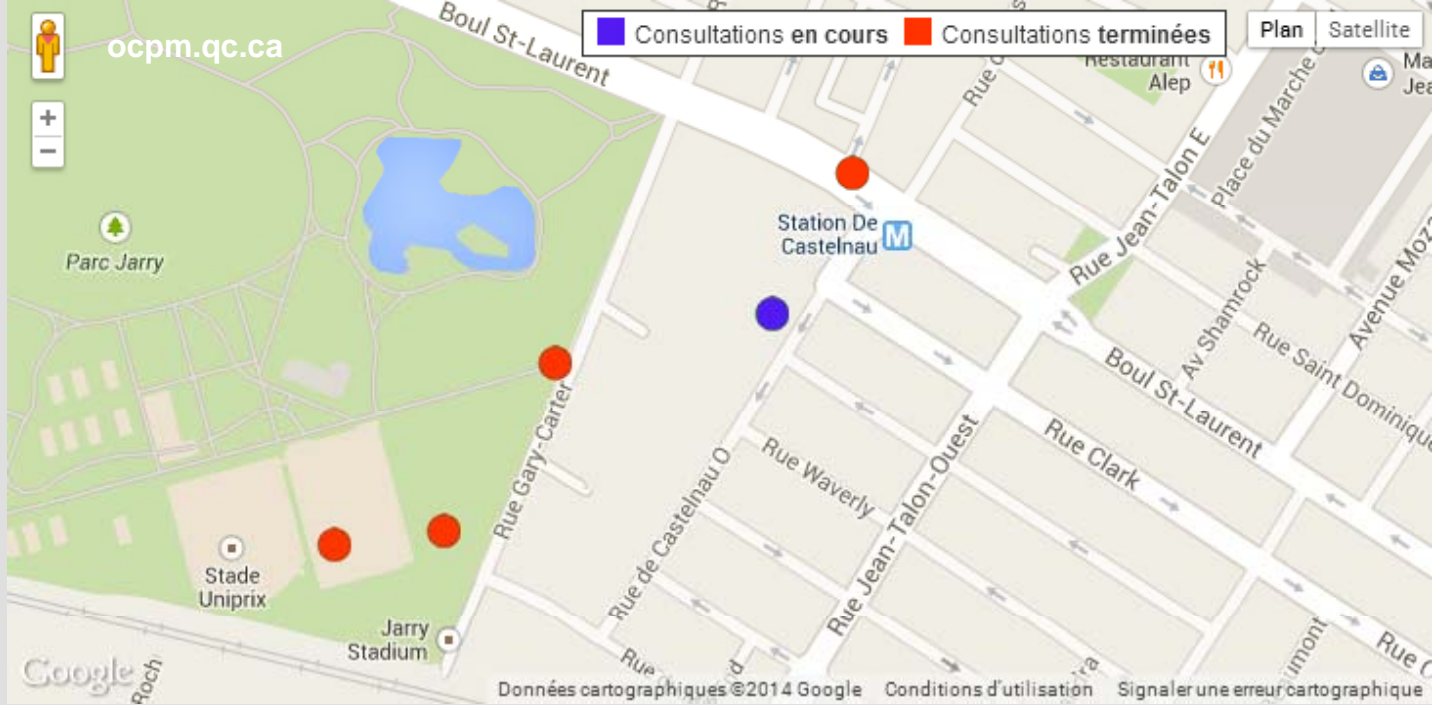
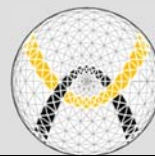
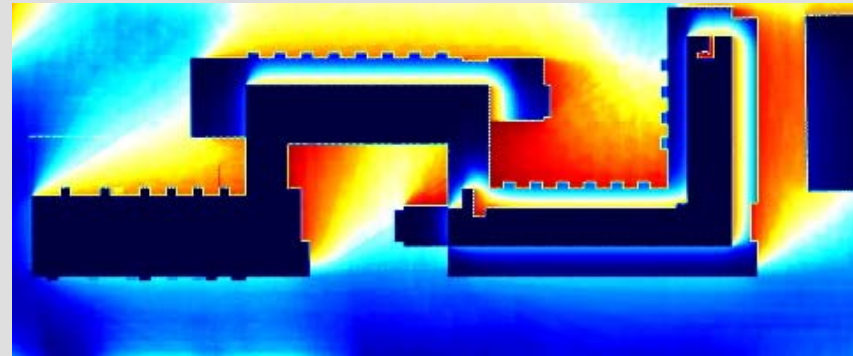




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DE MONTRÉAL**

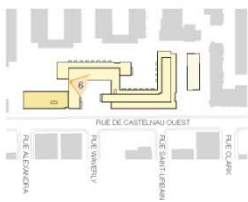


**Projet immobilier - Les Ateliers Castelnau**



www.**SOLARCHVISION**.COM

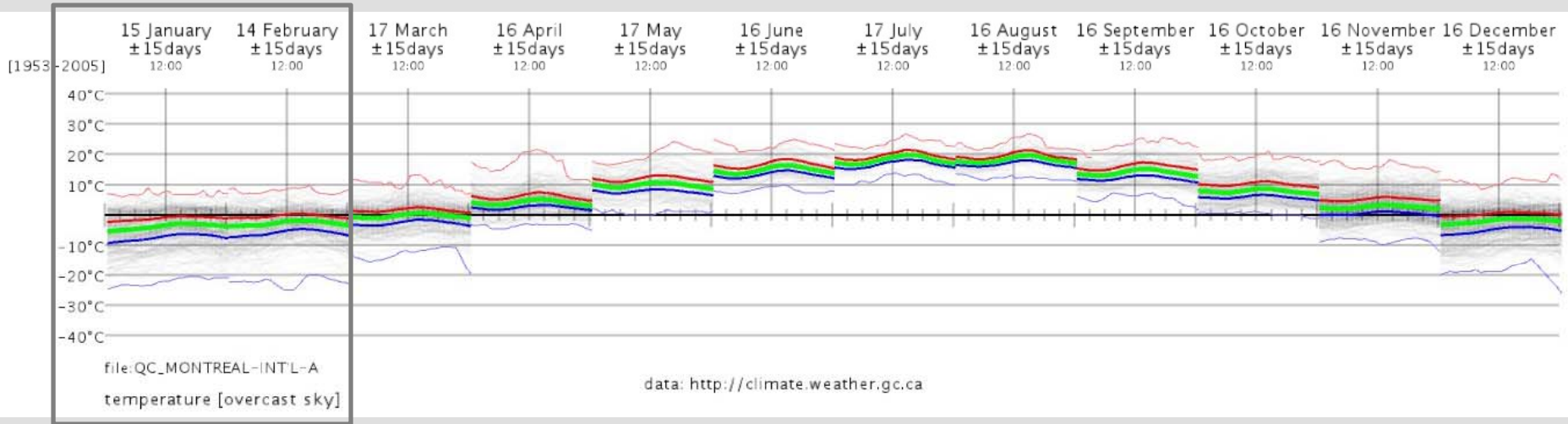
March 18, 2014  
MOJTABA SAMIMI



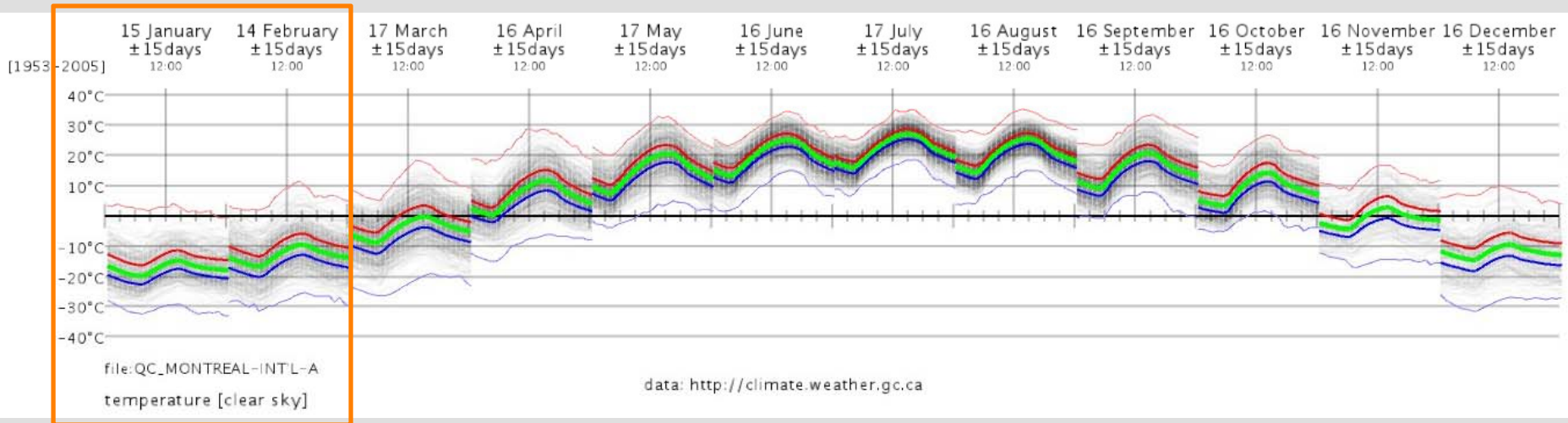
In cities with extreme temperature conditions, in many cases, extreme **high** and **low** temperature conditions are **SUNNY**.



# Air temperature plot in overcast sky condition



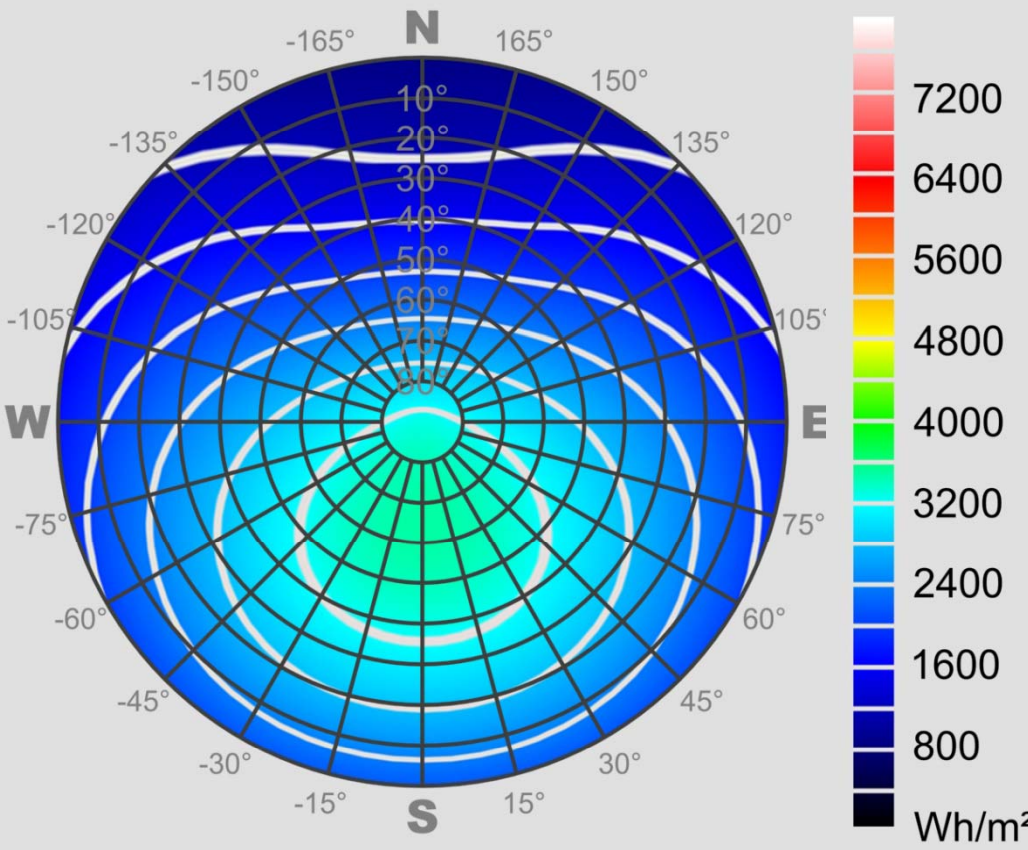
SOLARCHVISION standardization based on Canadian Weather Energy and Engineering Datasets of Montréal (1953-2005)



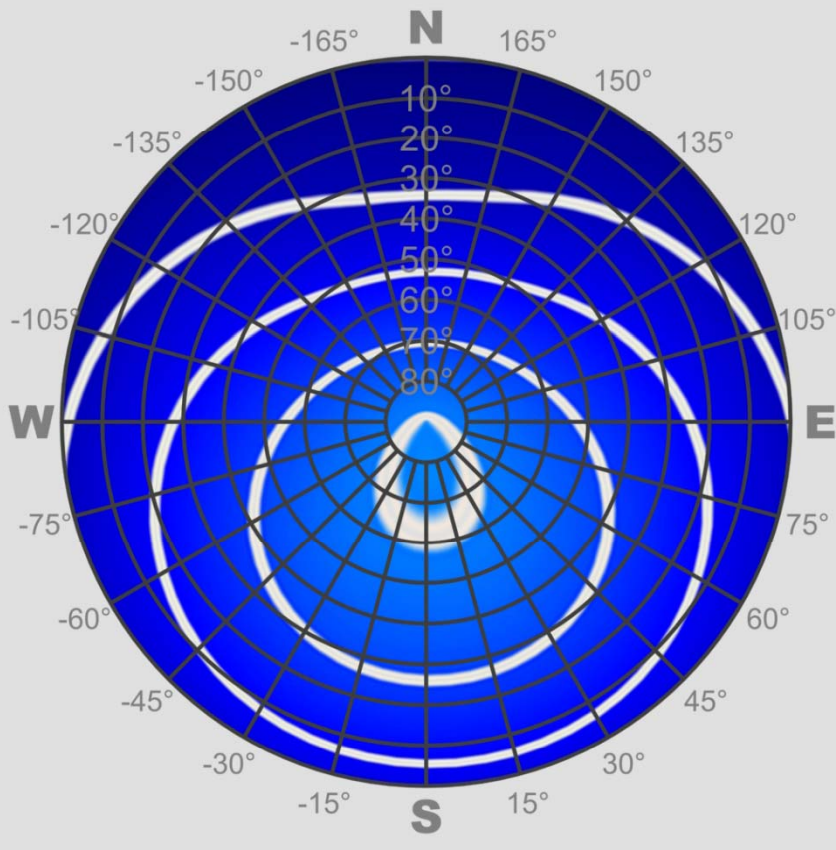
# Air temperature plot in clear sky condition

# Potentials for active of strategies in Montréal (CA) is much higher comparing to those of Berlin(DE).

Differences between the total amount of annual radiation on different orientations and inclinations in typical meteorological year (U.S. Department of Energy TMY files)



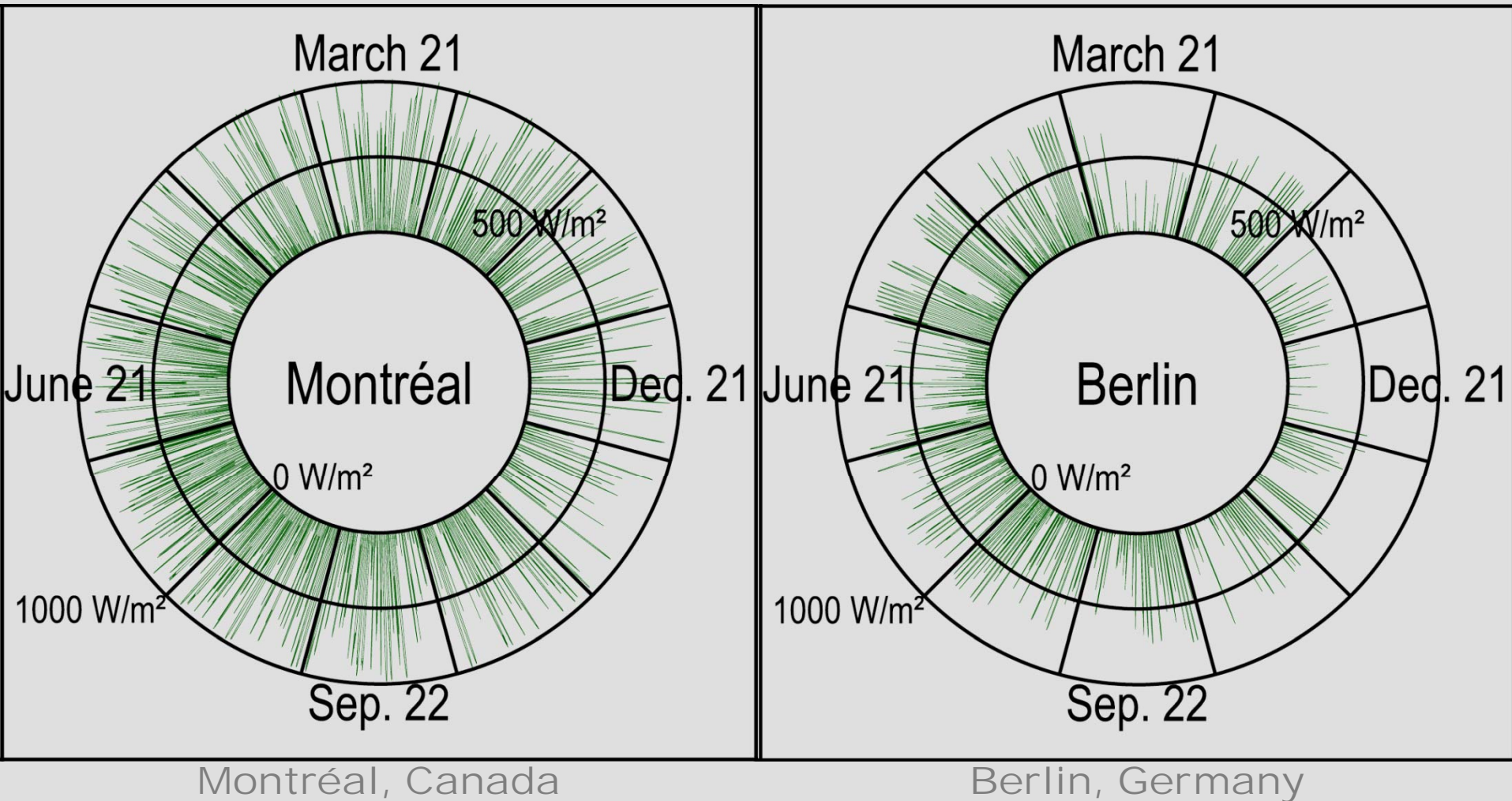
Montréal, Canada



Berlin, Germany

Intelligent design using solar-climatic vision, 2014

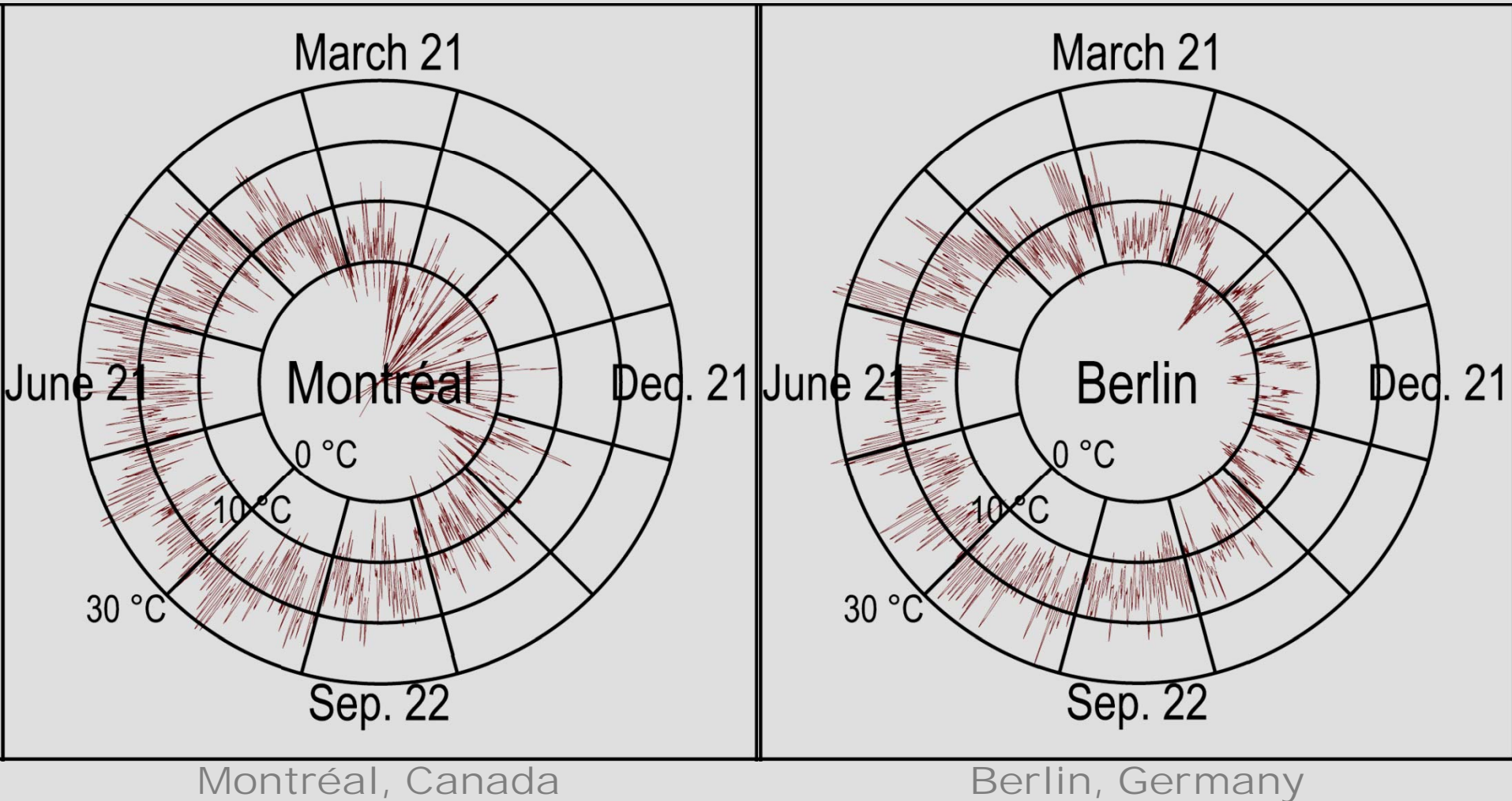
Annual plot of hourly **direct beam radiation**  
in typical meteorological year (U.S. Department of Energy TMY files)



Intelligent design using solar-climatic vision, 2014



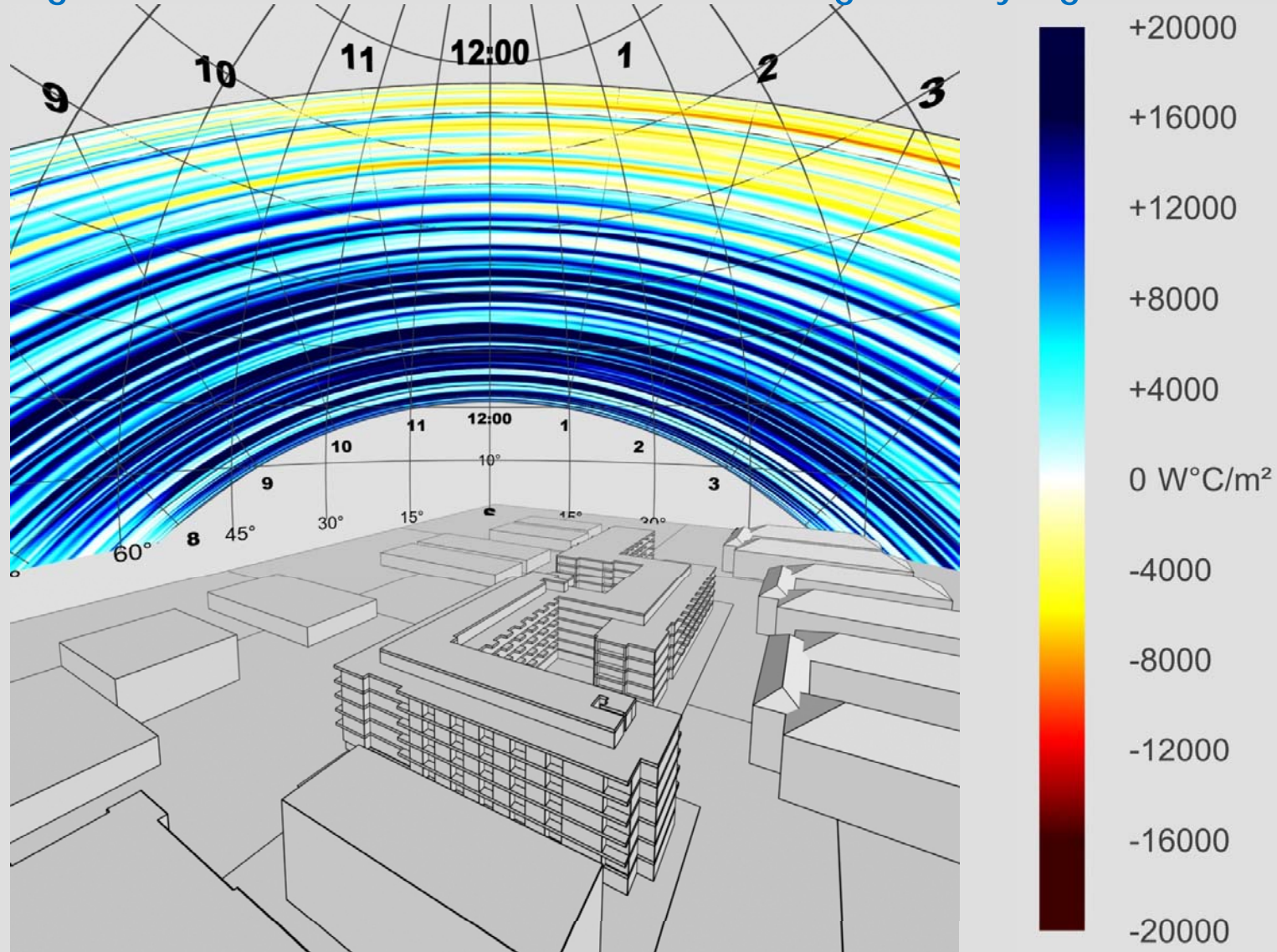
Annual plot of hourly **air temperature**  
in typical meteorological year (U.S. Department of Energy TMY files)



Intelligent design using solar-climatic vision, 2014



Besides active strategies, potentials and importance of integrated designs based on positive/negative effects of the sun in Montréal is also significantly high.





RUE DE CASTELNAU OUEST

[ocpm.qc.ca/files/pdf/P73/3a.pdf](http://ocpm.qc.ca/files/pdf/P73/3a.pdf)

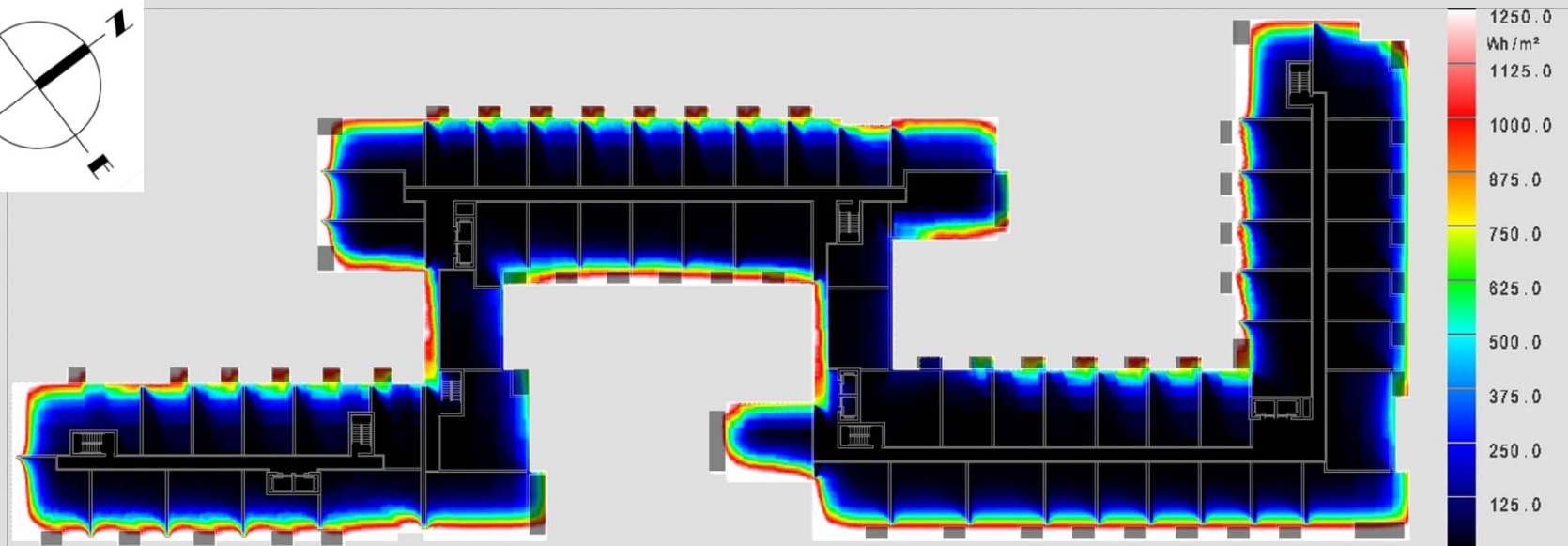
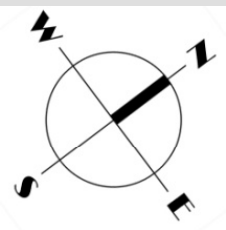
PLAN D'ENSEMBLE | ÉCHELLE 1 : 500



ÉLÉVATION RUE CASTELNAU | ÉCHELLE 1 : 500

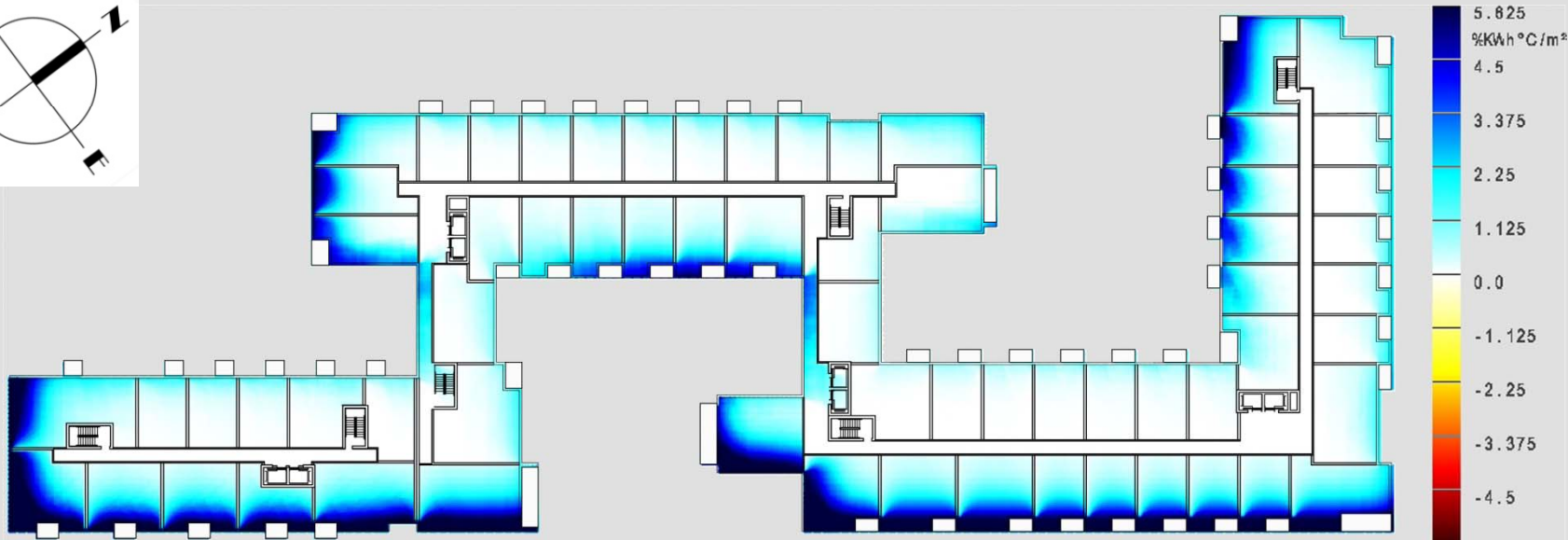
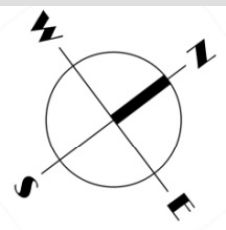






Indoor radiation model during the annual cycle (3<sup>rd</sup> floor plan)  
showing general\* daylight potentials for each unit.

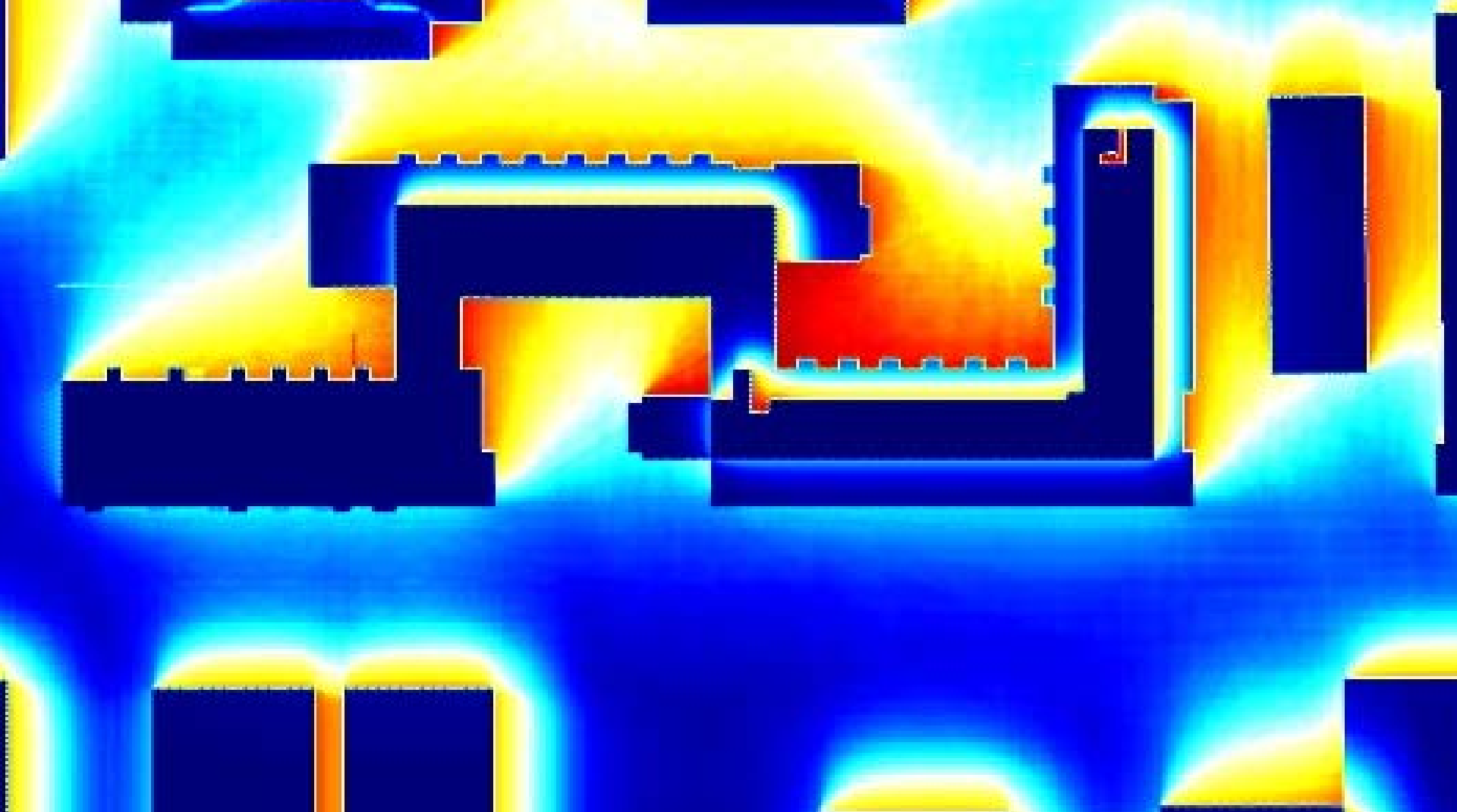
*\* not designated façade*



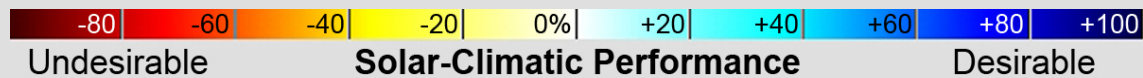
Annual performance study (3<sup>rd</sup> floor plan)  
showing general\* potentials of each orientation to be opened to the sun.

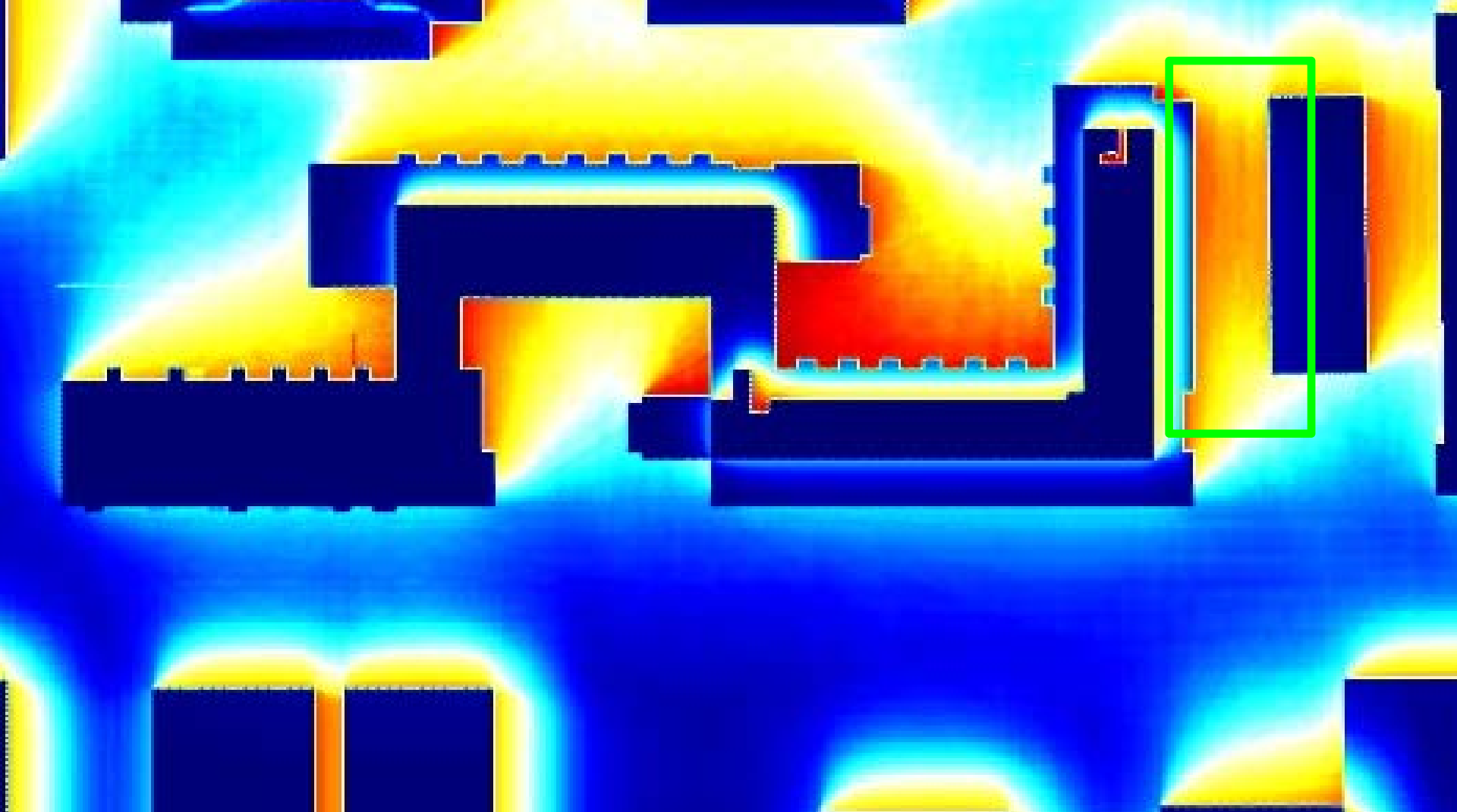
*\* not designated façade*



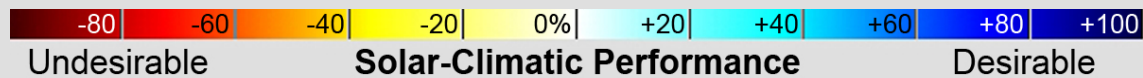


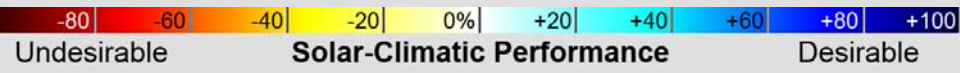
Annual performance study  
 illustrating desirable and undesirable areas at outdoor/building skin levels.





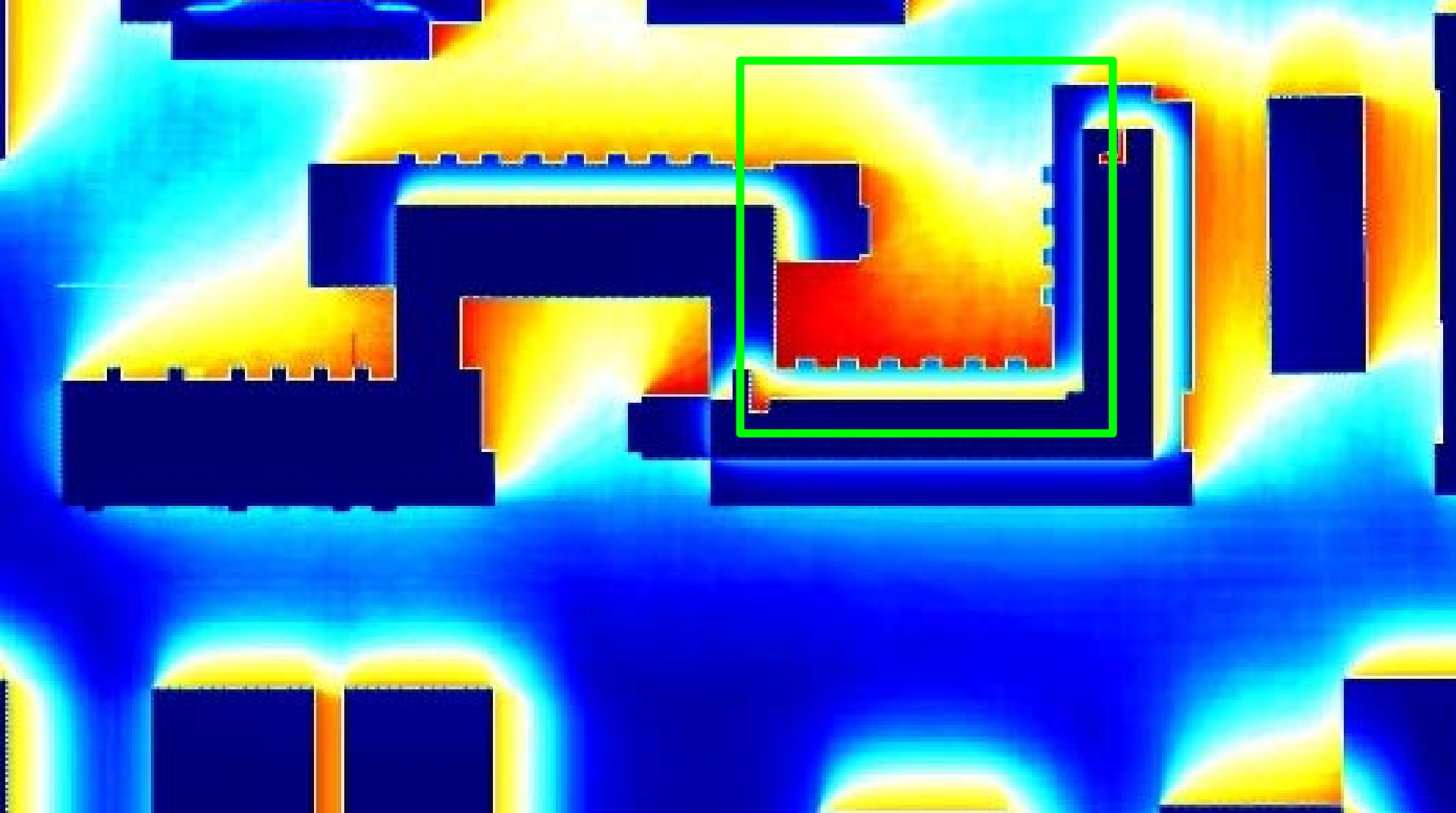
Zone 1



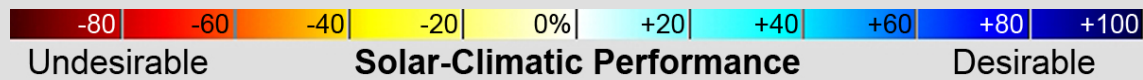


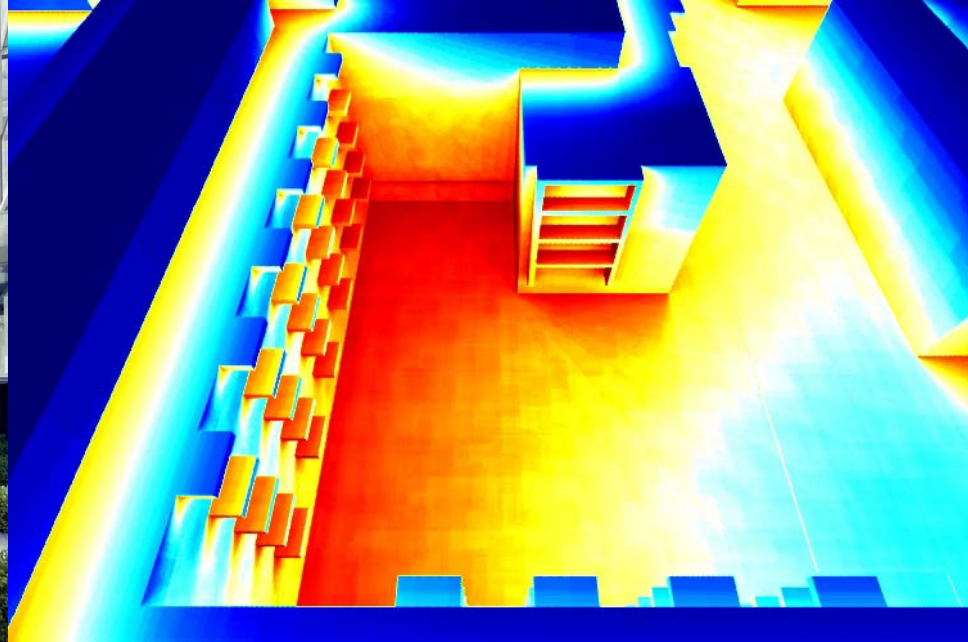
Zone 1

Performance study in the annual cycle (from Sunrise to Sunset) in typical year illustrating desirable and undesirable areas at outdoor/building skin levels.

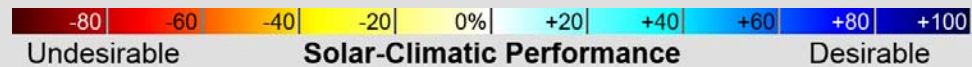


Zone 2



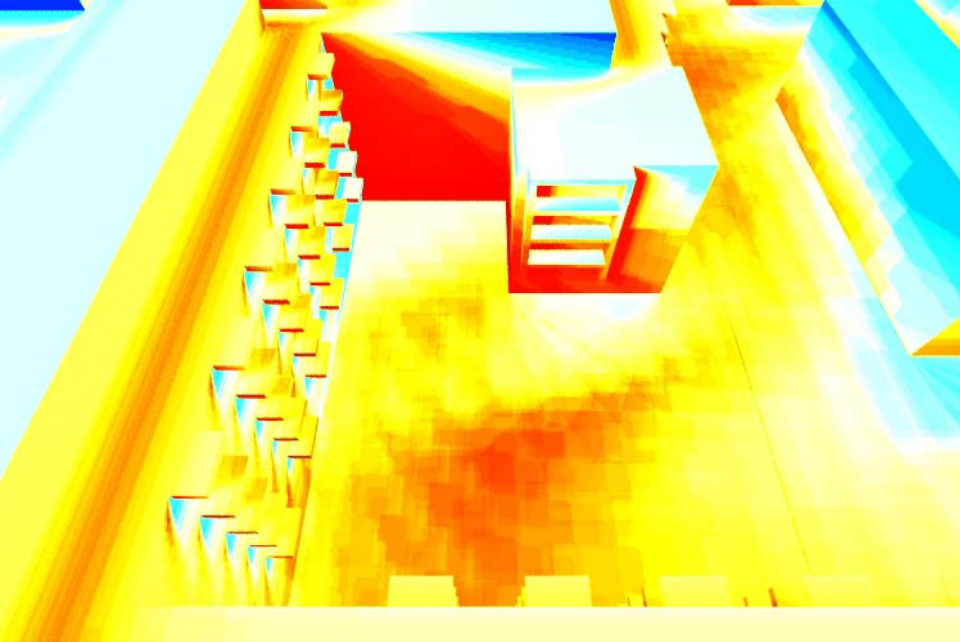


Zone 2

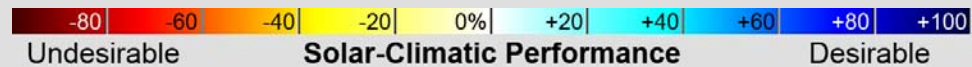


Green space or red space?  
Espace vert ou espace rouge?

Performance study in the annual cycle (from Sunrise to Sunset) in typical year illustrating desirable and undesirable areas at outdoor/building skin levels.



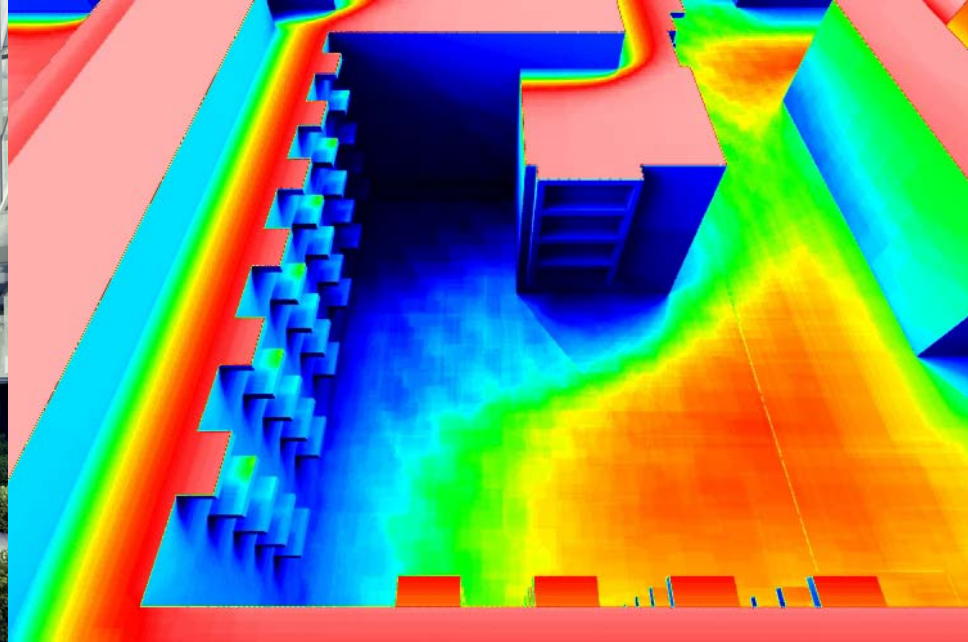
Zone 2



Green space or red space?  
 Espace vert ou espace rouge?

Performance study between June 21 and September 22 (from Sunrise to Sunset) in typical year illustrating desirable and undesirable areas at outdoor/building skin levels.



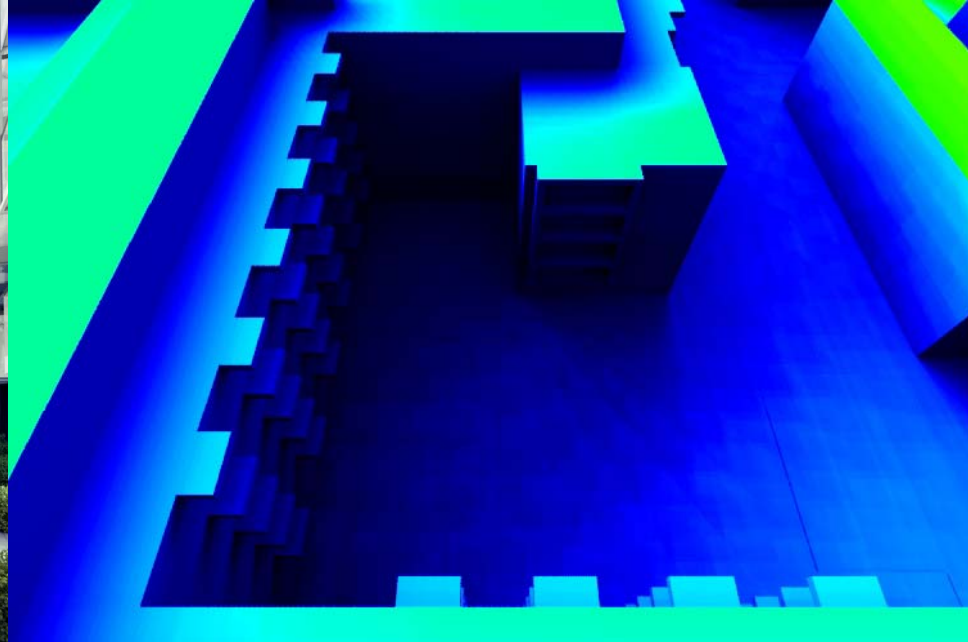


Zone 2 : Is it comfortable, healthy and safe?



in hot times:  
- Most likely no!

Radiation study between June 21 and September 22 (from Sunrise to Sunset) in typical year illustrating desirable and undesirable areas at outdoor/building skin levels.



### Zone 2 : Is it comfortable, healthy and safe?



in cold times:  
- Most likely no!

Radiation study between December 21 to March 21 (from Sunrise to Sunset) in typical year illustrating desirable and undesirable areas at outdoor/building skin levels.

Solar-climatic studies  
during the architectural/urban design process  
can improve many aspects in terms of  
**energy, daylight, health, comfort** and **safety**  
for long periods of time;

most of these architectural rearrangements and improvements  
do NOT necessarily increase the construction costs.



## Some recommendations:

Reducing overshadowing impacts in winter

- effects on the energy efficiency performance of existing buildings and new units
- impacts regarding creation of undesirable and unsafe courtyards

Reducing overheating in summer

- design and optimize ingenious shading devices for each building orientation

Improving indoor air qualities:

- consider a ventilation corridor on top of the access corridors (the units could basically be opened to these corridors to have effective cross ventilation namely in summer.)

Designing different façades in different orientations

Consideration of general solar-climatic weather conditions during the typical meteorological year as well as in years (extreme conditions, long-term and short-term future scenarios, etc.)



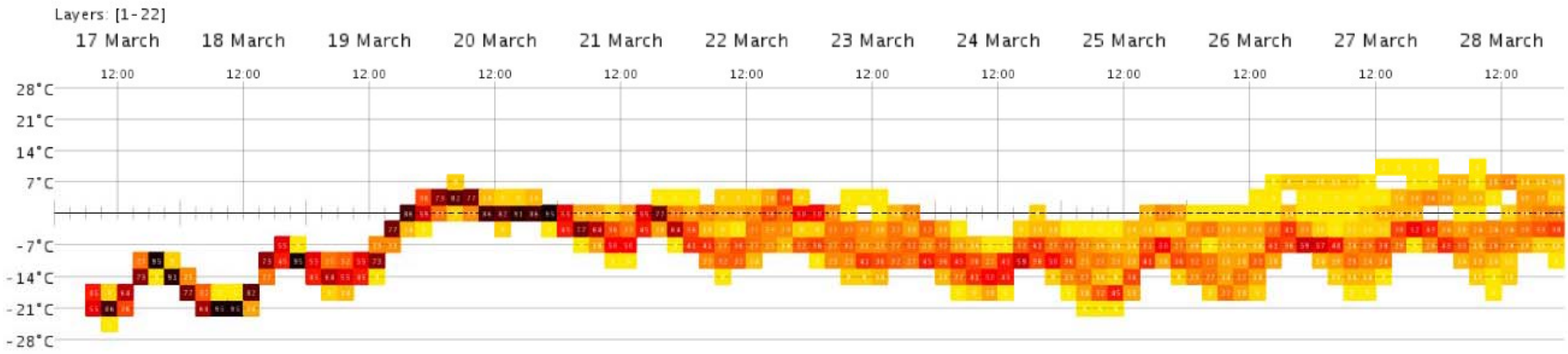
[ocpm.qc.ca/files/pdf/P73/3a.pdf](http://ocpm.qc.ca/files/pdf/P73/3a.pdf)



# Future development areas

Interaction with real-time and forecast weather information

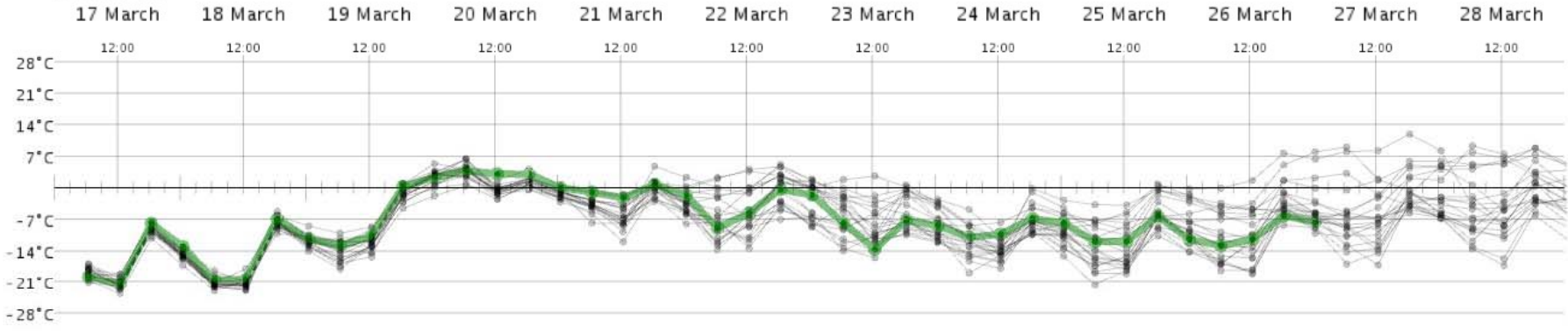
Probabilities and different layers of a sample forecast: Air Temperature at the surface published at 00Z, 2014-03-17



file:QC\_MONTREALDORVAL\_2014\_03\_17\_00

Surface Air Temperature

Layers: [1-22]



file:QC\_MONTREALDORVAL\_2014\_03\_17\_00

Surface Air Temperature

SOLARCHVISION Plots of 21 members from the Environment Canada's Global Ensemble Prediction System (GEPS) as well as one deterministic layer (green line).

(For more information see "Weather Forecast Data an Important Input into Building Management Systems", Poulin, 2013, available at: [http://collaboration.cmc.ec.gc.ca/cmc/cmof/product\\_guide/docs/REFcsts/](http://collaboration.cmc.ec.gc.ca/cmc/cmof/product_guide/docs/REFcsts/)).



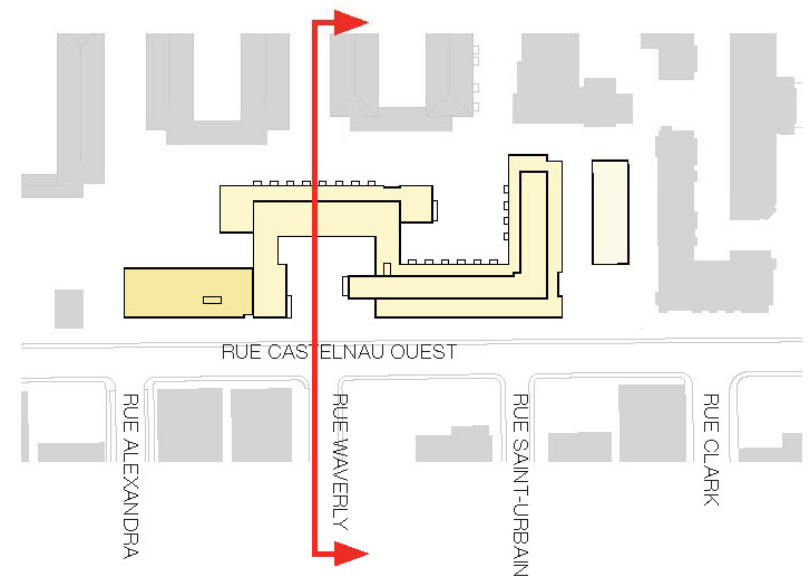
# More recommendations:

Considering huge roof area of this project as a design potential:

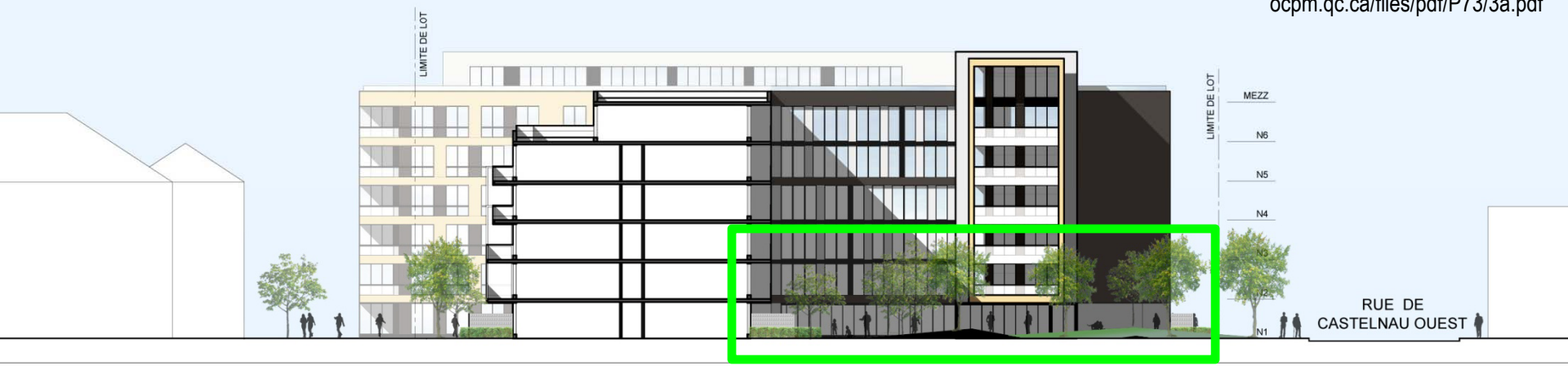
- Harvesting of rain water, installing a green roof, etc.
- Expecting solar thermal collectors, PV panels to be provided and installed by the users in future and planning to integrate them in design.

Developing a multi-story parking structure instead of using the rest of the land!

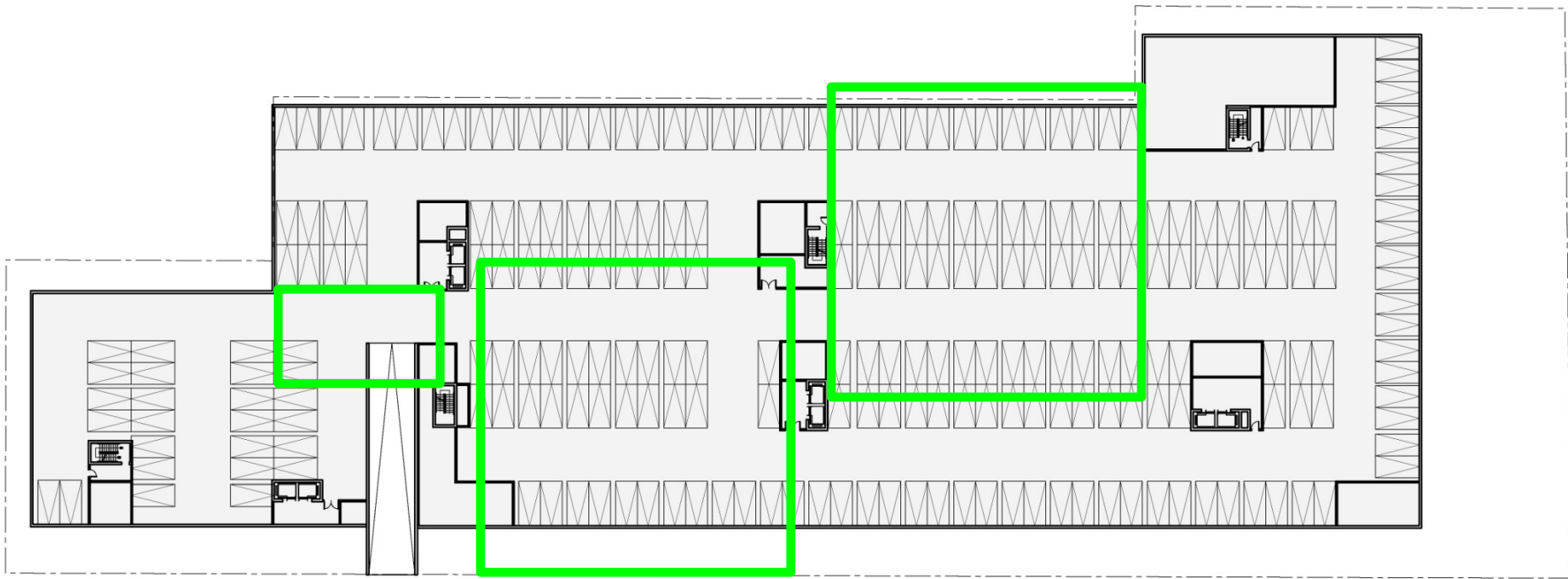
- to create/maintain better conditions for planting the trees,
- to reduce urban heat island contributions
- to achieve more flexibility for future developments on this site.



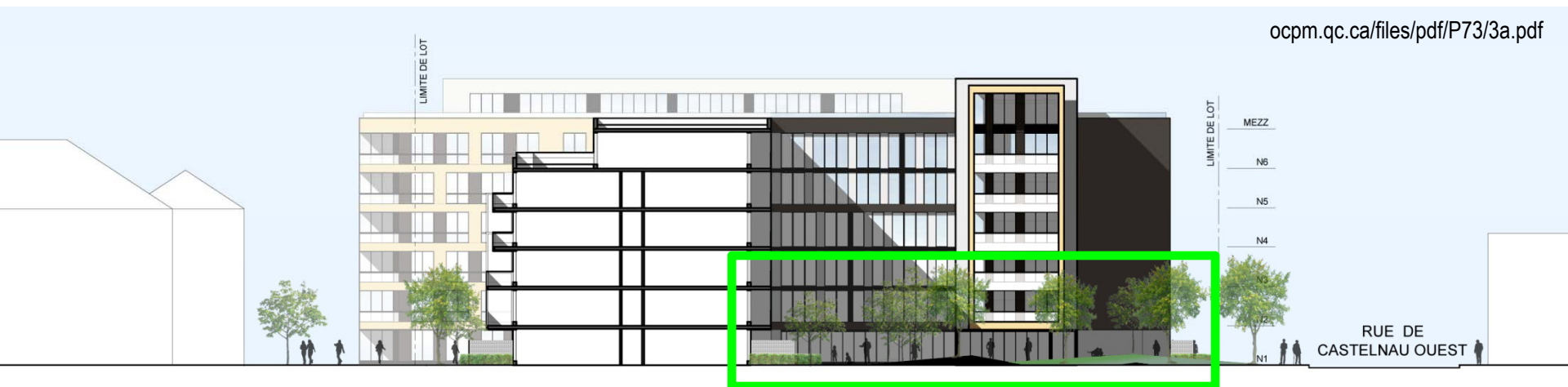
[ocpm.qc.ca/files/pdf/P73/3a.pdf](http://ocpm.qc.ca/files/pdf/P73/3a.pdf)



The trees need roots

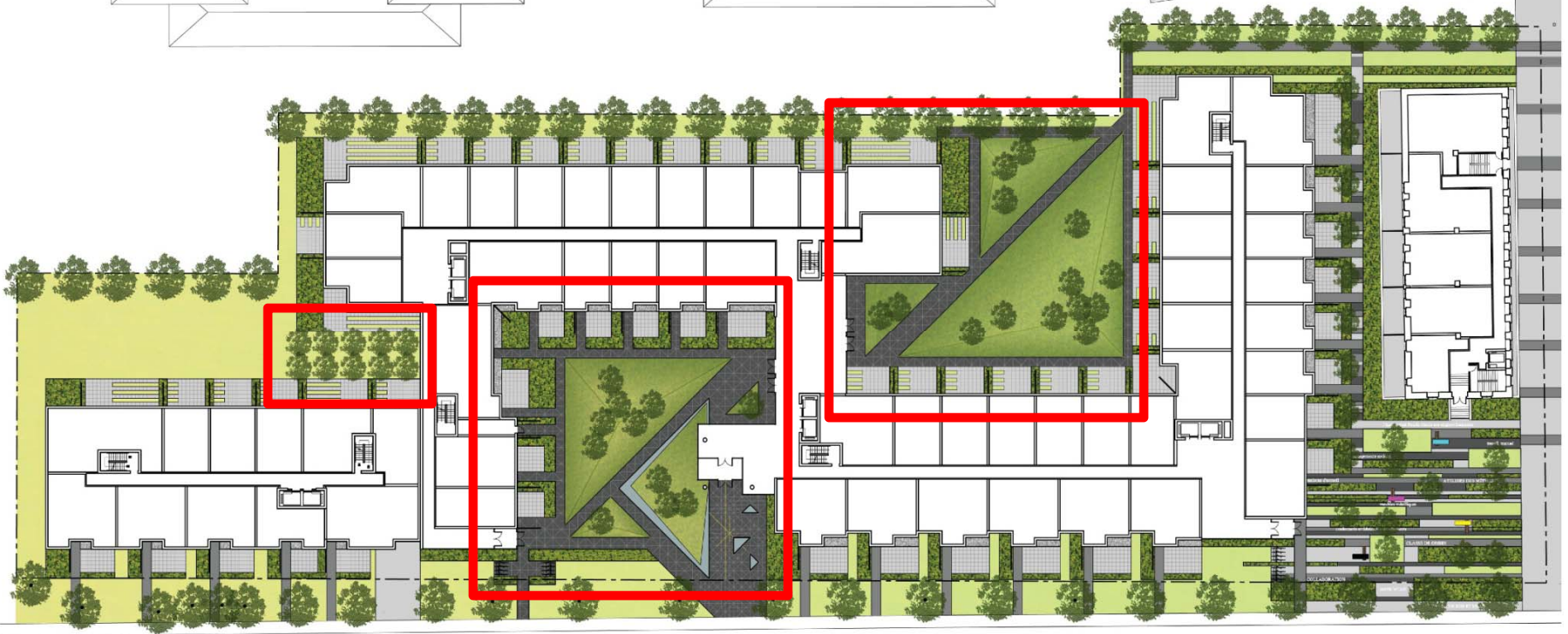


ocpm.qc.ca/files/pdf/P73/3a.pdf

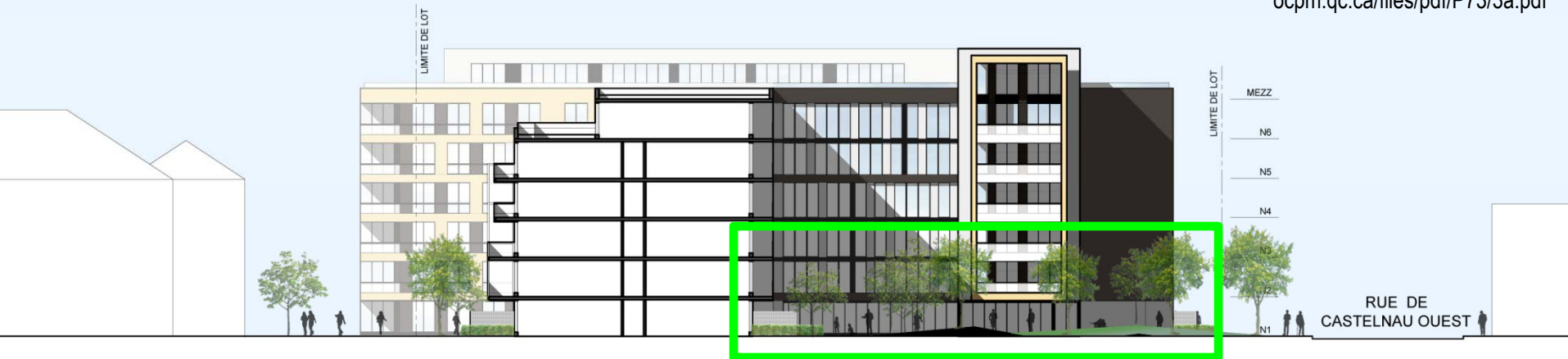


The trees need roots





[ocpm.qc.ca/files/pdf/P73/3a.pdf](http://ocpm.qc.ca/files/pdf/P73/3a.pdf)



The trees need roots



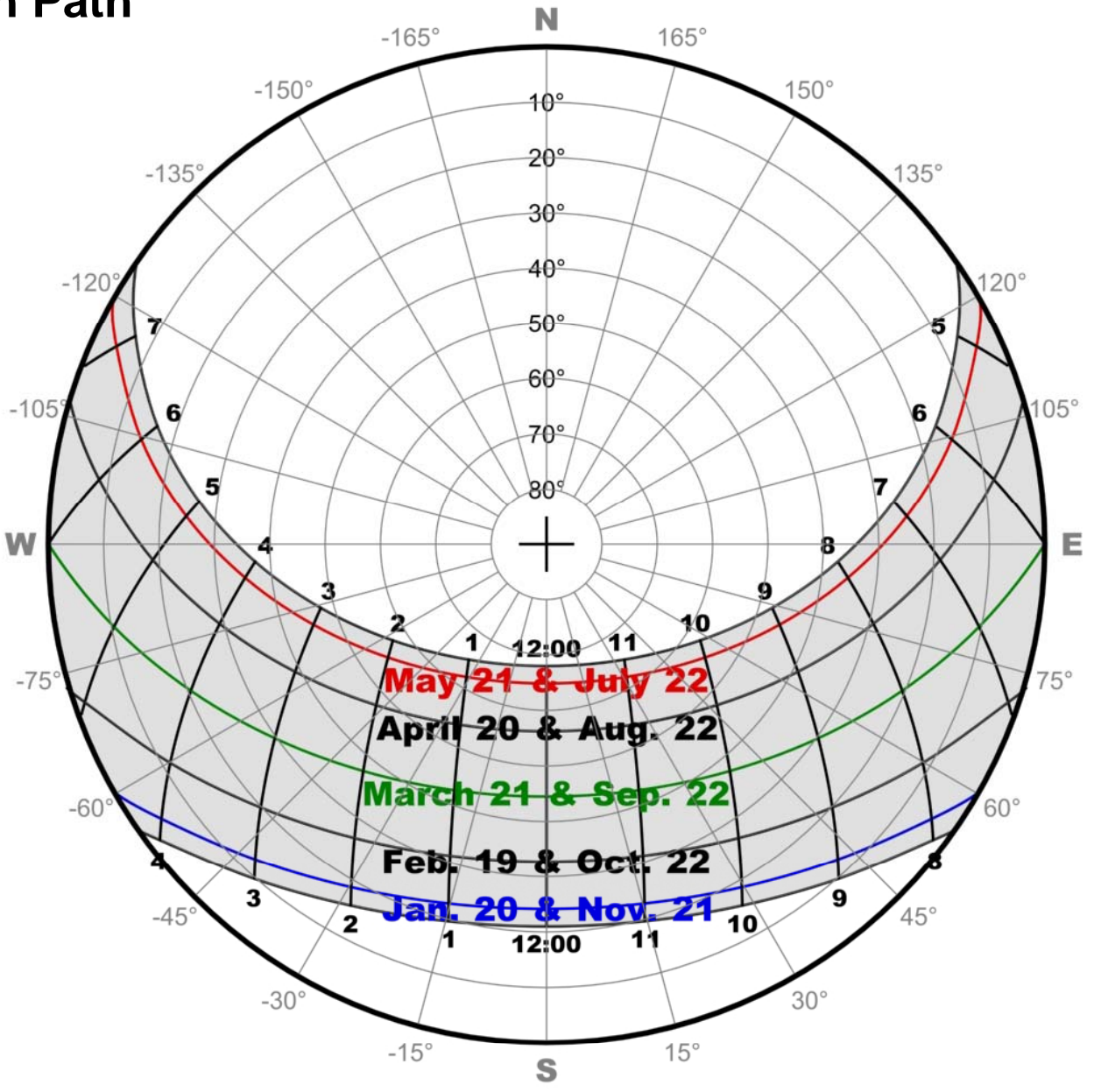


# consider a look from the Sun!

The author welcomes further exchanges with the OCPM consultation committee so that additional updates to this type of information and analysis can be shared regarding this project or similar developments for Montréal.

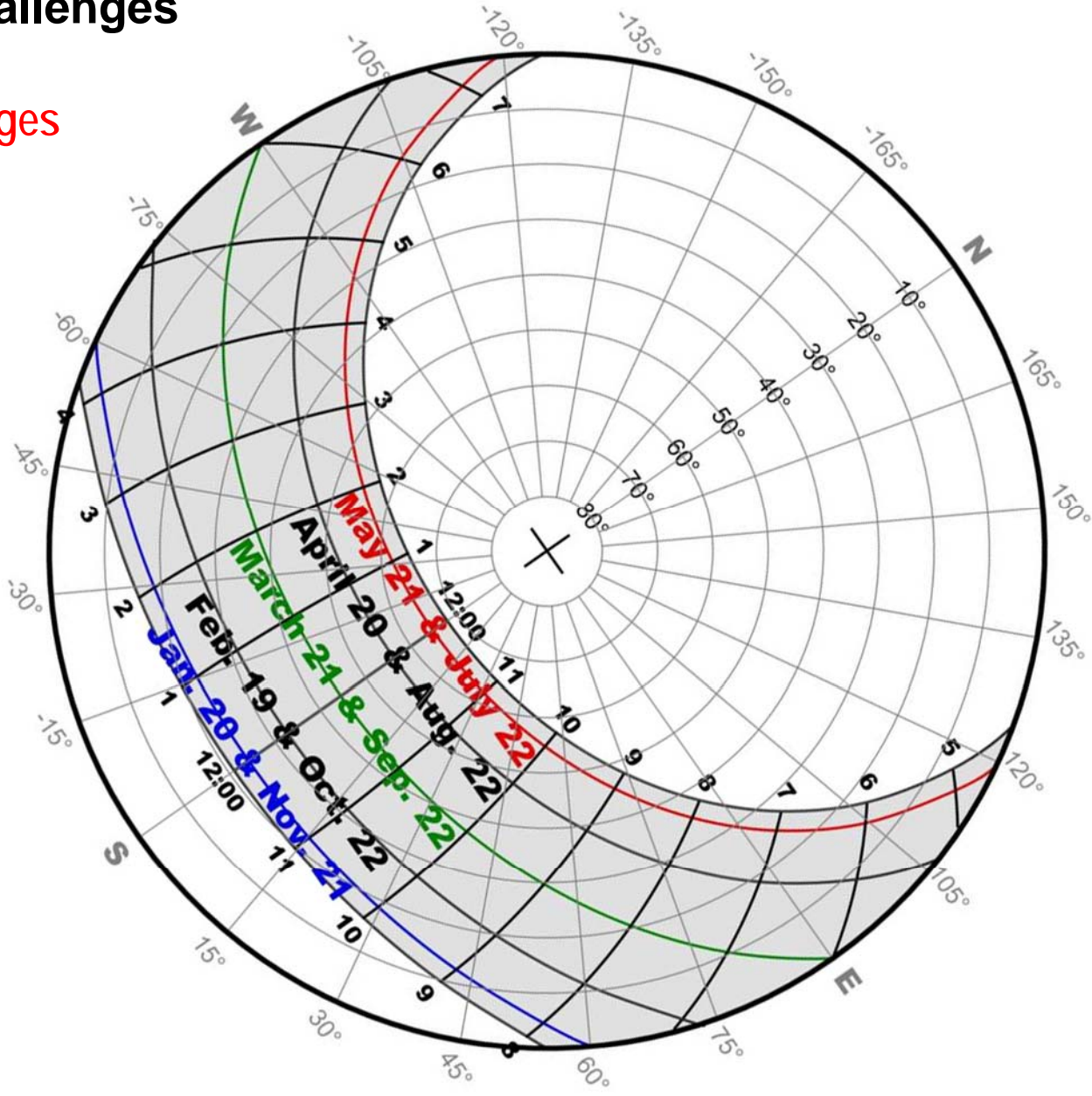


# Montréal Sun Path



# Montréal Challenges

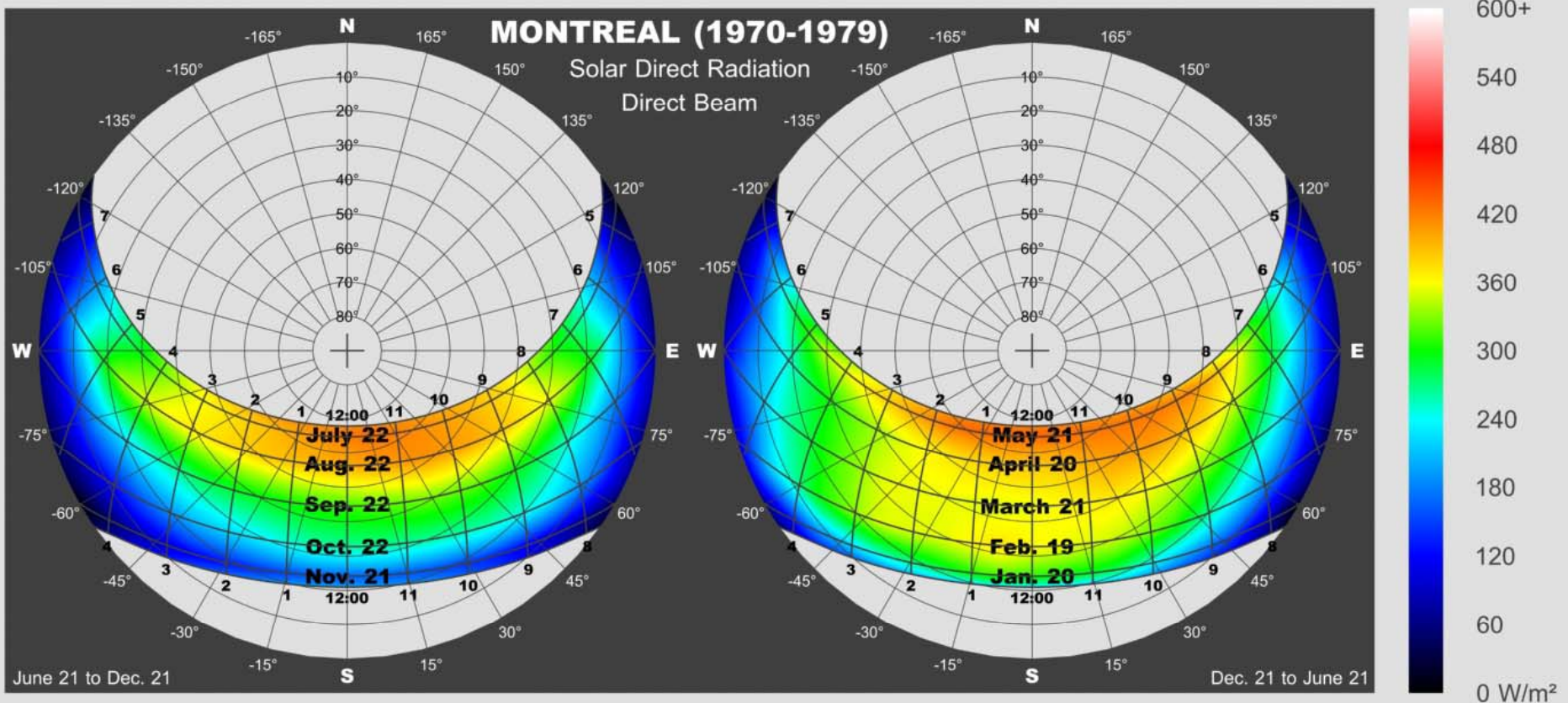
+ Climate changes



# Montréal

## Pattern of direct beam solar radiation: 1970's

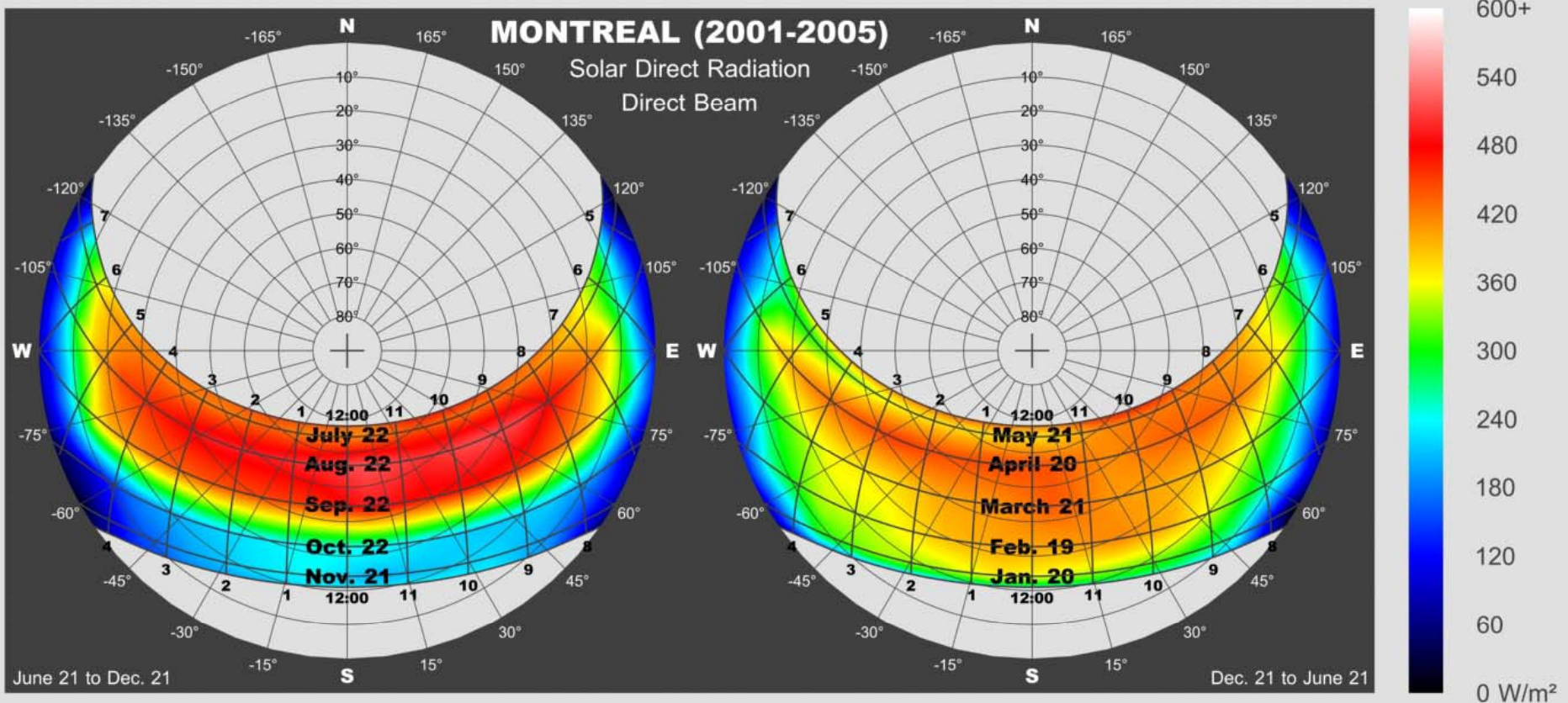
SOLARCHVISION standardization based on Canadian Weather Energy and Engineering Datasets



# Montréal

## Pattern of direct beam solar radiation: 2000's

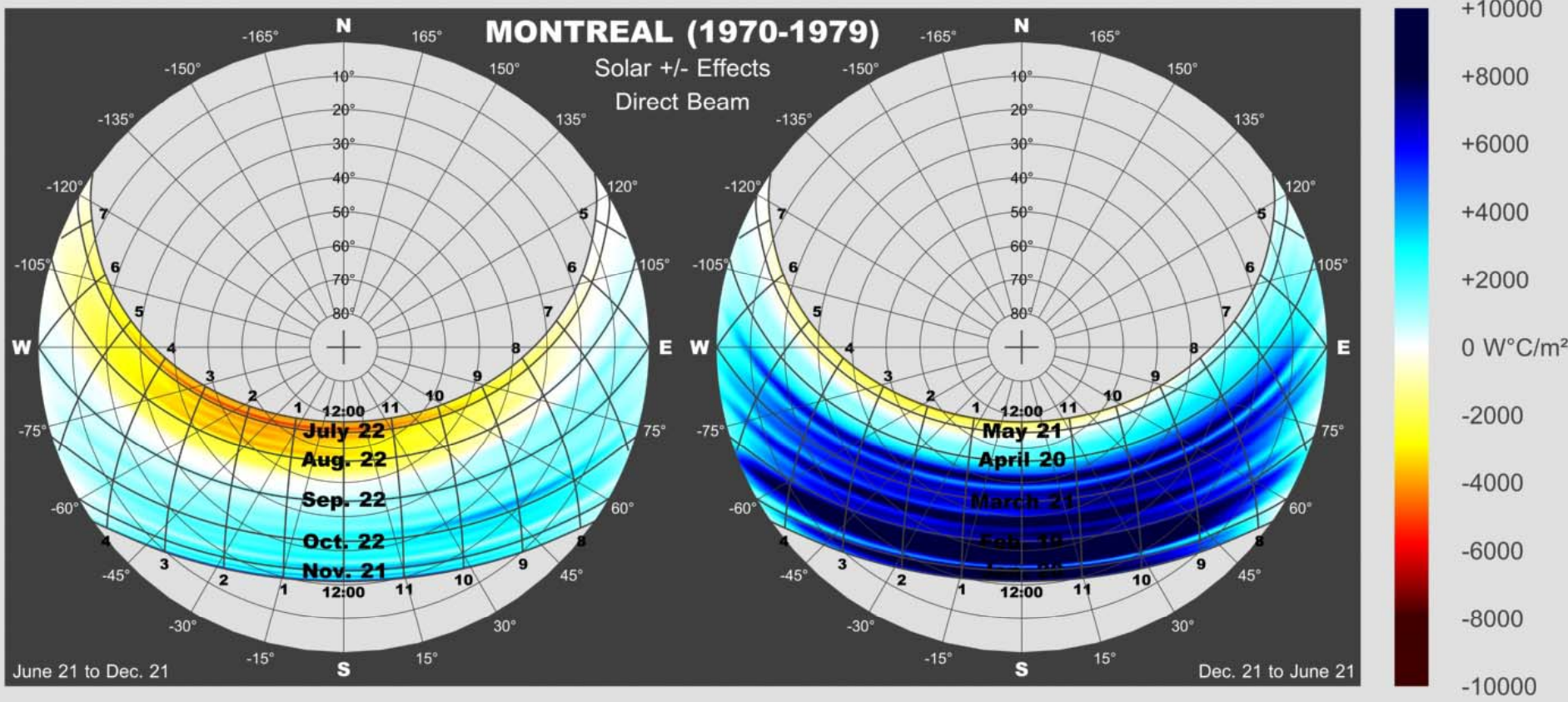
SOLARCHVISION standardization based on Canadian Weather Energy and Engineering Datasets



# Montréal

## 1970's positive and negative effects of direct beam radiation

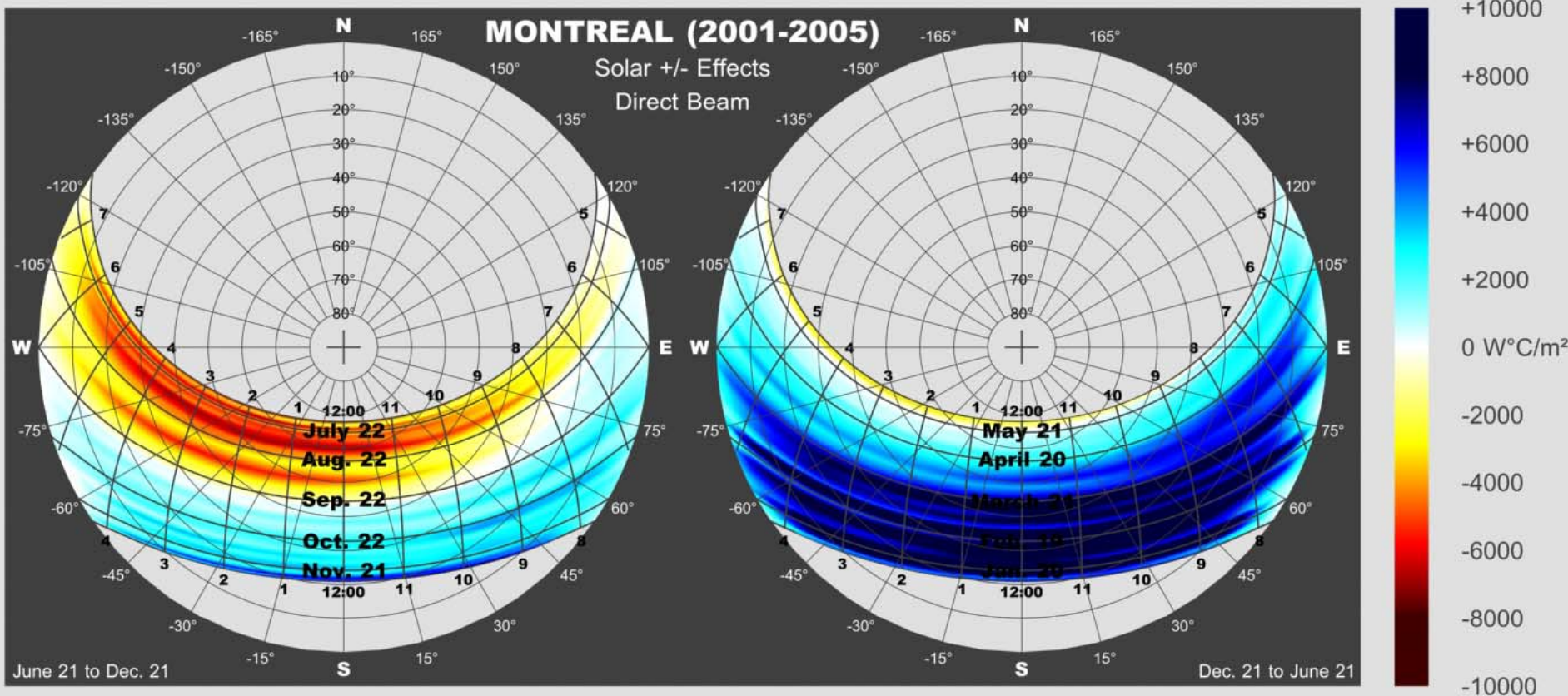
SOLARCHVISION calculations based on  
Canadian Weather Energy and Engineering Datasets



# Montréal

## 2000's positive and negative effects of direct beam radiation

SOLARCHVISION calculations based on



And in the case of Montréal, a sunnier situation means not only more warm days with higher air temperatures in summers, but could it also mean more sunny days in winter accompanied by extremely cold air temperatures.

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<http://ocpm.qc.ca/sites/ocpm.qc.ca/files/pdf/P72/8a4.pdf>  
<http://ocpm.qc.ca/sites/ocpm.qc.ca/files/pdf/P72/8a4a.pdf>
- ▶ OCPM, PDM Report Overview (2014): Public Consultation Report On Montréal Development Plan (PDM), available at:  
<http://ocpm.qc.ca/sites/ocpm.qc.ca/files/pdf/P70/pdm-presse-eng.pdf>
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- ▶ Samimi, M. (2013): “The sun and the city of Montréal”, Proposal for PDM (Plan for Development of Montréal), available at: <http://ocpm.qc.ca/pdm>, Documents, No. 9.1.20 and 9.1.20.1, OCPM
- ▶ Environment Canada: available at: <http://www.ec.gc.ca/>
- ▶ Canadian Weather Energy and Engineering Datasets CWEED: Long term hourly solar radiation and temperature, etc. contains information licensed under the Open Government Licence – Canada. available at: [ftp://ftp.tor.ec.gc.ca/Pub/Engineering\\_Climate\\_Dataset](ftp://ftp.tor.ec.gc.ca/Pub/Engineering_Climate_Dataset)
- ▶ U.S. Department of Energy: Typical Meteorological Year in EnergyPlus weather format (.epw)  
[http://apps1.eere.energy.gov/buildings/energyplus/weatherdata\\_about.cfm](http://apps1.eere.energy.gov/buildings/energyplus/weatherdata_about.cfm), based on CWEC: Canadian Weather for Energy Calculations
- ▶ Google Earth: <http://www.google.com/earth>
- ▶ Samimi, M., Nasrollahi, F. (2013): SOLARCHVISION Studies on Young Cities Project, Book, Young Cities Research Briefs, Vol. 06, Technische Universität Berlin.  
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- ▶ Samimi, M., Nili, M.Y., Nasrollahi, F., Parvizsedghy, L., Vahabi-Moghaddam, D. (2011): “External and Internal Solar-Climatic Performance Analysis of Building Geometries Using SOLARCHVISION”, Paper, CleanTech for Sustainable Buildings - From Nano to Urban Scale, CISBAT International Scientific Conference, EPFL University, Lausanne, Switzerland.  
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