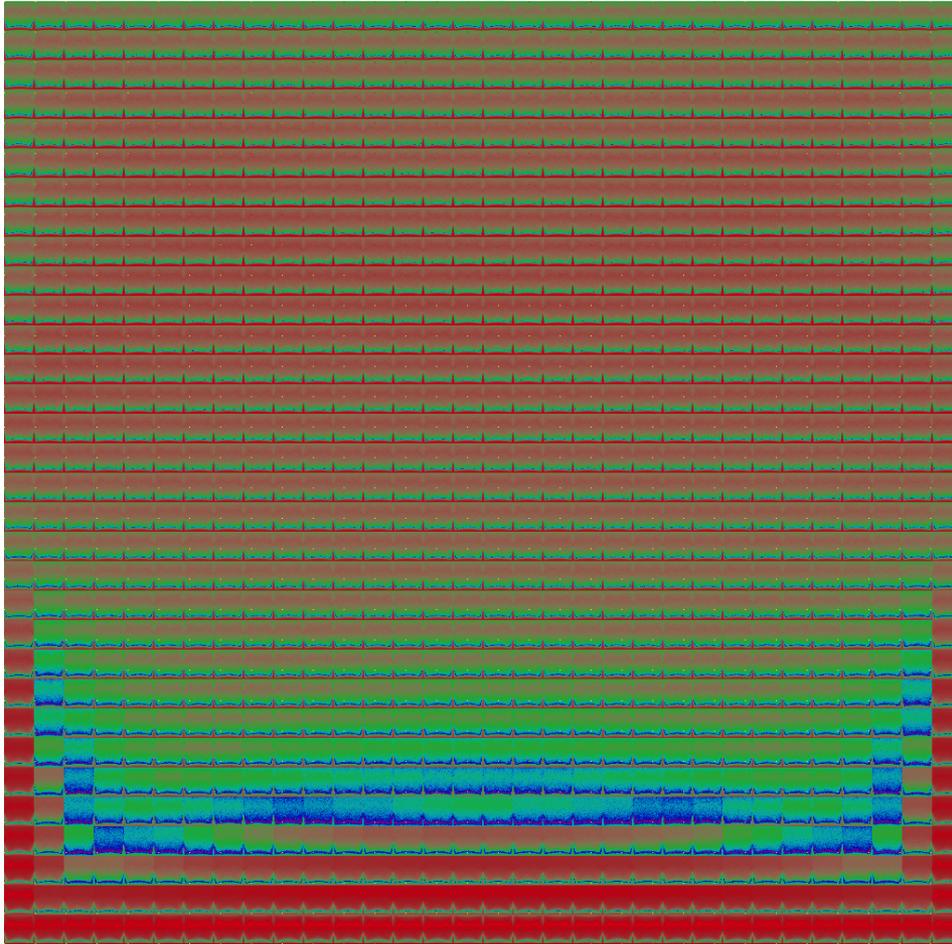
# Blocking Feature in rcollapse (2)

Original 5<sup>th</sup>  
degree Shirley-  
Chiu tensor BTDF  
for venetian  
blinds at 45° slat  
angle



# Blocking Feature in rcollate (3)

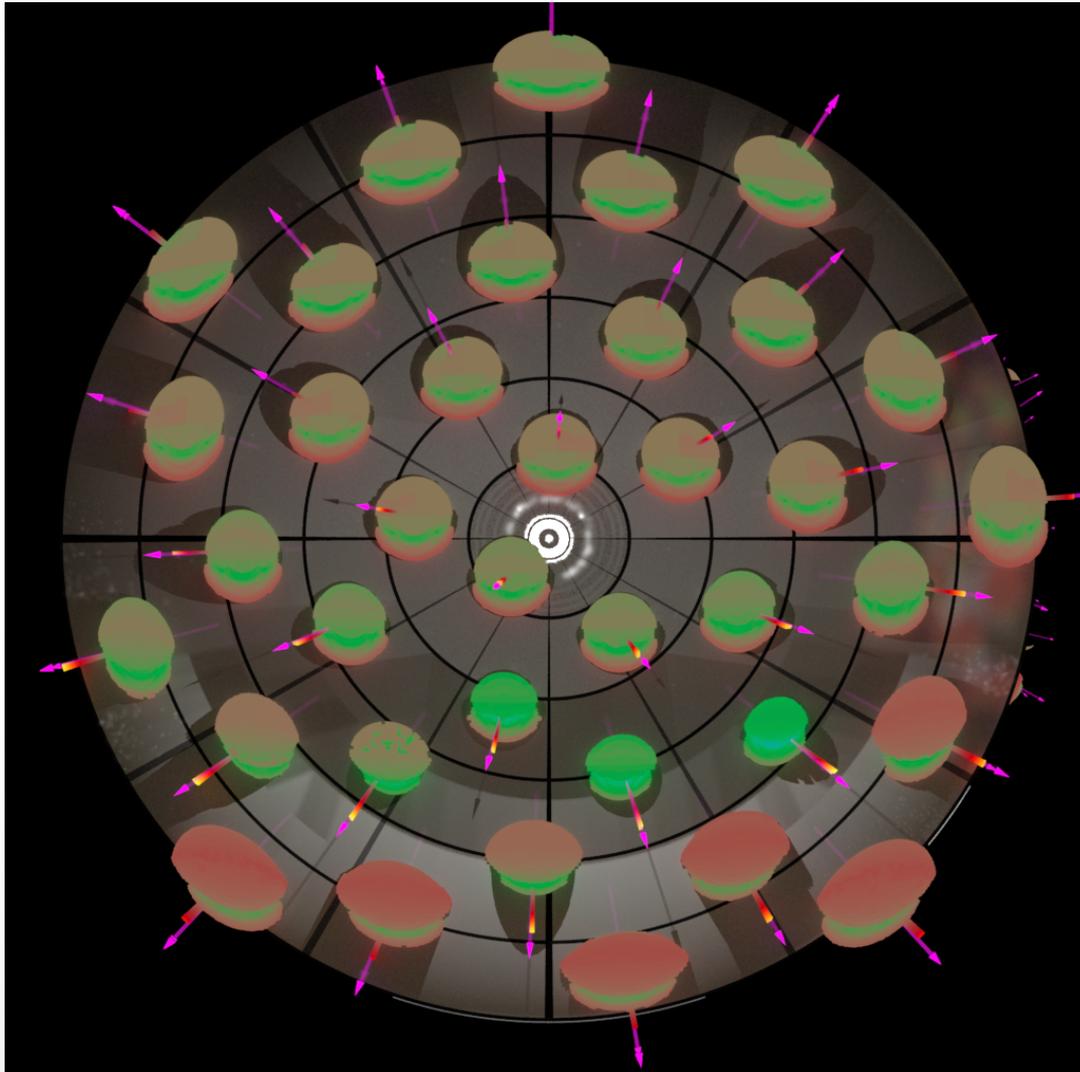
5<sup>th</sup> degree tensor  
BTDF rearranged  
as 32x32 incident  
array of 32x32  
transmitted  
directions



`rcollate -o 32x32x32x32`

# Blocking Feature in rcollapse (4)

Same BTDF  
visualized with  
**bsdf2rad**



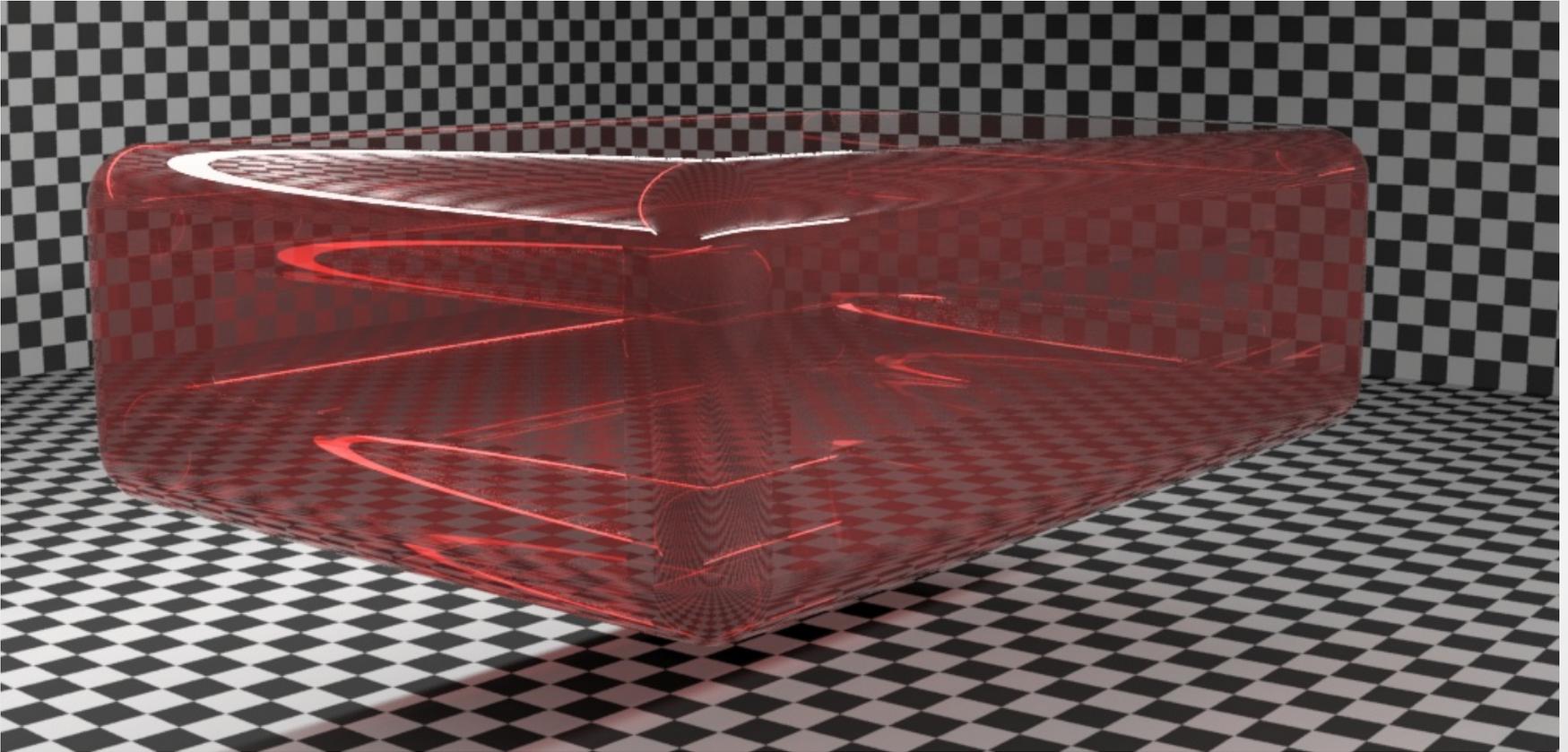
# Incorporated **robjutil** to Process Wavefront .OBJ

- Resurrected from DecorMagic™ project
- Removes degenerate and duplicate faces
- Provides several useful options:
  - Coalesce vertices within a specified epsilon of each other
  - Transform geometry using **xform** specification (no `-a` option)
  - Triangulate polygons with  $> 3$  sides
  - Extract or remove geometry groups or faces using named materials
  - Optionally remove unwanted surface normals or texture coordinates
- Handy for processing input to **obj2mesh**
- Can also convert to *Radiance*, like **obj2rad**
- New library calls useful for other tools as well

# Improvements to genbox Command (1)

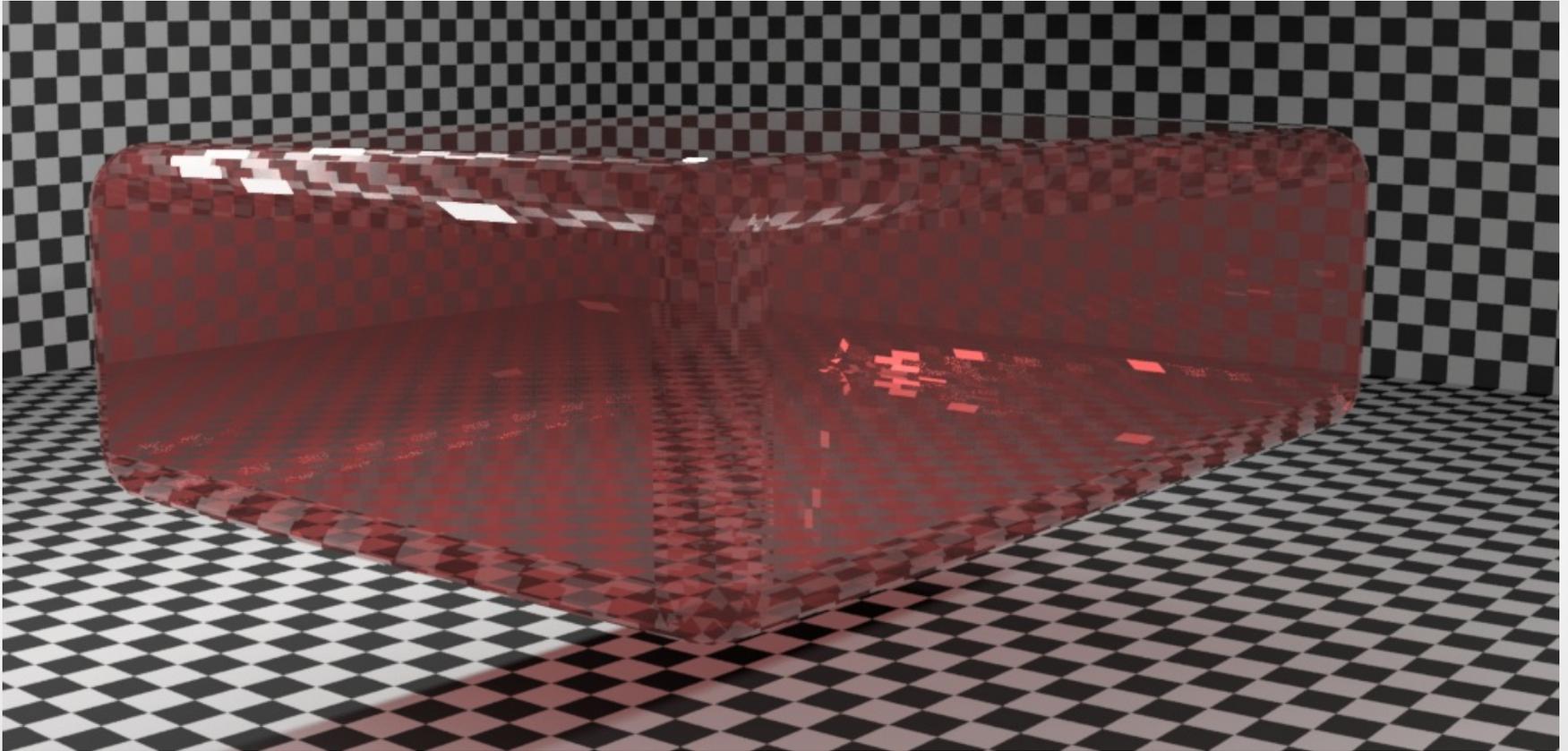
- New `-o` option to produce `.OBJ` output
  - Uses new library calls introduced with **robjectil**
- The `-r` option previously produced boxes with rounded edges/corners using cylinders/spheres
  - Retains this behavior for *Radiance* output without `-i` option
  - Applying `-i`, `-n`, or `-o` option now creates tessellated geometry (quads and triangles)
- Tessellation avoids issues when viewed from interior, or for `.OBJ` output
  - New `-n` option controls number of polygons generated
  - Defaults to `-n 32` when `-i` option is used with `-r` to invert normals
  - New `-s` option smoothes normals in tessellated output

# Improvements to `genbox` Command (2)



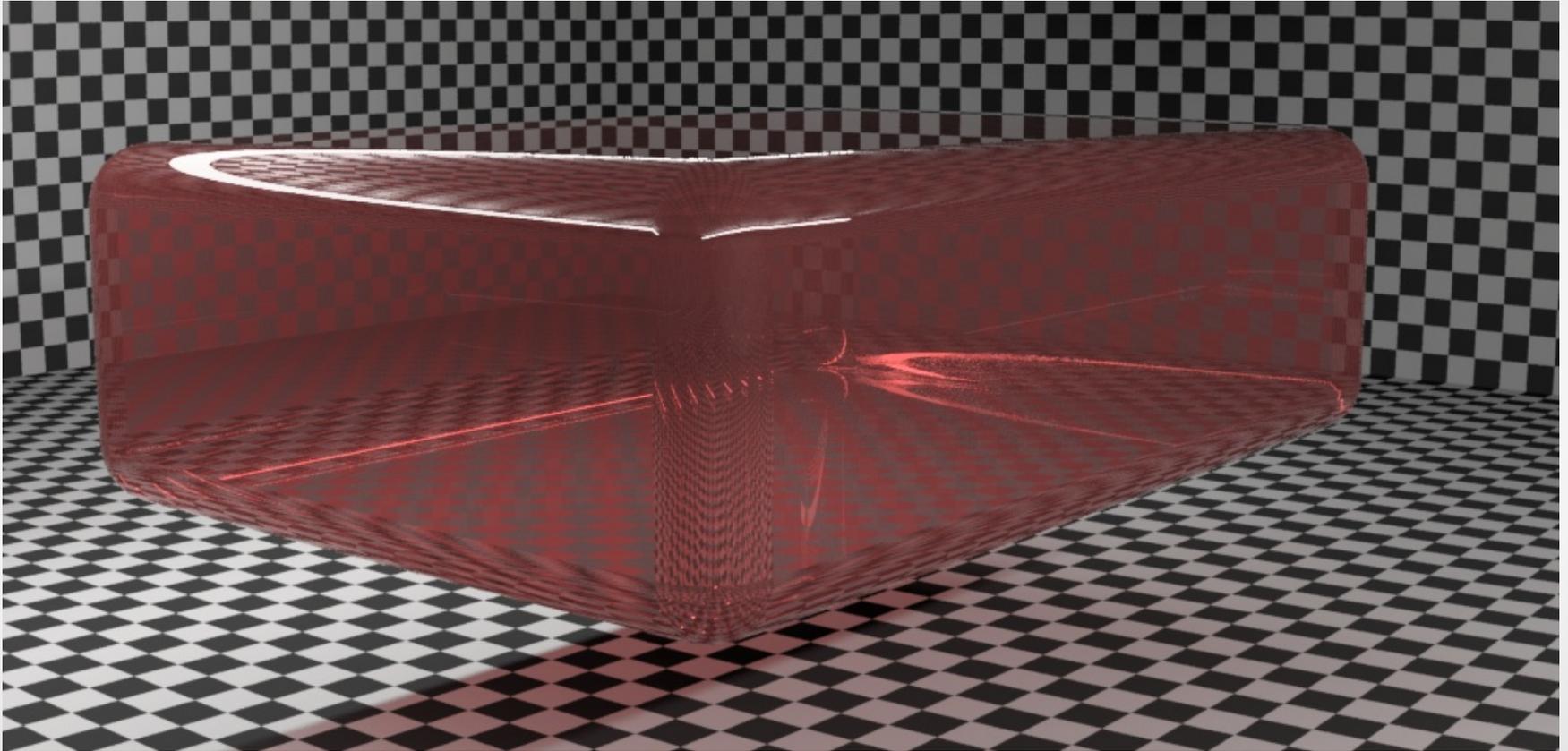
• Original `genbox` output with `-r` option •

# Improvements to `genbox` Command (3)



- New `genbox` output with `-r` and `-n 8` options

# Improvements to `genbox` Command (4)



- New `genbox` output with `-r`, `-n 8`, and `-s` options

# New gendaymtx Options

**-D** *sunpos.rad*

Output above-horizon solar positions to named file (*light* and *source* prims)

**-n**

No output of matrix data (implied with “-D -” to put suns to stdout)

**-M** *modfile.txt*

Create the named modifier file corresponding to suns in **-M** output

**-u**

Slides below-horizon sun positions in output matrix, independent of other options

- Also added support for leap days in weather file
- Most new features funded by Ladybug Tools SBIR



¿Preguntas?

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