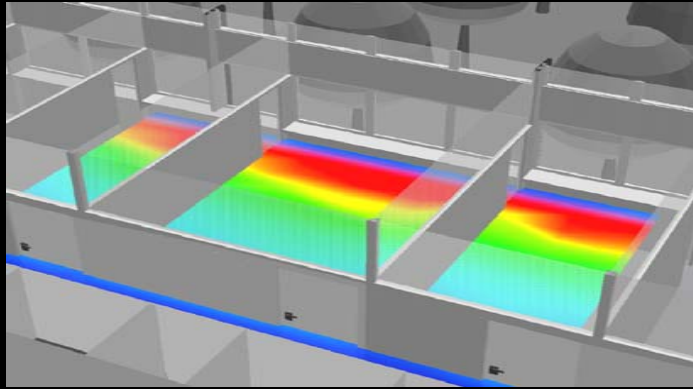
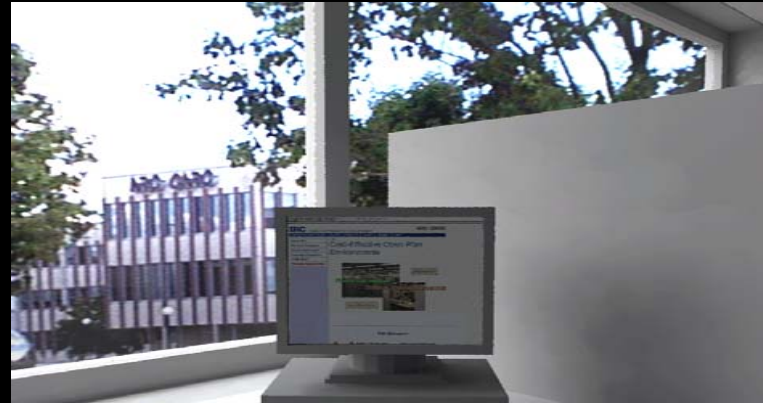


# Natural Light in Design

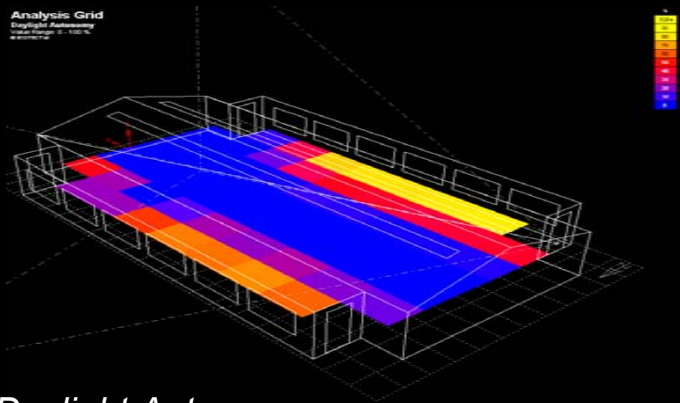
Using simulation tools to explore realistic daylight-responsive solutions



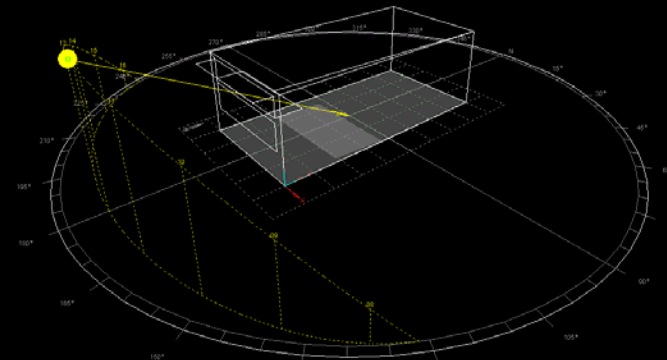
*Daylight Factor*



*Visual Comfort*



*Daylight Autonomy*



*Avoidance of Direct Sunlight*

**Ecotect Weather Tool**

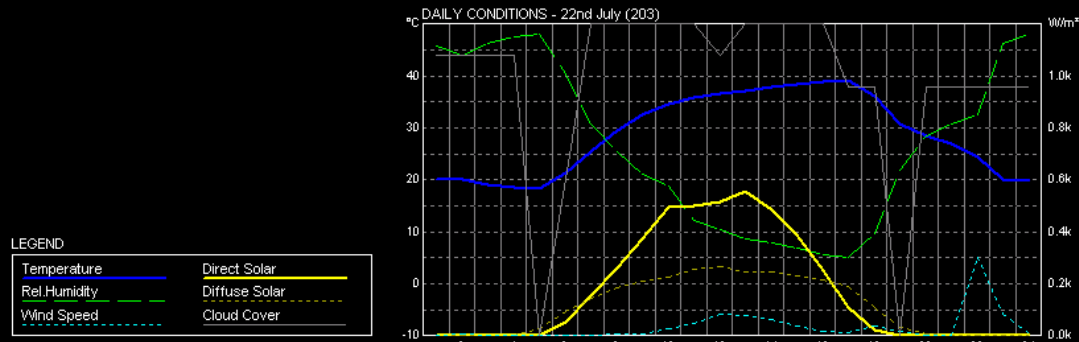
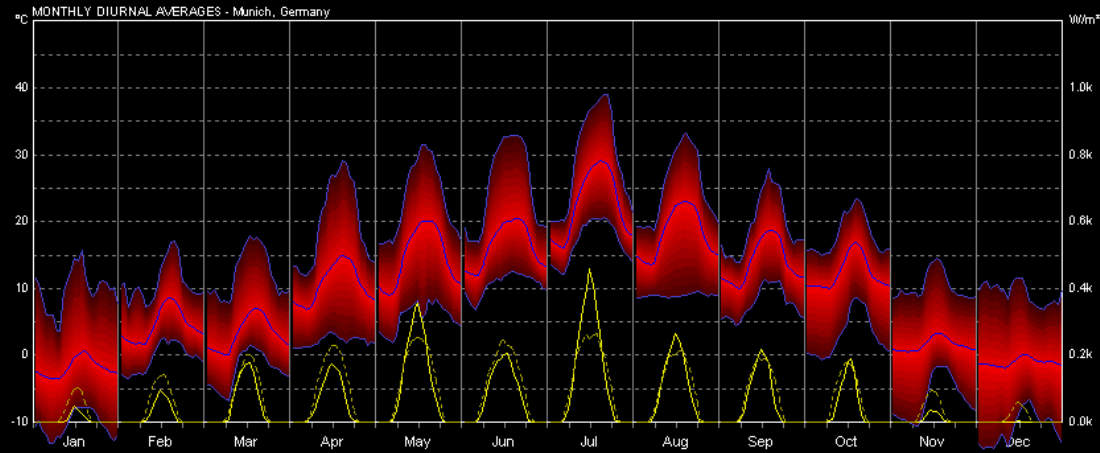
Christoph Reinhart, Ph.D.

# Overview – Weather Tool

Tuesday, Jan 24<sup>a</sup> 2006

time slot	Content	instructor
Mon 9.30	Welcome, class introduction, design project (teams formed next morning)	MA, all
Mon 10.00	- General Introduction to daylighting (benefits, history, some case studies)	MA
Mon 10.30	- Introduction to Building Simulation (why simulations for architects, tools used in this course)	CR
Mon 11.00	coffee break	
Mon 11.15	<ul style="list-style-type: none"> <li>- Photometry (definition, measurement, typical values, DF definition) (MA)</li> <li>- Static Daylighting Metrics (context of LEED, selected results from NRC survey, DF &amp; Solar Shading) (CR)</li> <li>- Daylight factor calculations: protractor method, LEED spreadsheet method, sky models CIE and Perez (MA)</li> <li>- Daylight factor simulation: design sky, split flux method in Ecotect (CR)               <ul style="list-style-type: none"> <li>▪ Hands-on exercise: DF calculation in Ecotect (split flux) (CR)</li> <li>▪ Hands-on exercise: solar shading module in Ecotect (CR)</li> </ul> </li> <li>- Intro to Radiance (CR)               <ul style="list-style-type: none"> <li>▪ Hands-on exercise: Radiance visualizations (CR)</li> <li>▪ Hands-on exercise: DF calculation in Ecotect (Radiance) (CR)</li> </ul> </li> </ul>	MA, CR, all
Mon 13.00	lunch (on your own)	
Mon 14.00	<ul style="list-style-type: none"> <li>- Climate Data (kind of data and measurement, weather files, E+ weather data directory) (MA)</li> <li>▪ Hands-on exercise: weather tool in Ecotect (CR)</li> <li>- Overview on visual comfort (glare, contrast, requirements, health) (MA)</li> <li>- Dynamic Metrics &amp; related tools (CR)</li> </ul>	MA, CR, all
Mon 15.45	coffee break	
Mon 16.00	<ul style="list-style-type: none"> <li>▪ Hands-on exercise: Daysim exercise from tutorial interrupted by discussions on:               <ul style="list-style-type: none"> <li>- Short time steps dynamics</li> <li>- Daylight Coefficients</li> <li>- User Behavior Model</li> <li>- Daylight Autonomy Results</li> </ul> </li> </ul>	all
Mon 17.00	<ul style="list-style-type: none"> <li>▪ Hands-on exercise: students to repeat at DF, Solar Shading &amp; DA analysis on their own</li> </ul>	all
Mon 17.30	end of first day	

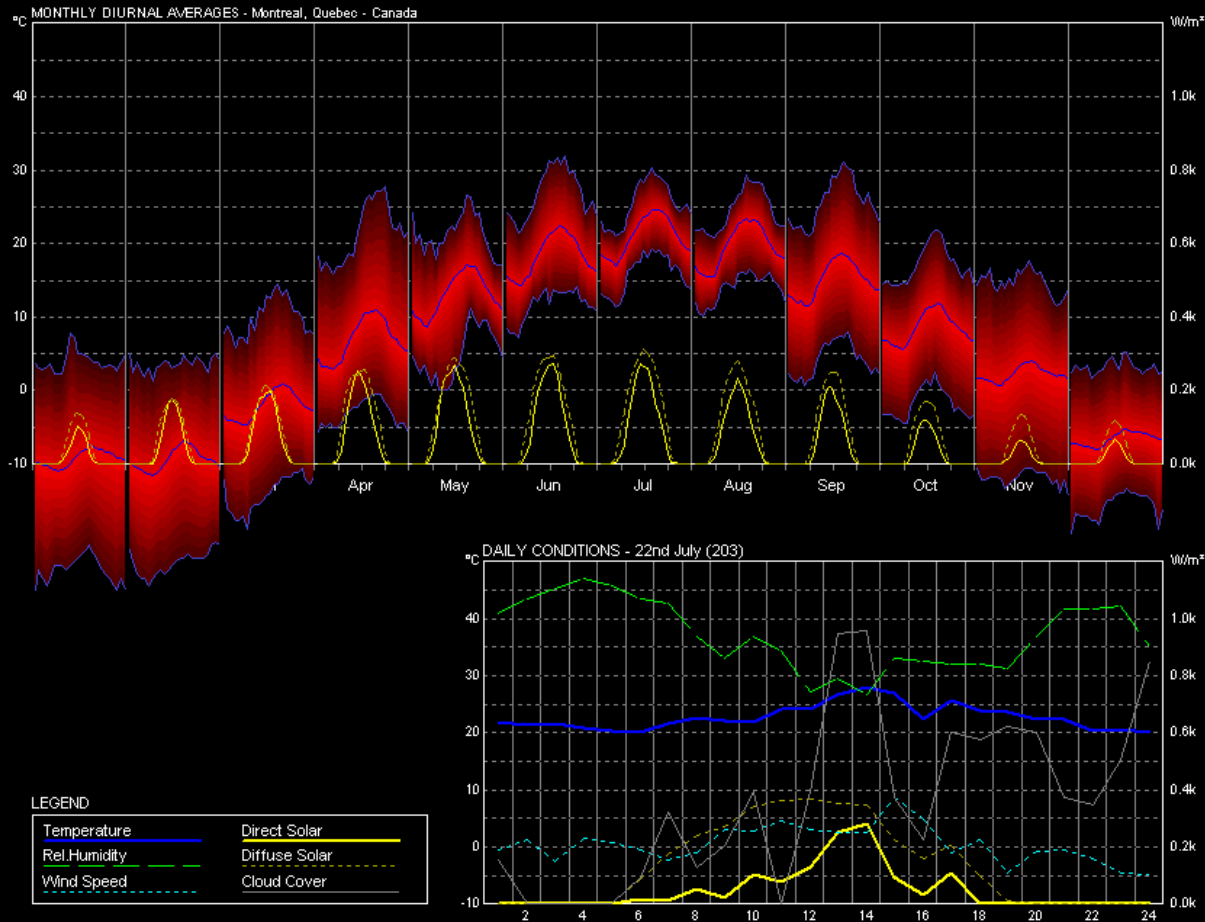
# Climate Analysis - Munich



large diurnal amplitude on hottest days of the year

=> potential for nighttime cooling

# Climate Analysis - Montreal

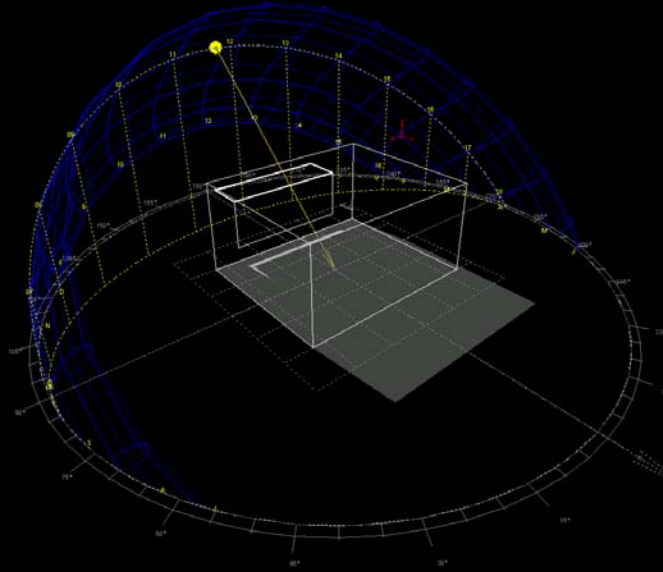
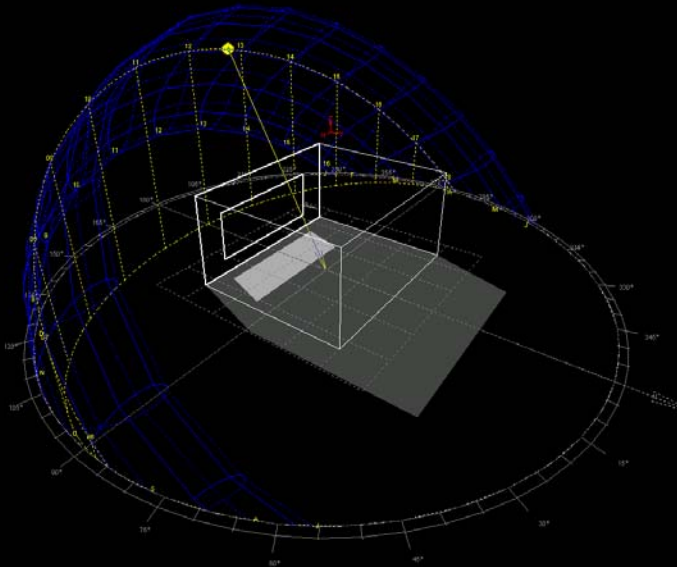


small diurnal amplitude on hottest days of the year

=> Less potential for nighttime cooling

# Avoidance of Direct Sunlight

optimized for static shading device  
louvers, lightshelves etc. <



Avoidance during cooling period (often assumed to be Apr 1<sup>st</sup> to Oct 1<sup>st</sup>) or according to climate file. **For Montreal: May 1<sup>st</sup> to Oct 1<sup>st</sup>.**

Resulting building design form is improved from an energy standpoint.