COMPUTING COMPLEXITY

AASHISH SAPKOTA

PROTOTYPING SOLAR OPTIMISED GREEN GROWTH FRAMEWORKS

PROBLEM

An Morphological constraints of the built environment impacts the benefits of natural light in our daily lives.

Voids between buildings often suffer from limited natural light. This can cause an ineffective or heavily restricted green growth infrastructure.

PHOTO BY LUKAS RODRIGUEZ:

HTTPS://WWW.PEXELS.COM/PHOTO/TREES-DURING-DAY-3573351/

ABSTRACT

An Green growth is vital in the urban environment, through understanding photosynthesis, that plant life requires light to generate its own energy, we can abstract that natural light is a key indicator for green growth. The morphological makeup of urban cityscapes such as green growth, lack of space, large shading and un-natural materials, thus leading to ineffective implementation of green plantation.

An improved comprehension of the relationship between the light, the space, and the green growth can be provided by solar study. Utilizing Ladybug, an environmental plugin for Grasshopper, with real time weather, location, and time data with set parameters to create a site specific solar study along with graphical display.

Through integrating solar analysis with a generative design algorithm, we can optimize a structure to maximize plant growth potential within an urban canyon, whilst minimizing the structures impact on the existing light in the canyon.

HYPOTHESIS

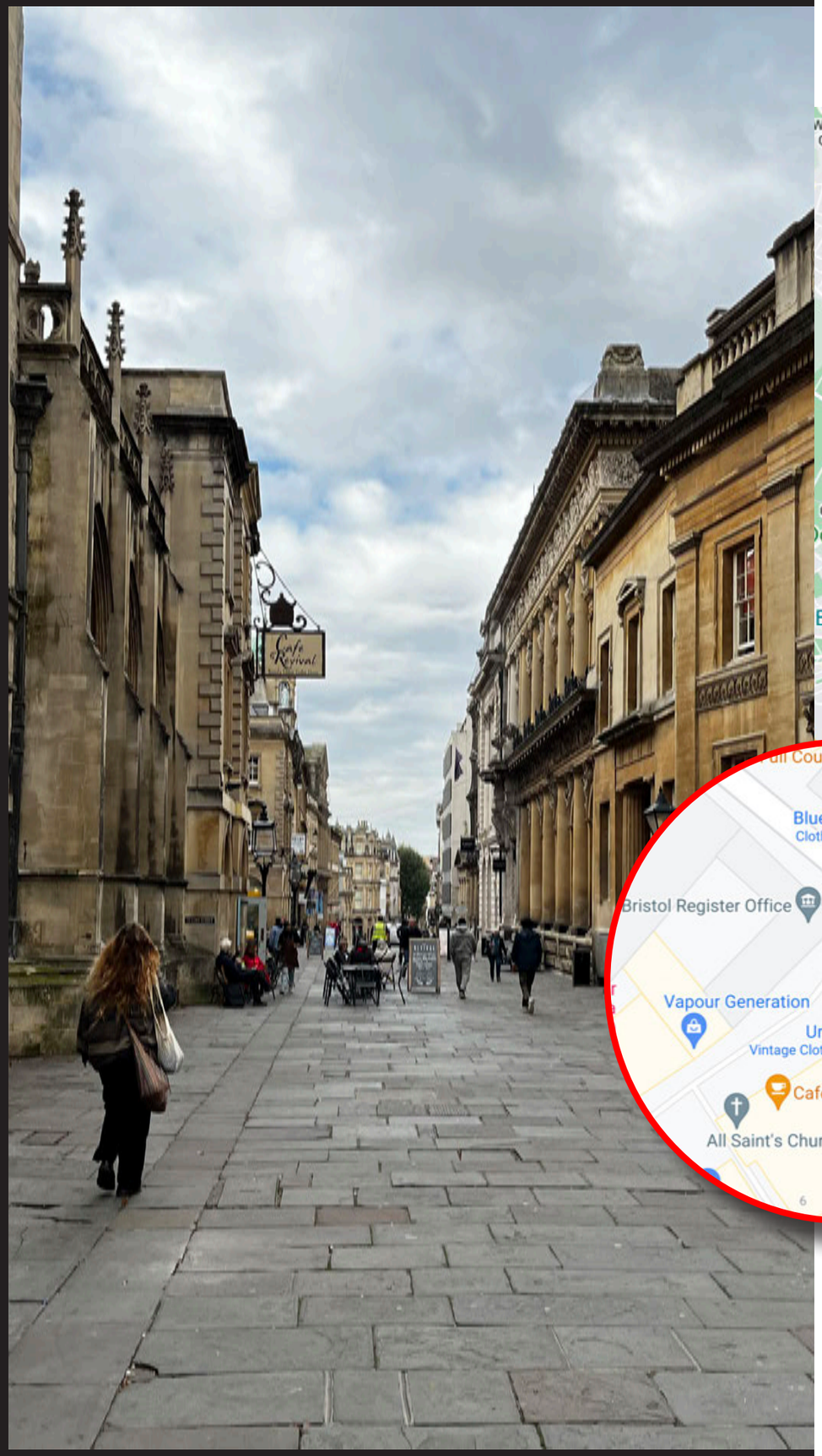
By mapping the exposure of natural light in a predefined urban environment through computational modelling, we can optimise a structural greening of the area to utilise the natural light more effectively.

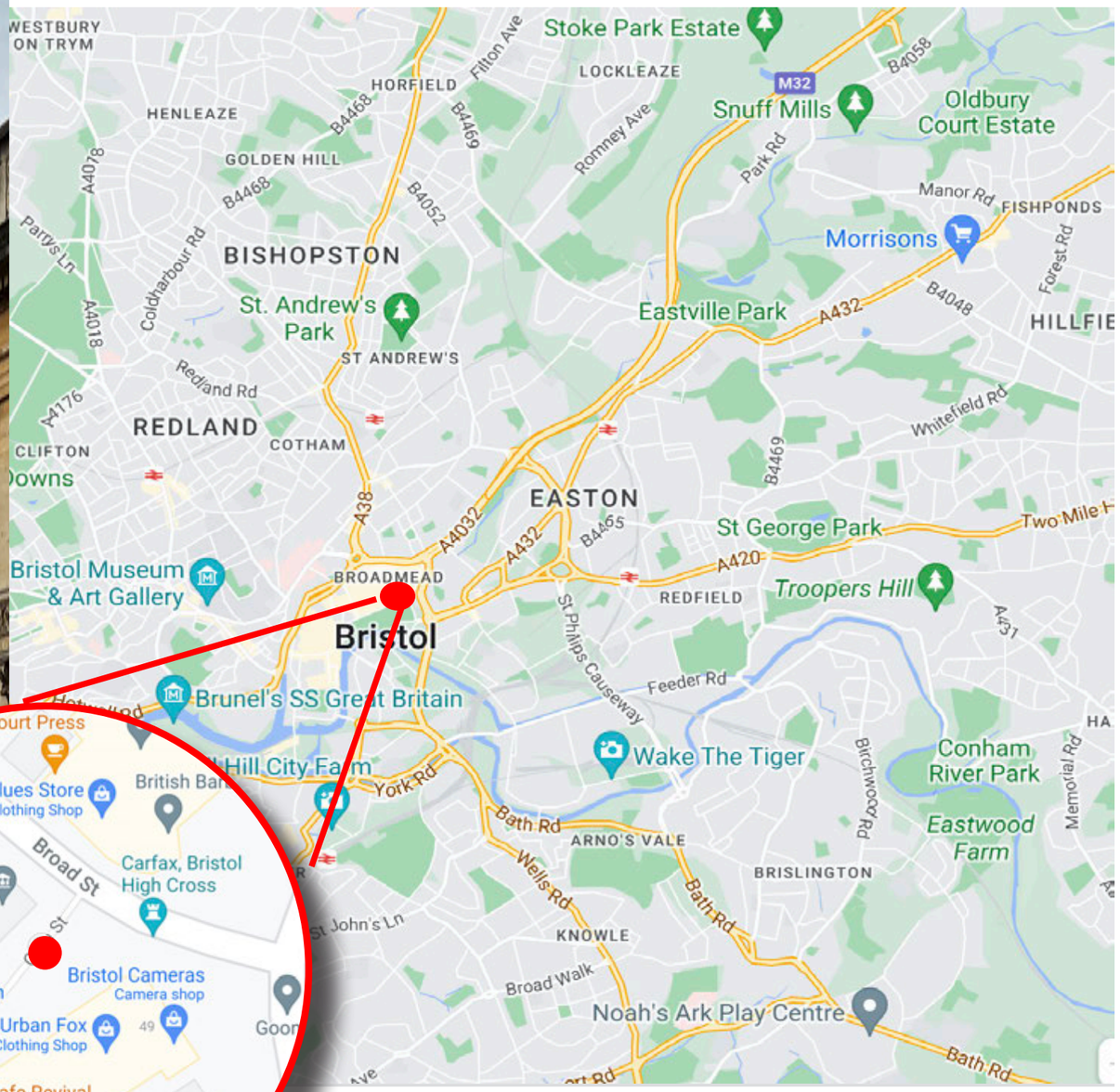
An interactive rapid prototype situation with human-computer interaction can facilitate an effective design process,
Allowing the physical design interference to
Manipulate the results of the parametric solution.

PHOTO BY LUKAS RODRIGUEZ:

HTTPS://WWW.PEXELS.COM/PHOTO/TREES-DURING-DAY-3573351/

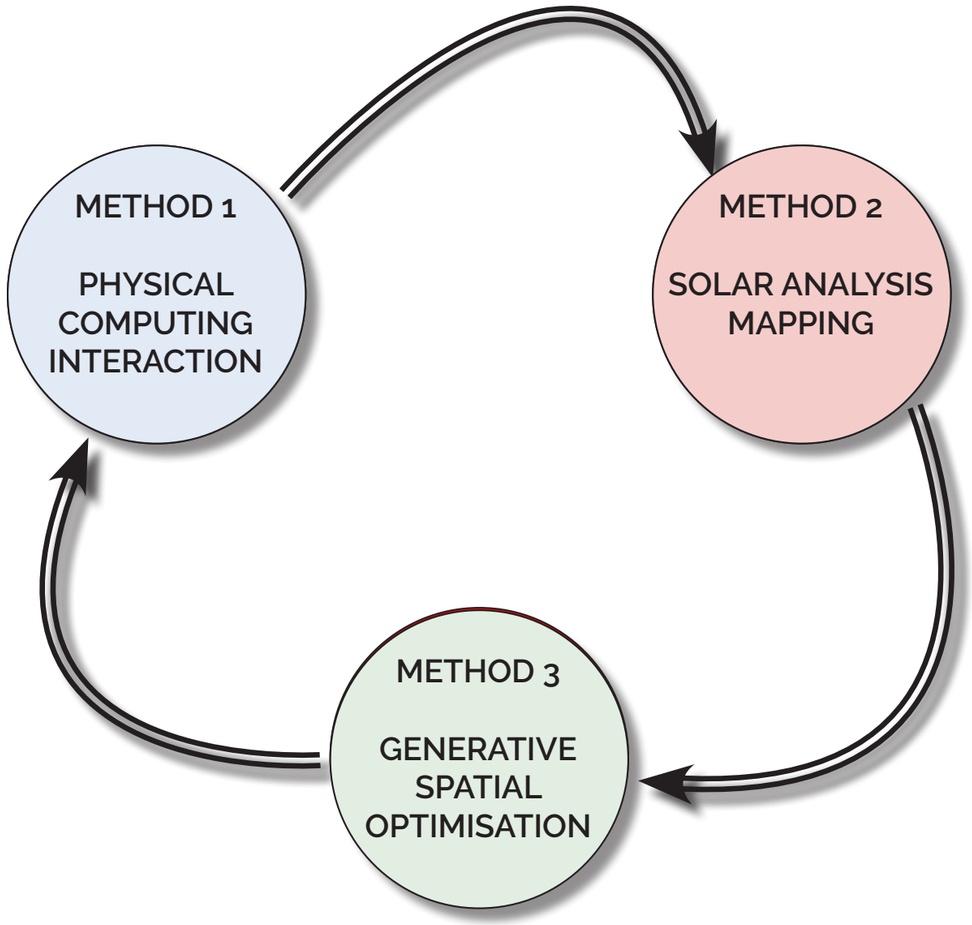
SITE LOCATION



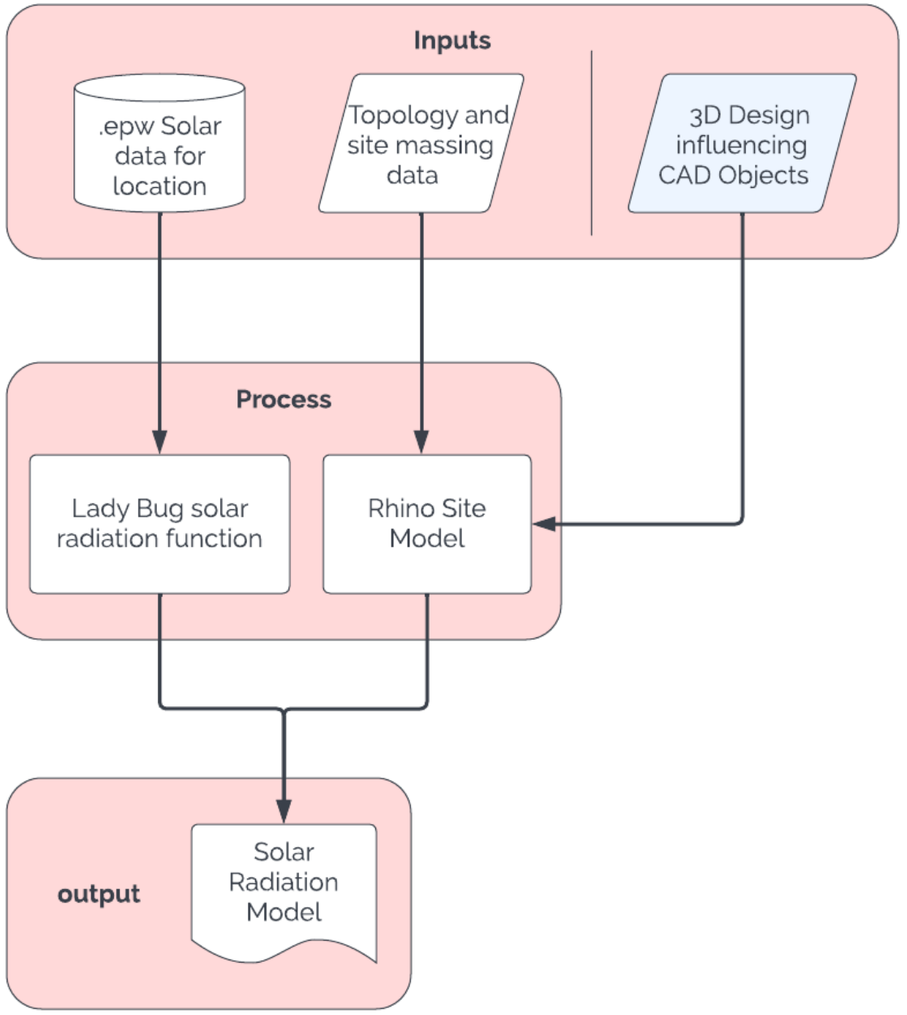


Site Location:

Corn Street, Bristol, BS1



SOLAR ANALYSIS

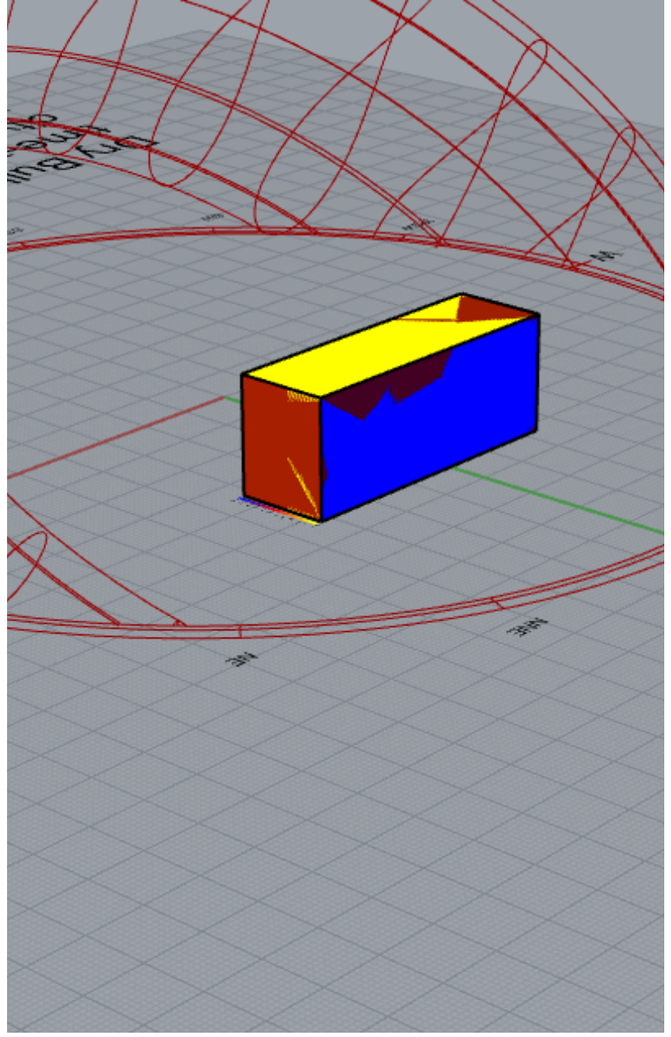


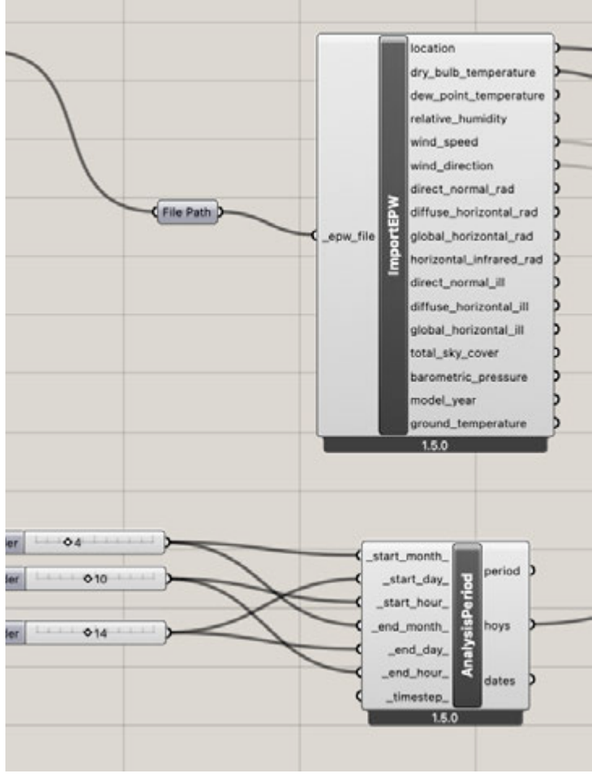
SOLAR ANALYSIS USING LADYBUG IN GRASSHOPPER

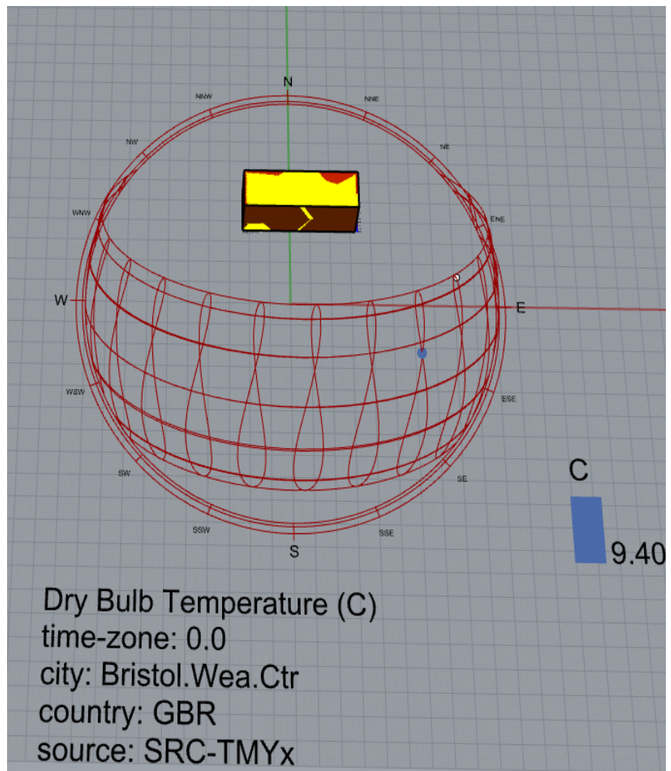
LADYBUG

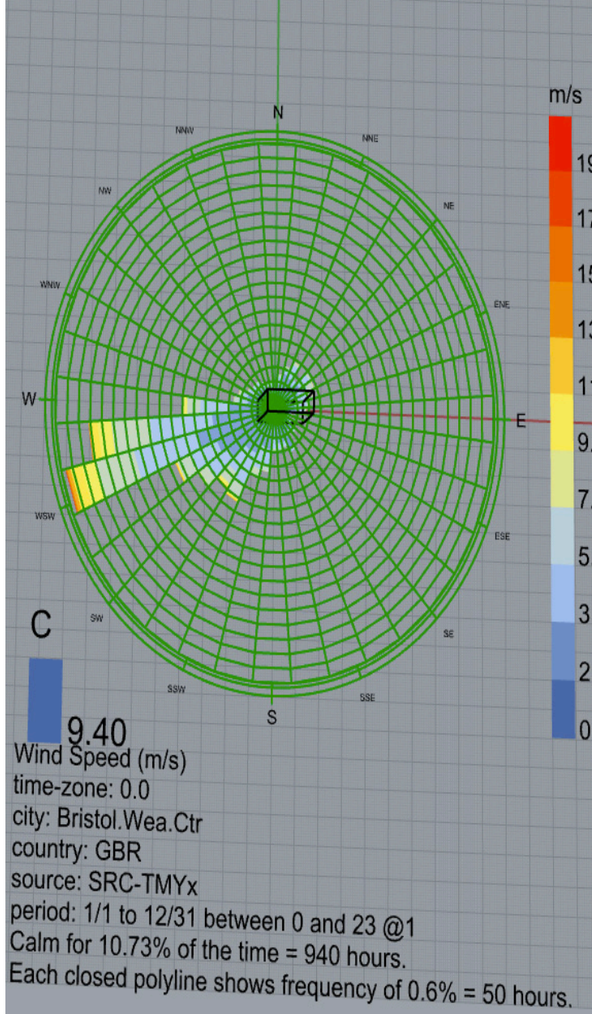
Ladybug allows you to visualize and analyse weather data in Grasshopper. This includes diagrams like the sun path, wind rose, psychometric chart, etc., as well as studies of geometry like radiation analysis, shadow studies, and view analysis. (https://www.food4rhino.com/en/app/ladybug-tools)

Using the ladybug plugin within Grasshopper in Rhino, .epw file of Bristol containing all the weather data was imported in.









EDIT MAP

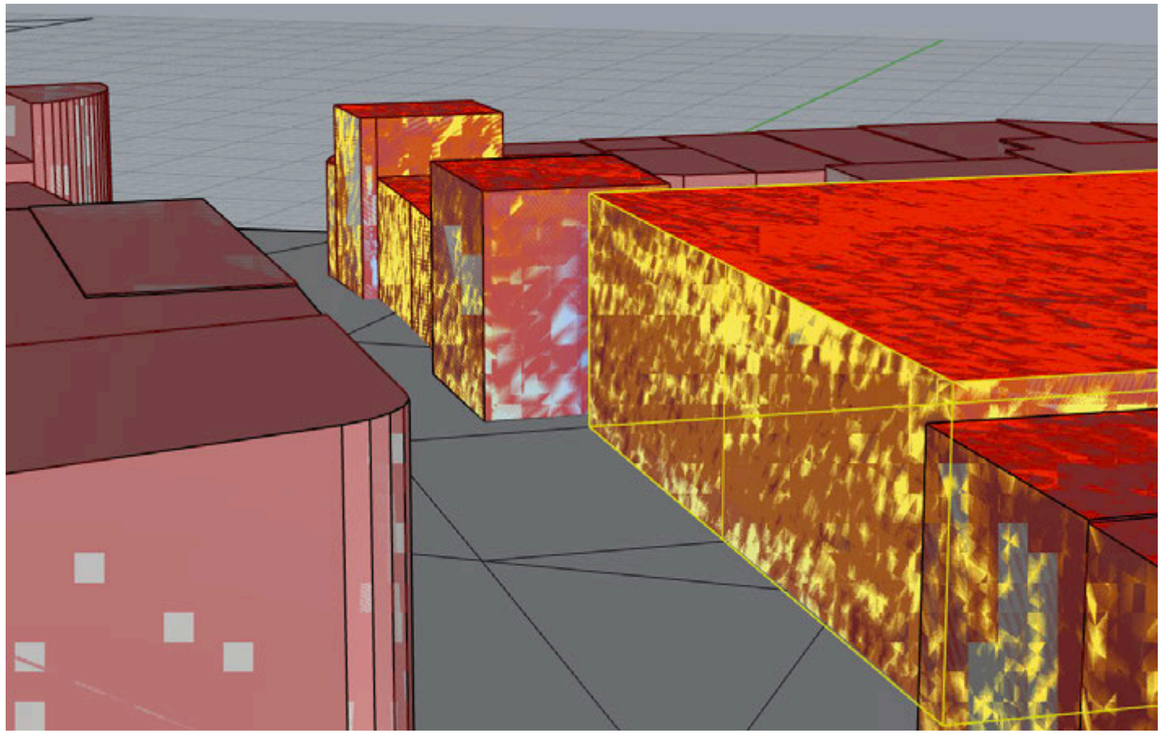
Map near Bristol, England, GB

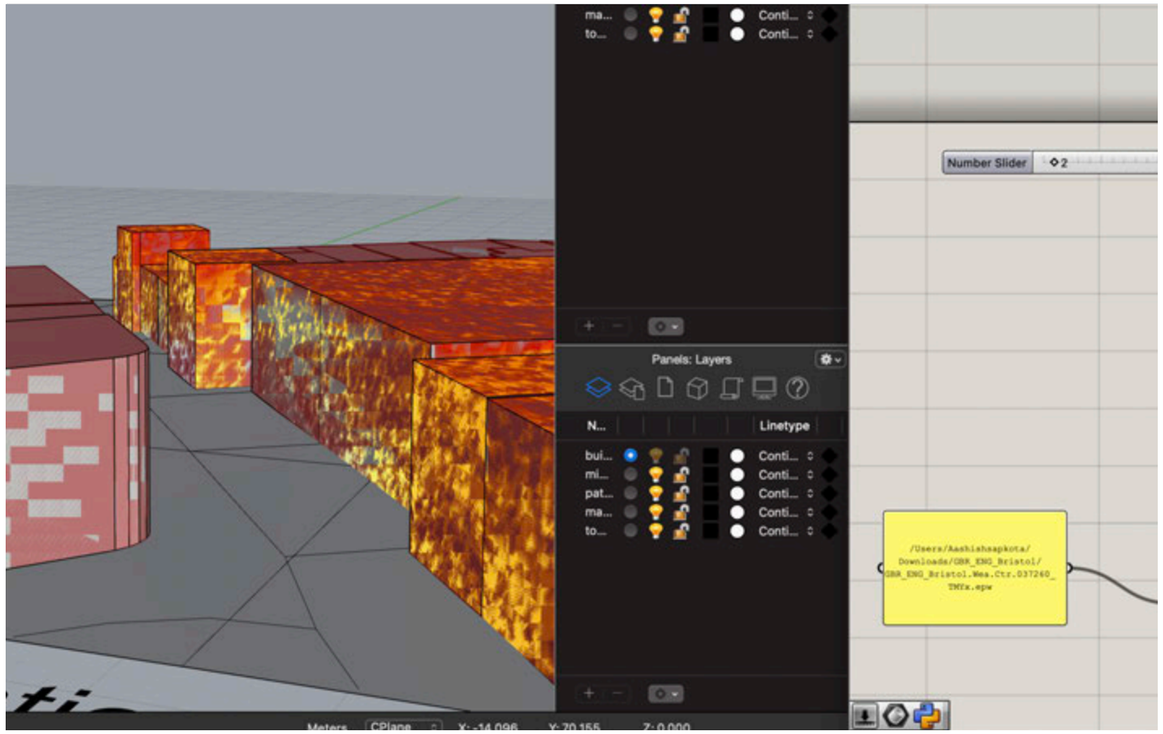
File Type: Rhino 5 3DM
Area: 0.047 km^2
Buildings: 128 total, 43 with height value (34%)
Topography: Included, 11.00 m above sea level
Settings: Road centerlines, 3D buildings, 10 m contours
Spatial Reference System: Meters; UTM zone: 30, easting: 528175.20, northing: 5700372.49

DOWNLOAD (35.9 KB) Download available for 1 week.

PREVIEW: **3D Axonometric View** 2D View Topography

CADMAPPER
Selected area of site location downloaded as a Rhino .3DM file and imported into Rhino

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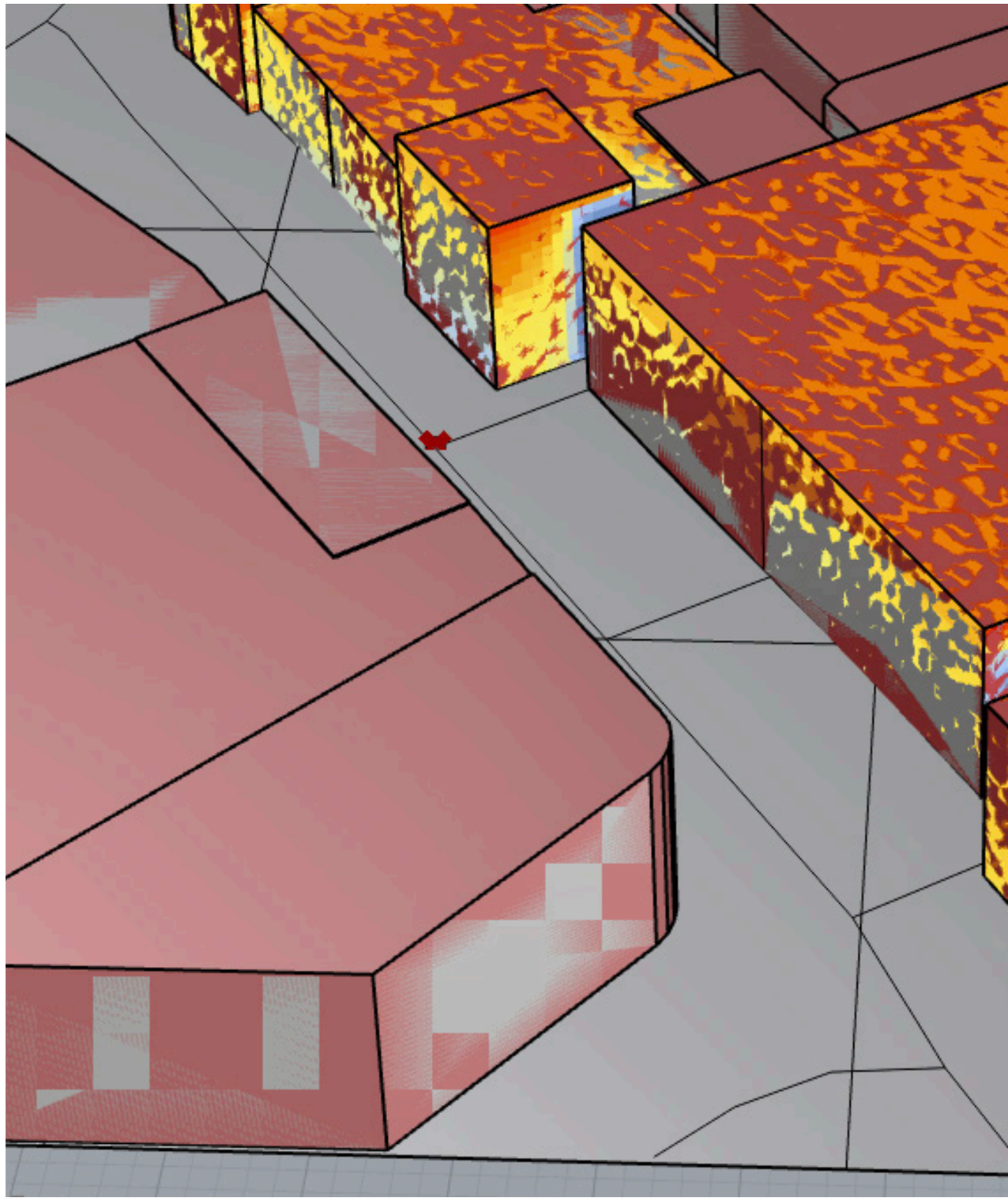
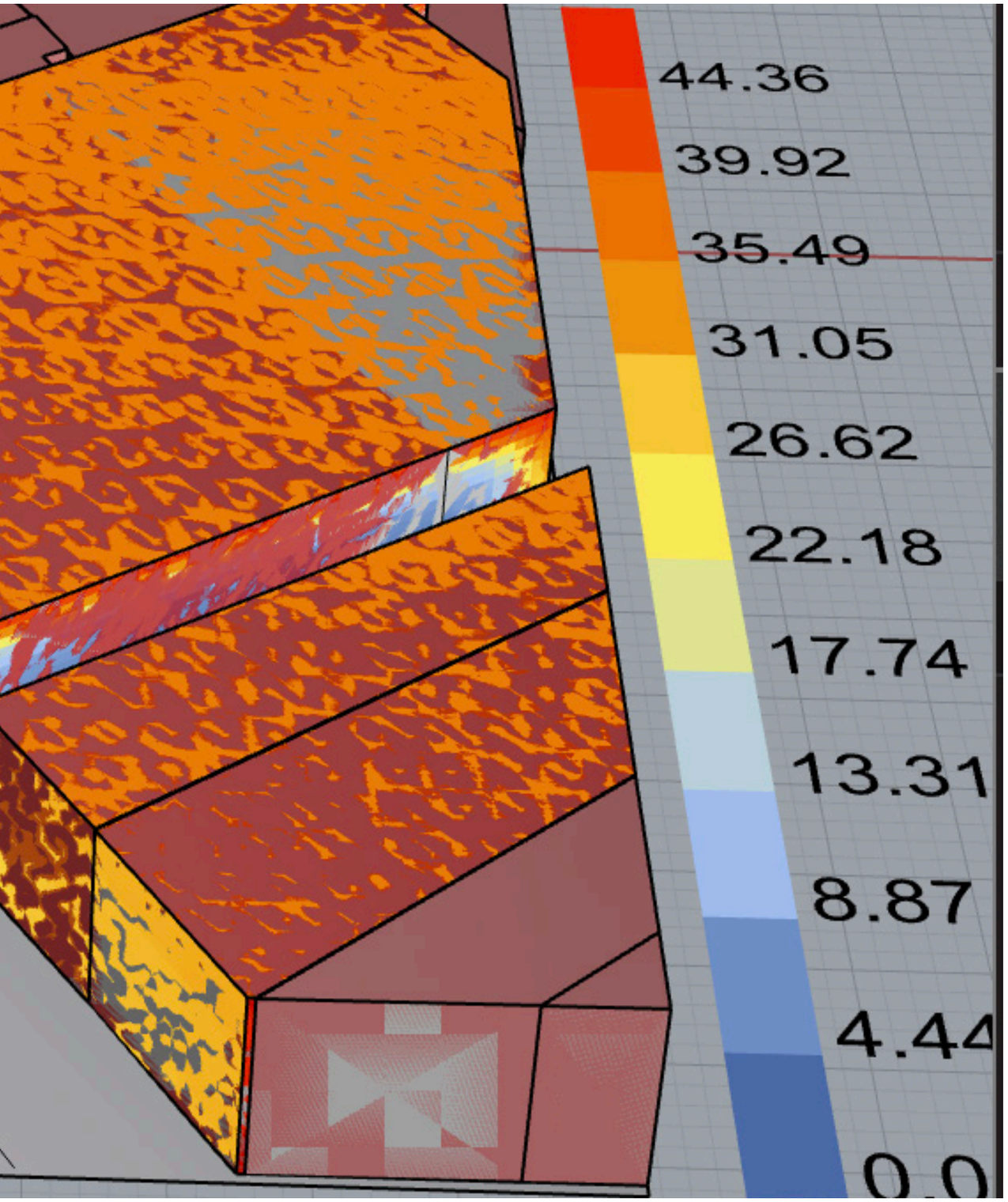
Linetype

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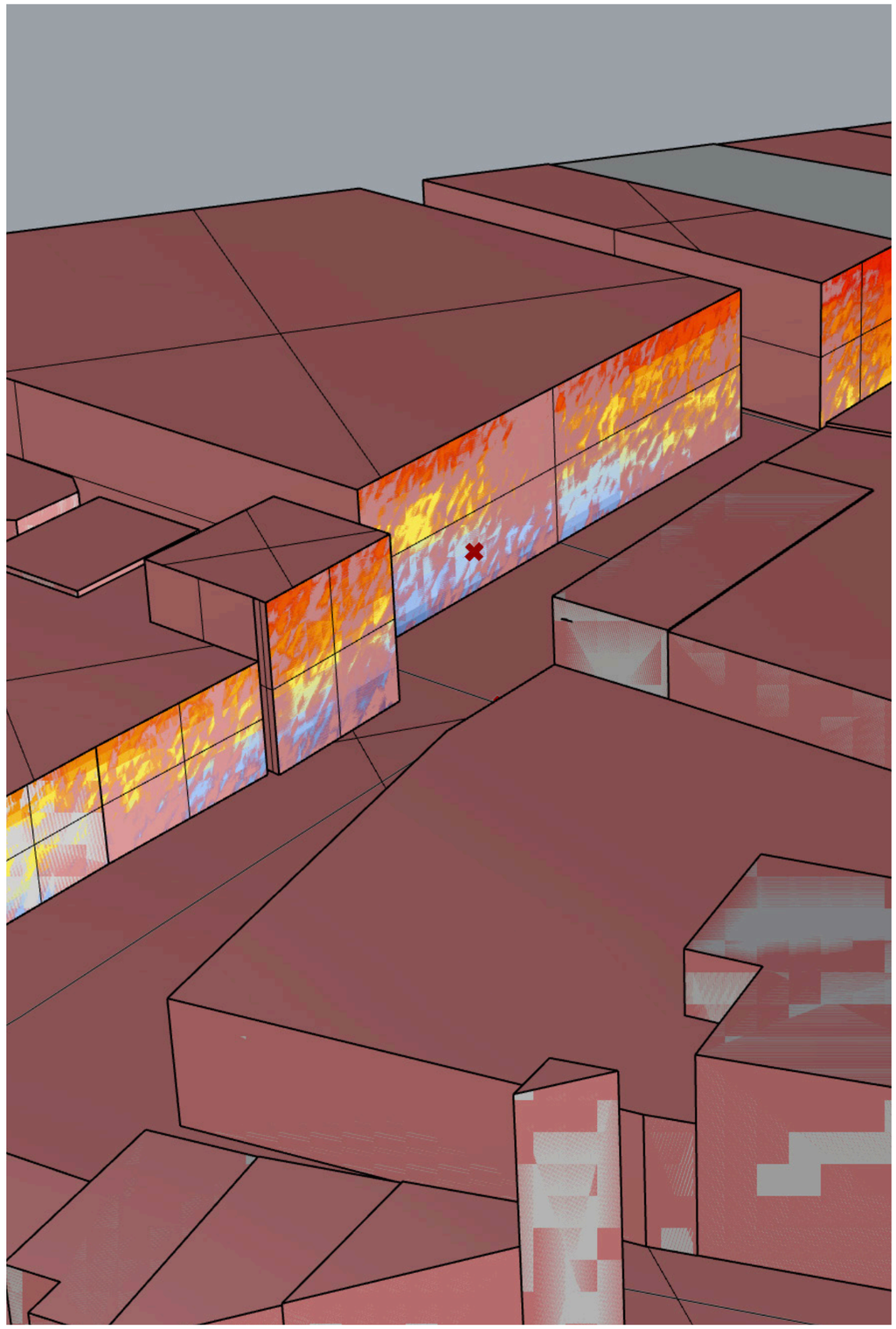

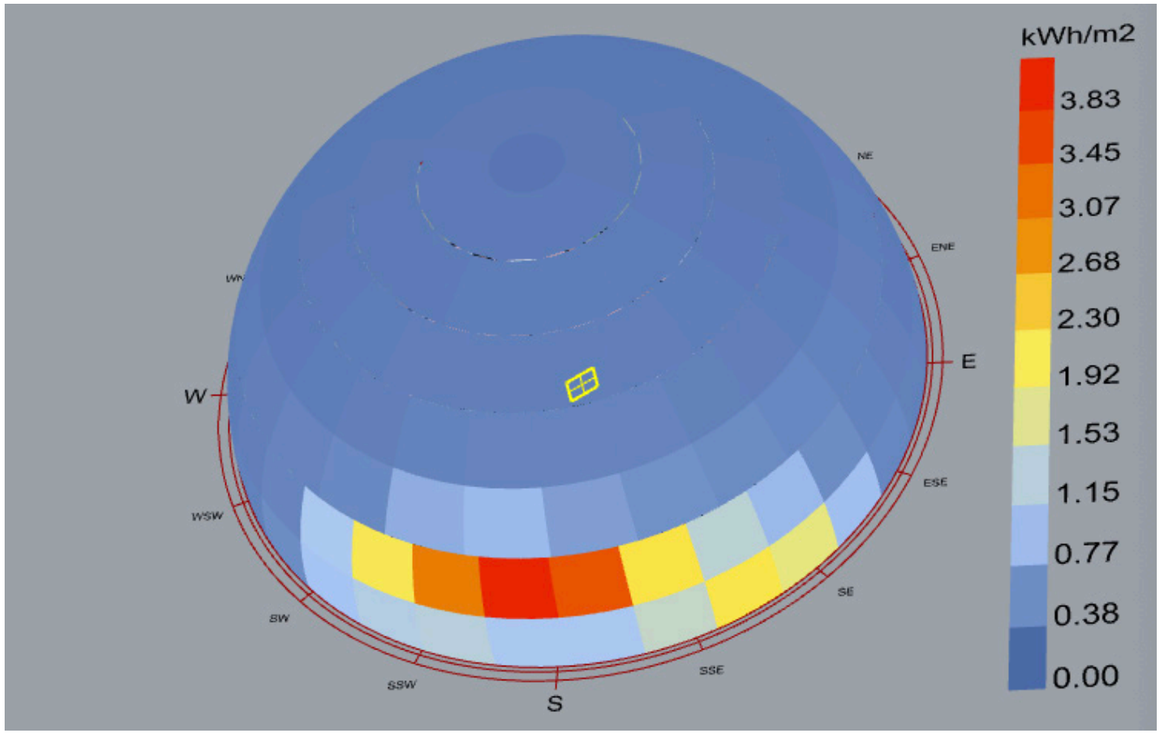
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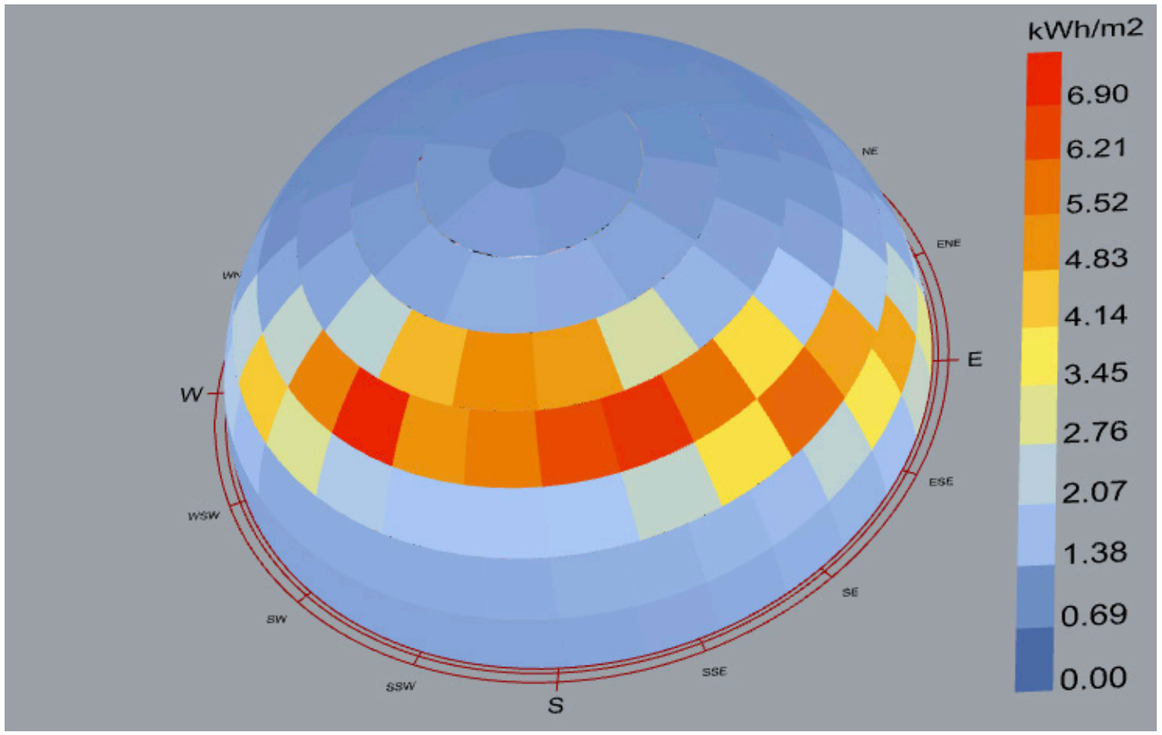
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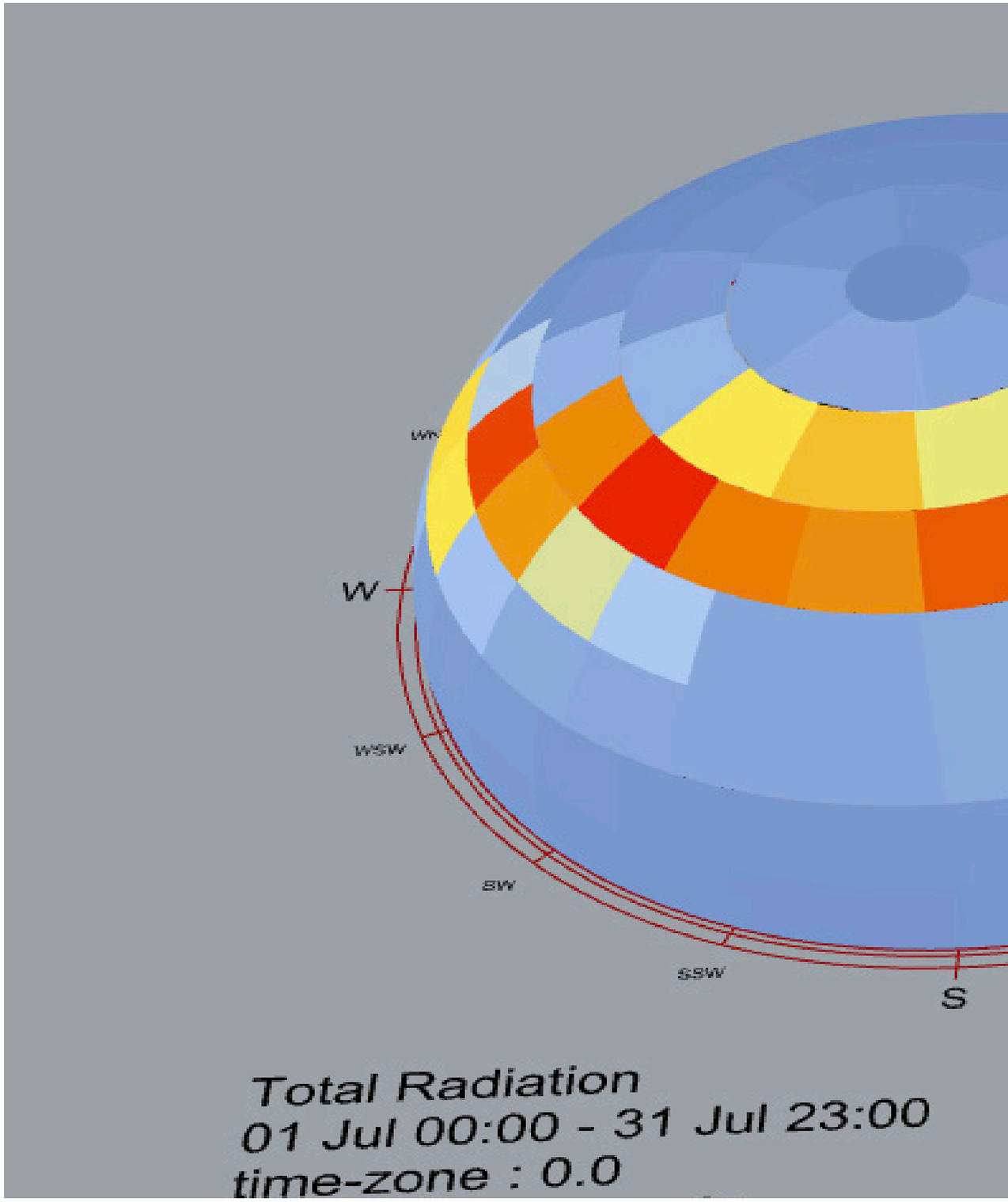
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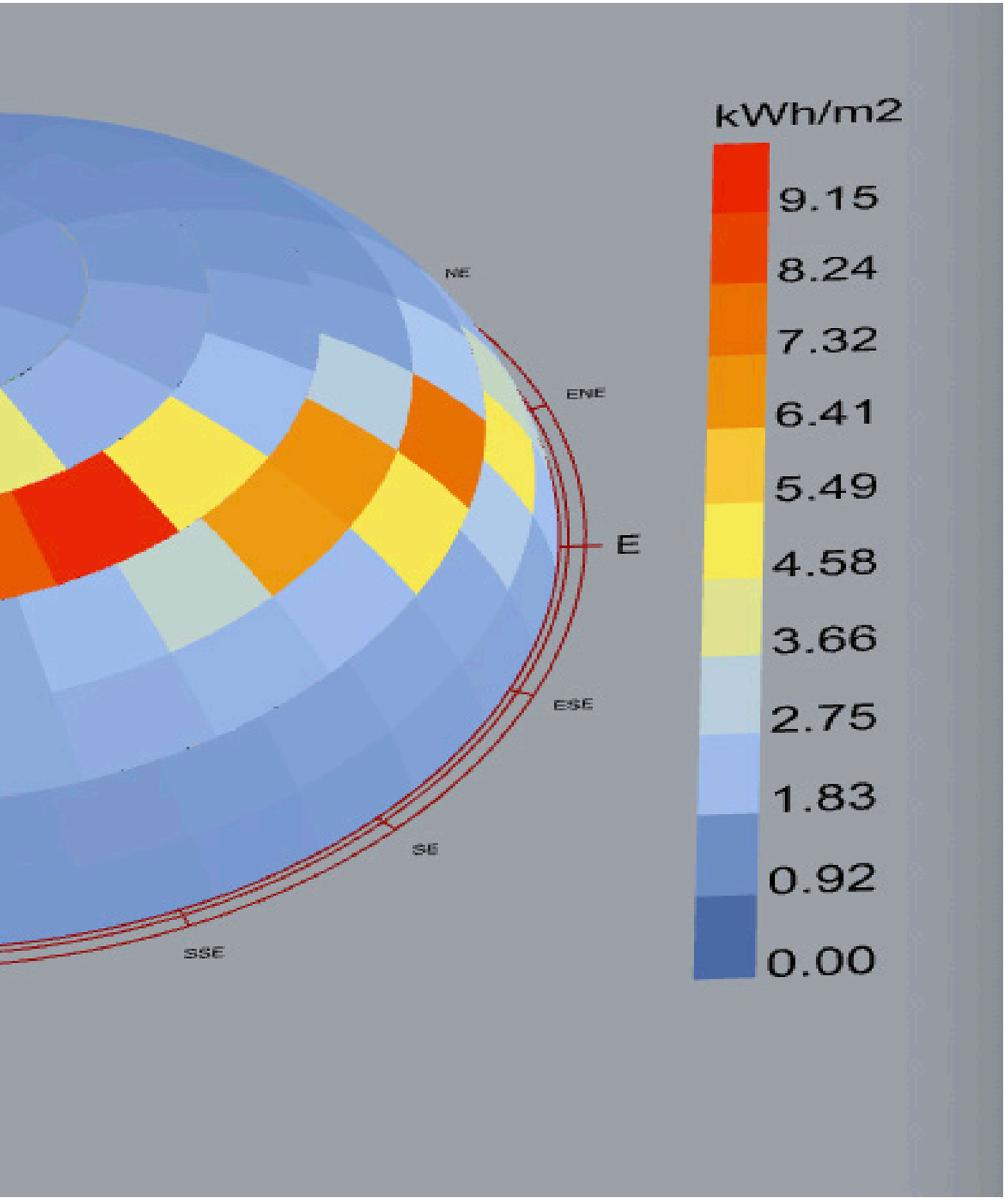
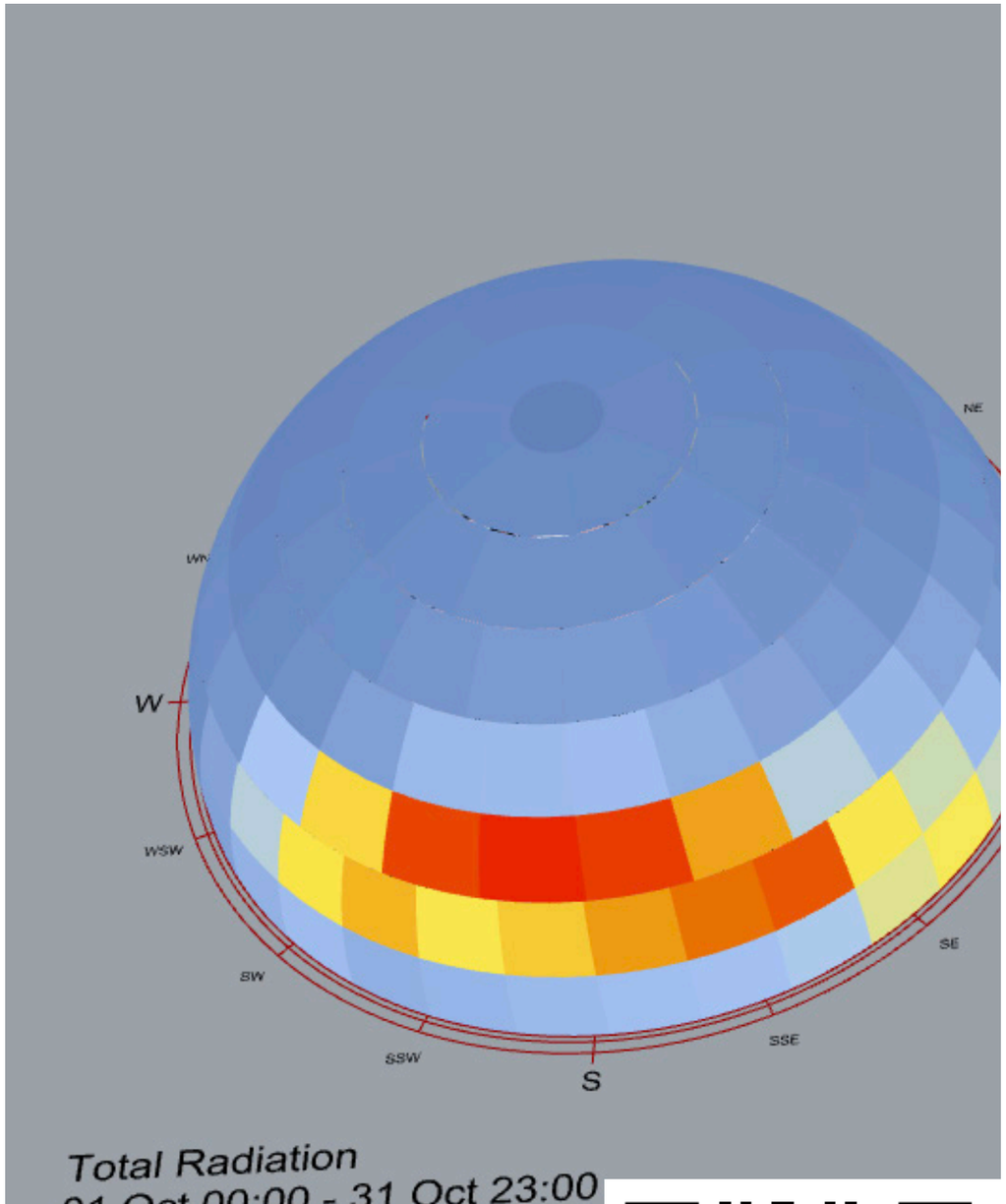
Total Radiation
01 Jul 00:00 - 31 Jul 23:00
time-zone : 0.0





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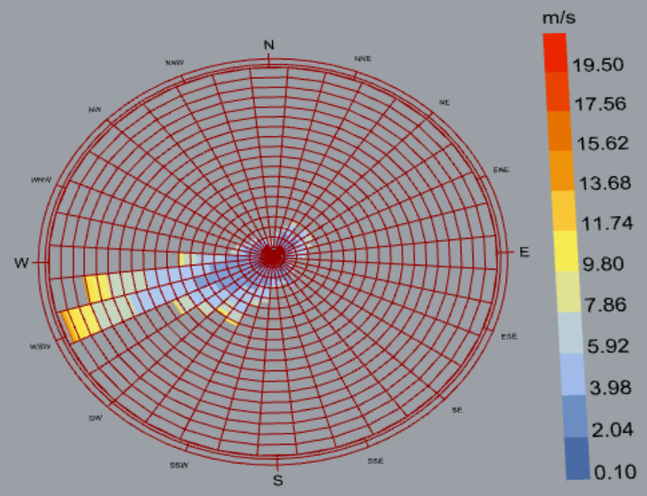
country : GBR
source : SRC-TMYx



Wind Speed (m/s)
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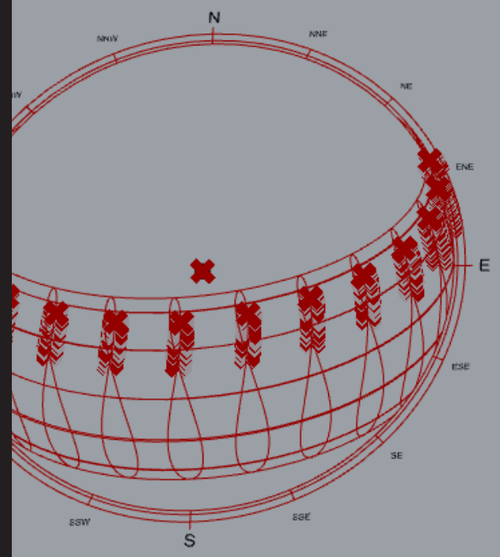
city: Bristol.Wea.Ctr
country: GBR
source: SRC-TMYx
period: 1/1 to 12/31 between 0 and 23 @1
Calm for 10.73% of the time = 940 hours.
Each closed polyline shows frequency of 0.6% = 50 hours.



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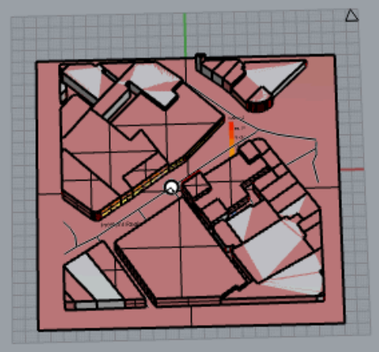

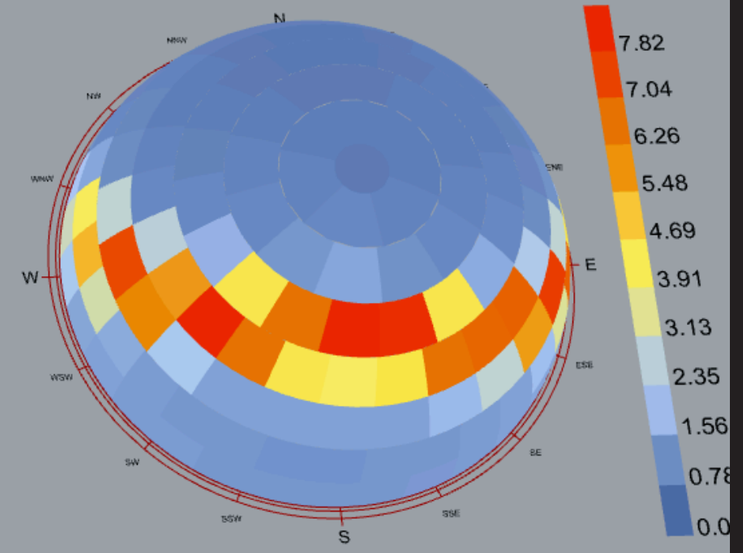

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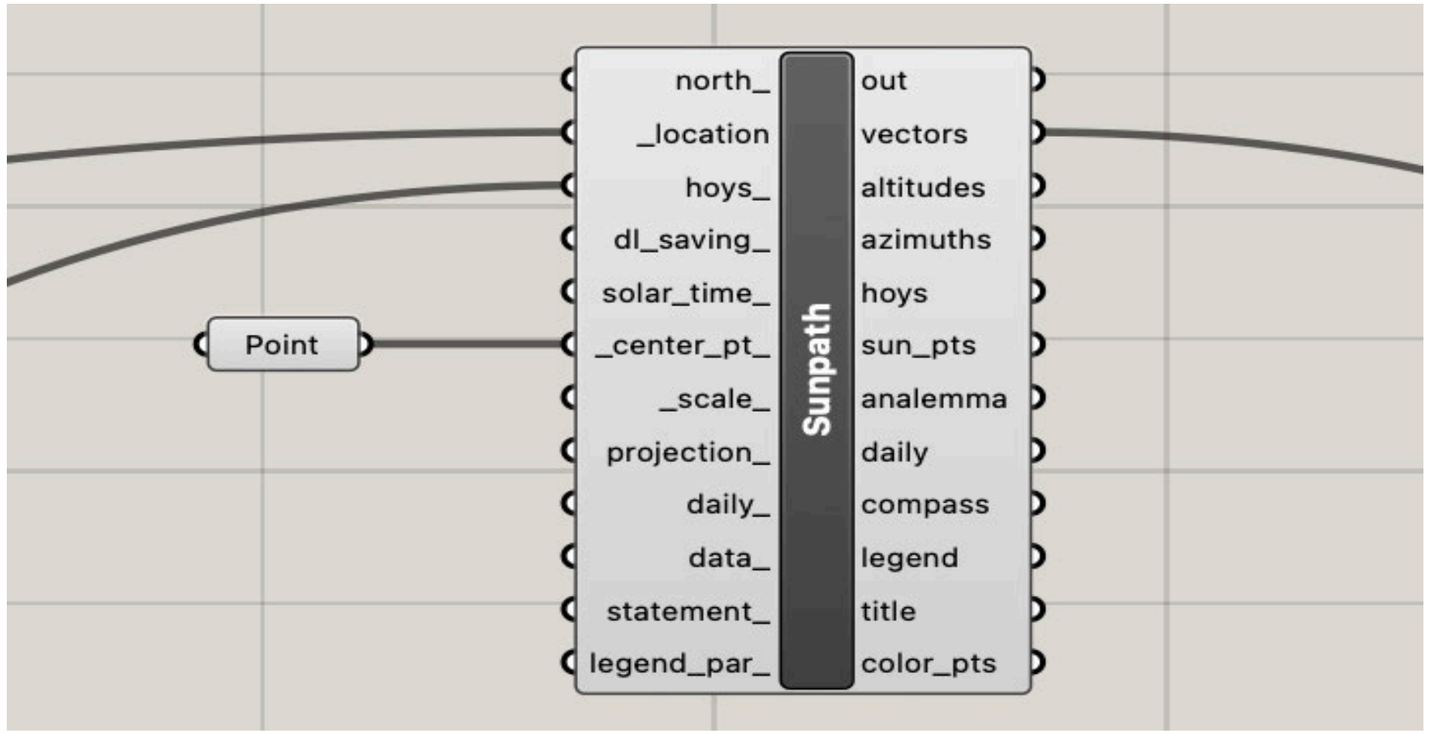
country : GBR
source : SRC-TMYx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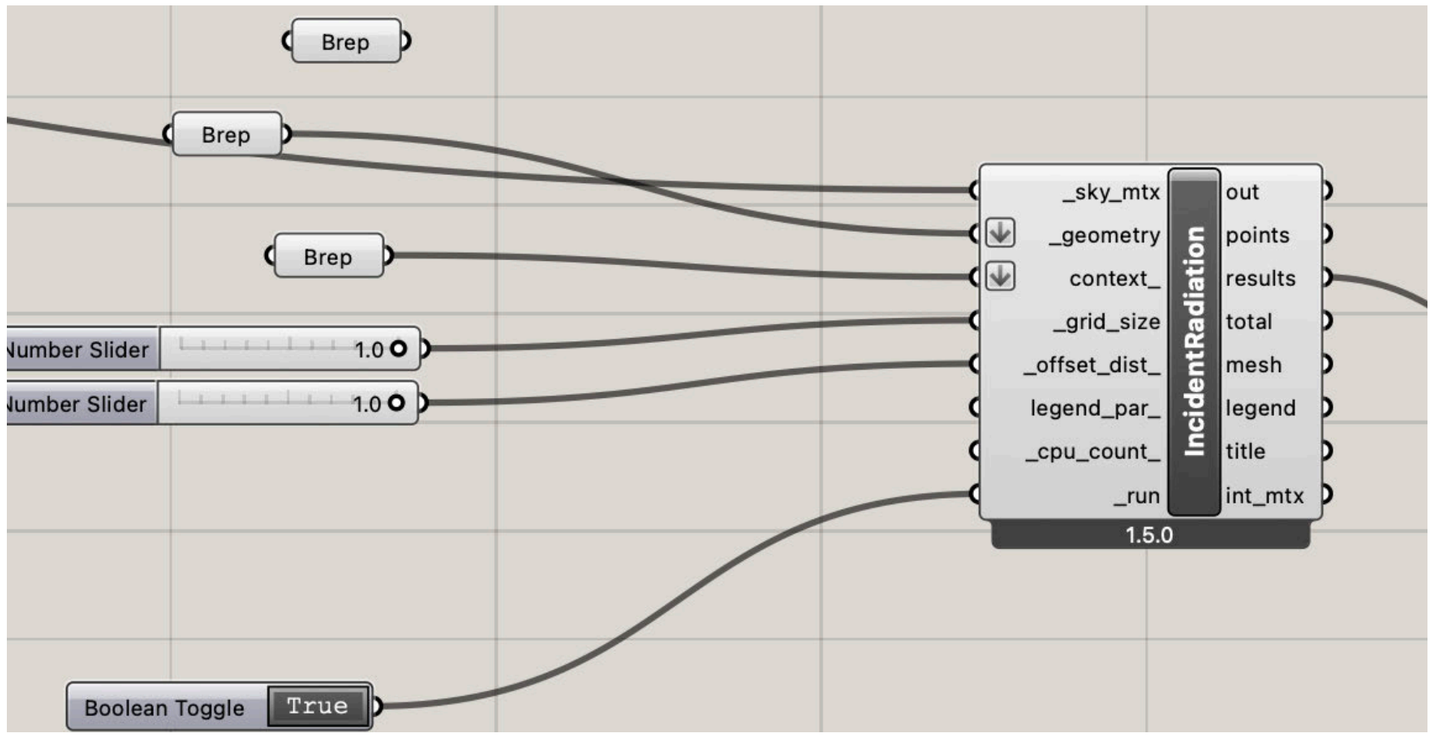
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Number Slider
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_offset_dist_
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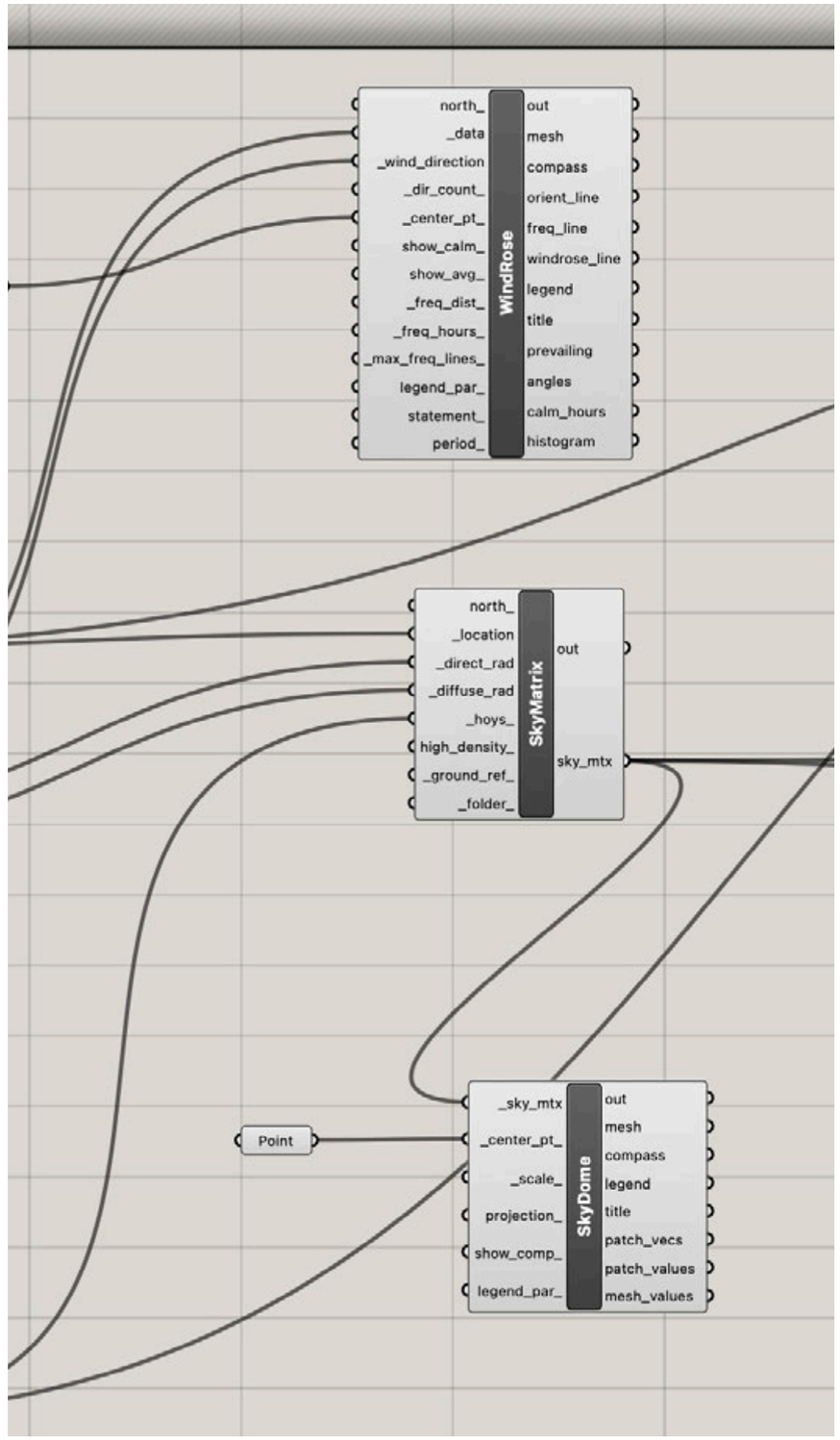
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_freq_hours_
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legend_par_
statement_
period_
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mesh
compass
orient_line
freq_line
windrose_line
legend
title
prevailing
angles
calm_hours
histogram
north_
_location
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hoys
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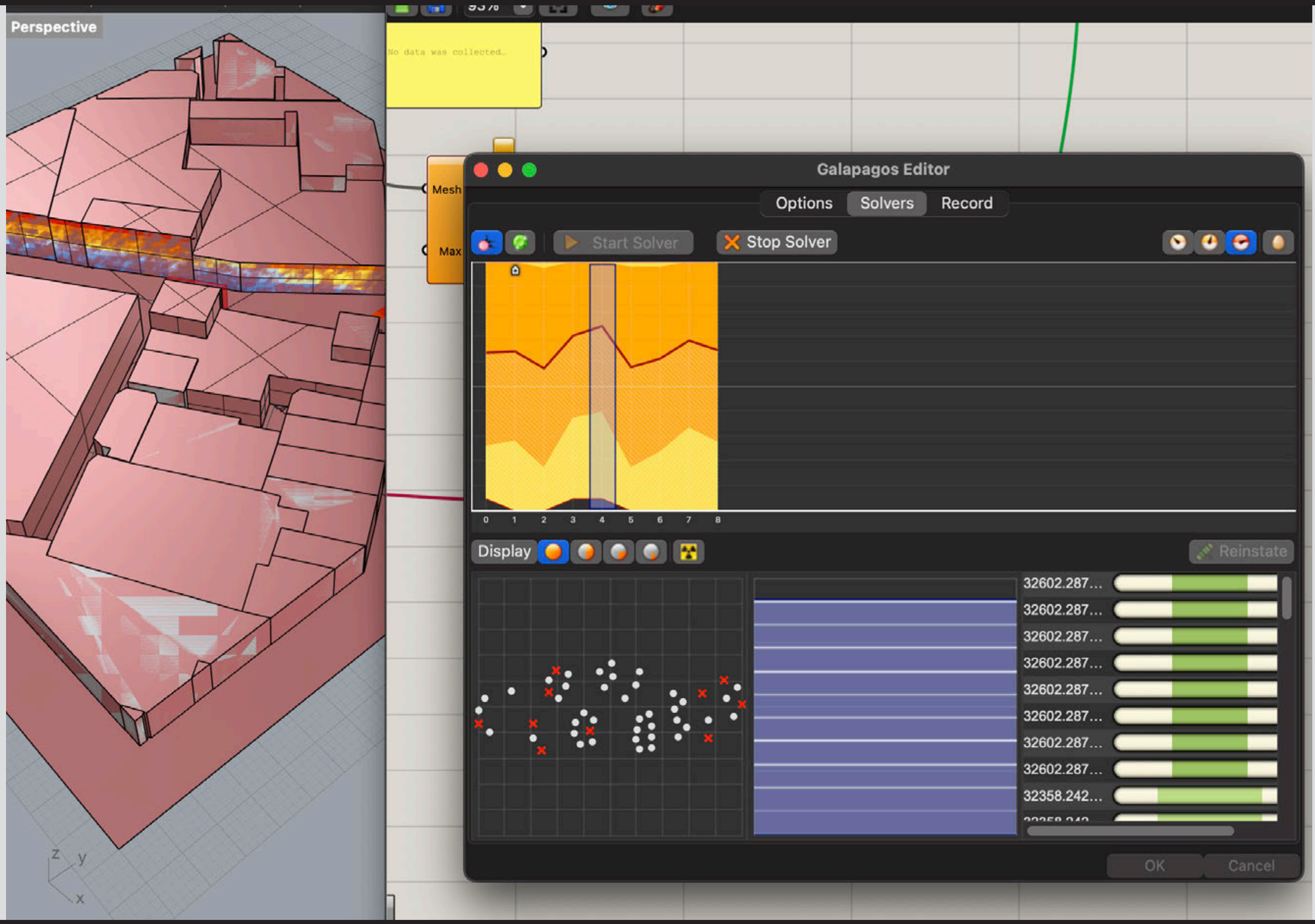
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Galapagos Editor
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Stop Solver
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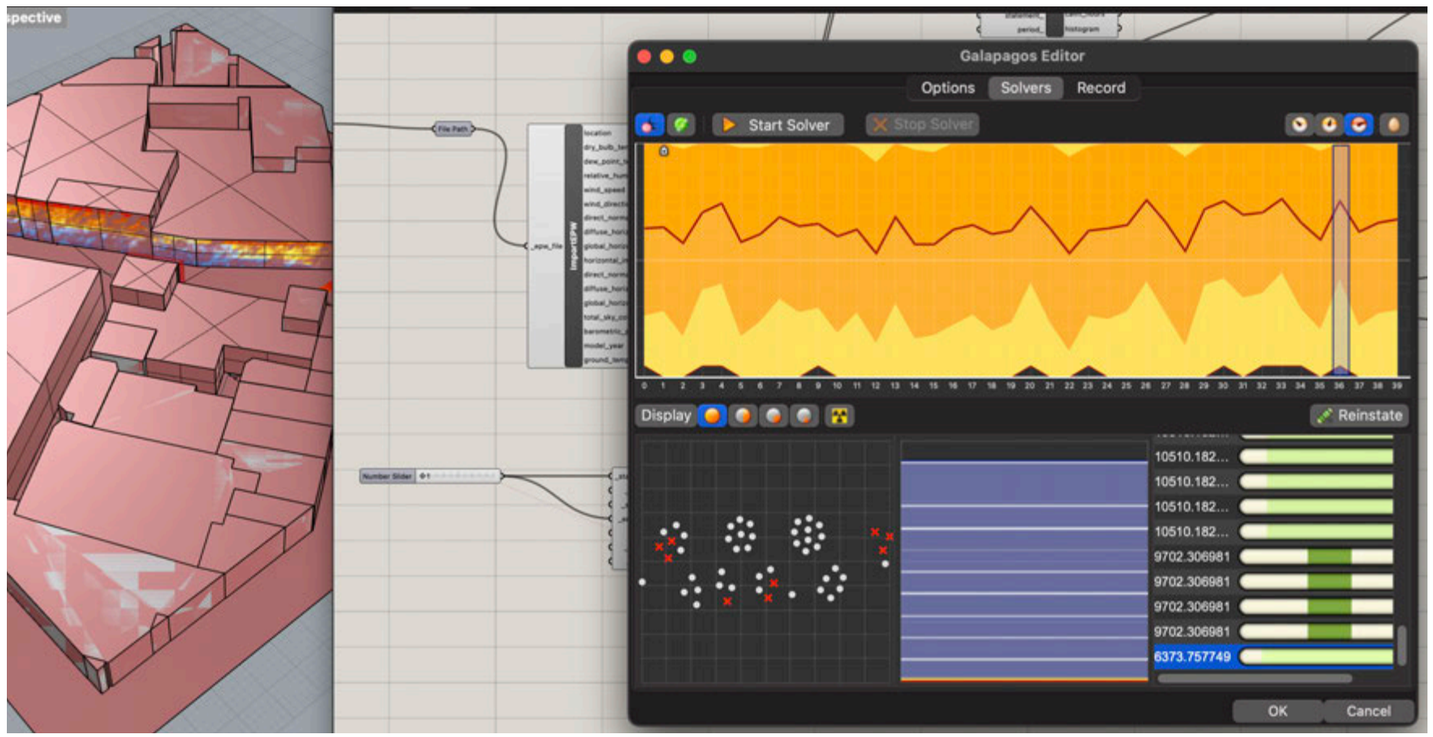

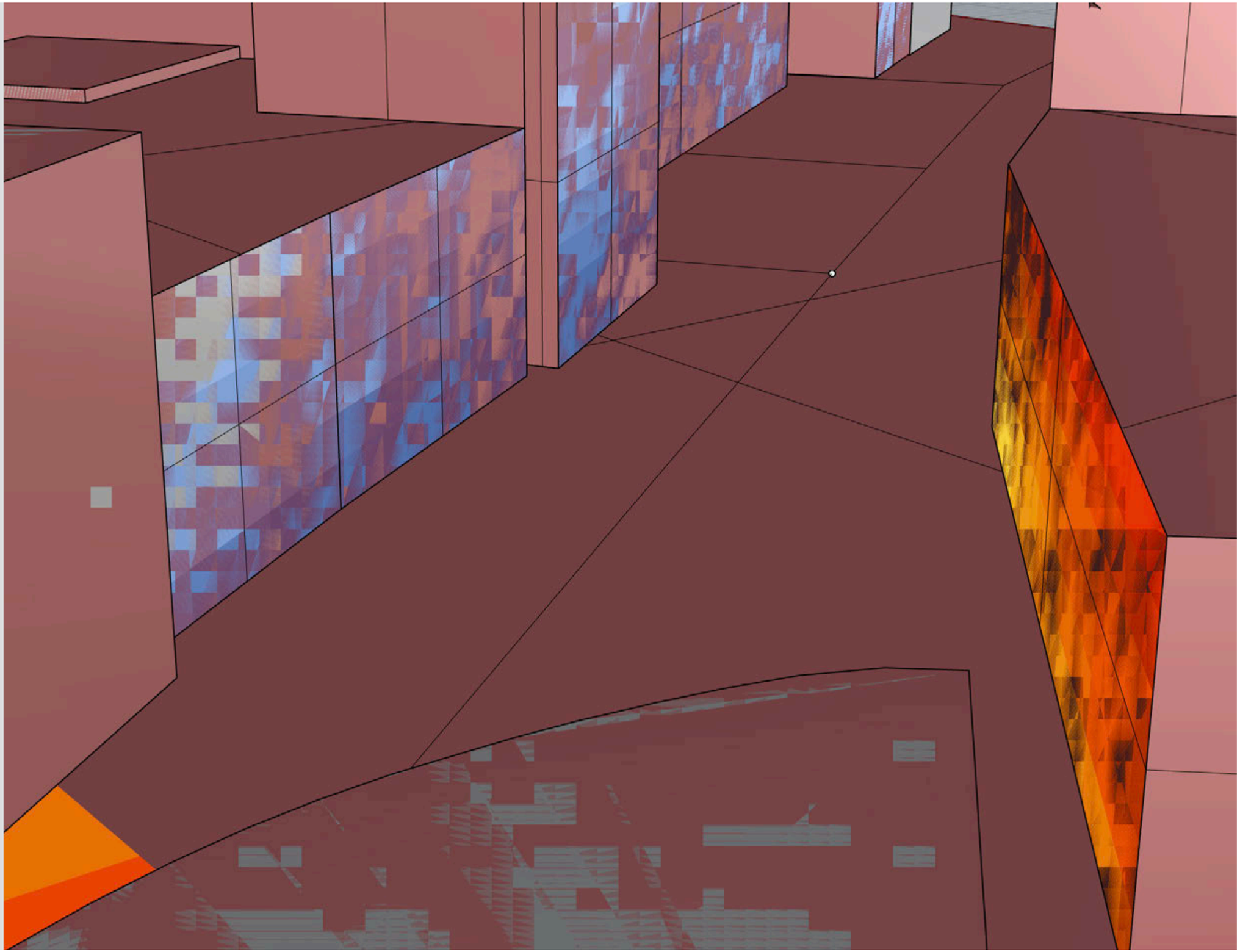
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