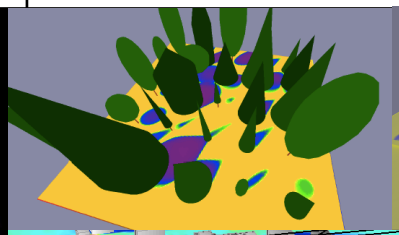
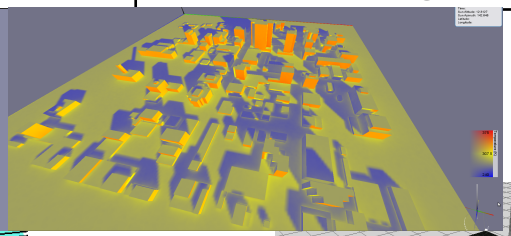
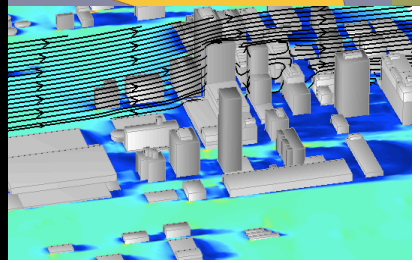
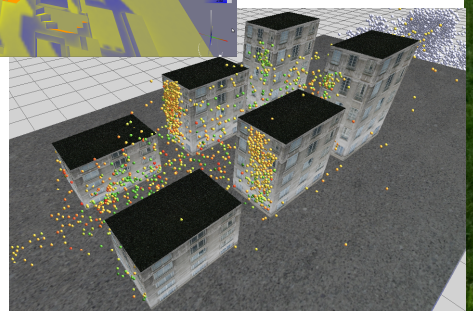
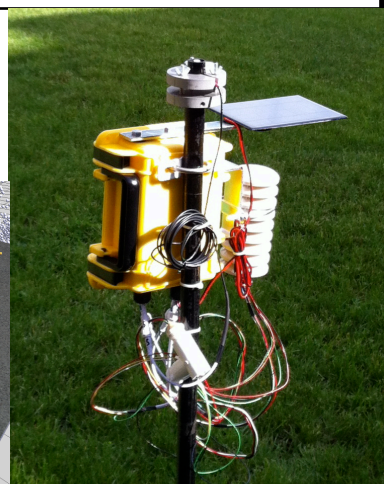
Understanding the Impact of Green Infrastructure on Urban Microclimate and Energy Use Through Simulation and Observation

- Pete Willemsen – Professor in Computer Science UMD
- Eric Pardyjak – Professor in Mechanical Engineering University of Utah

- Project supported by the National Science Foundation - IDR-CBET-PDM 113458

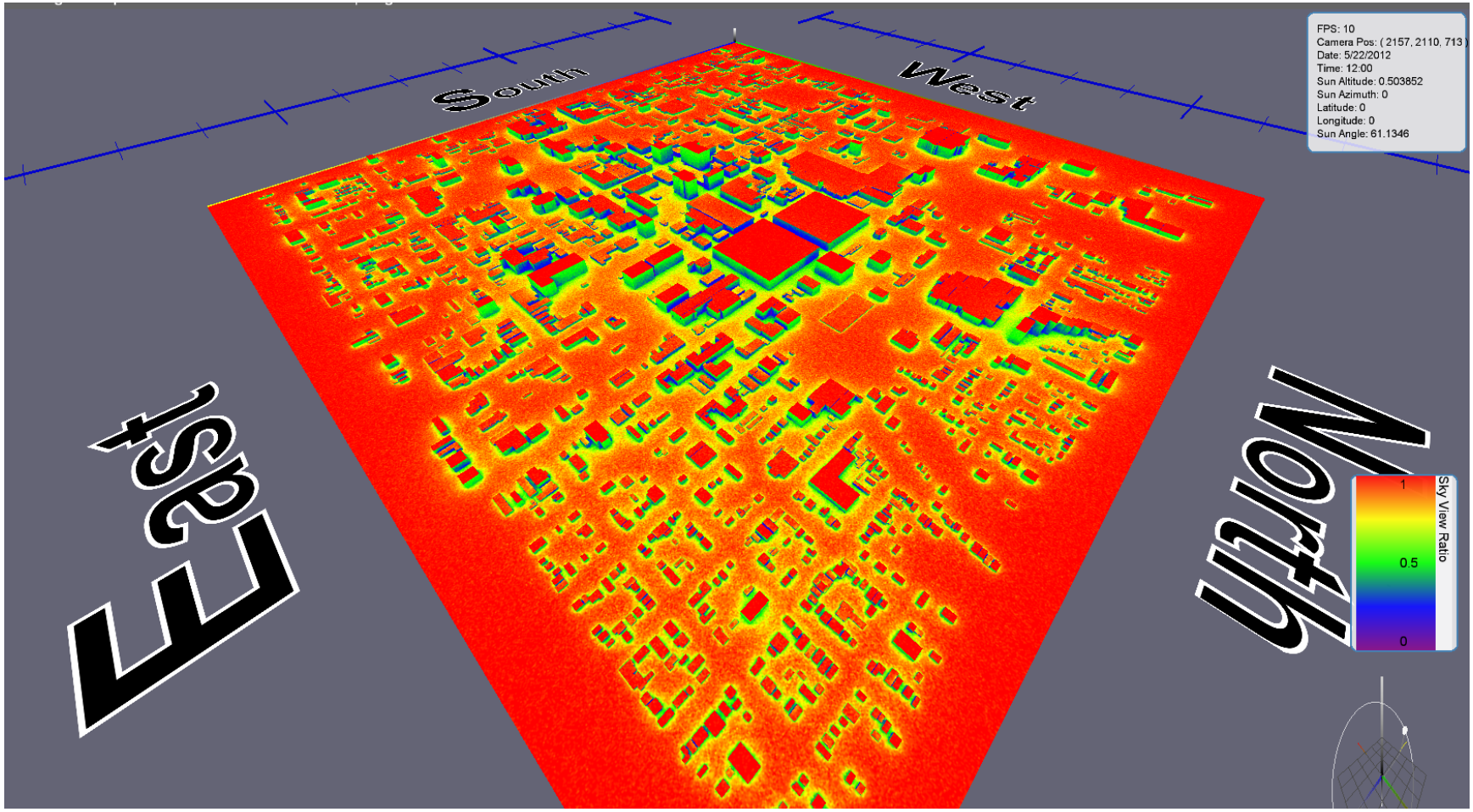
Understanding the Impact of Green Infrastructure on Urban Microclimate and Energy Use Through Simulation and Observation

Day	Hypothesize	Observe/ Discuss	Design & Simulation
Monday	Energy Efficient Cities	LEMS stations & HOBOS	Introduction to QUIC Modeling system
Tuesday			Test Efficient Designs with QUIC Energy
Thursday	Effect of vegetation and buildings on urban energy balance	Download and analyze data	
Friday		Effect of vegetation	QUIC-Energy Simulations of UMD

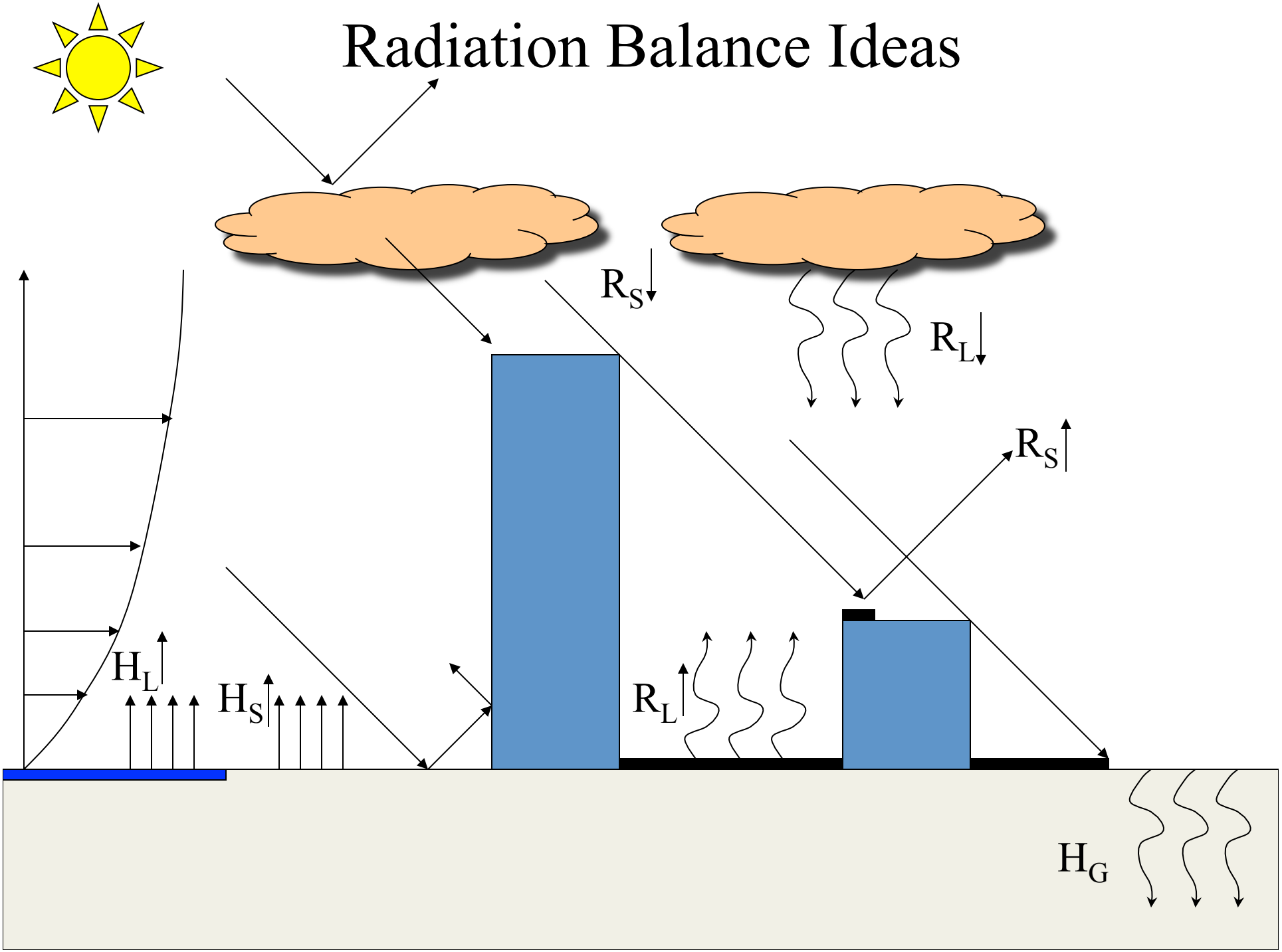







What is Green Infrastructure?

Simulation of the Energy Balance in Cities



Radiation Balance Ideas



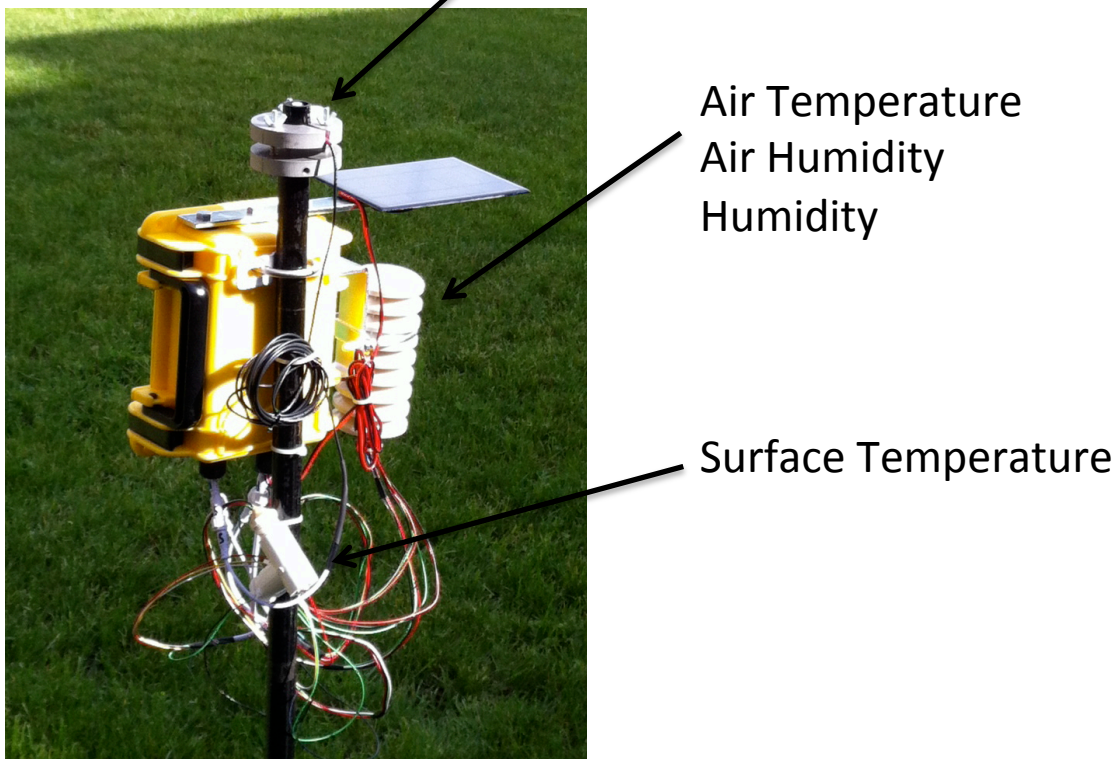
Arduino Microprocessors For Observation

- Open hardware platform

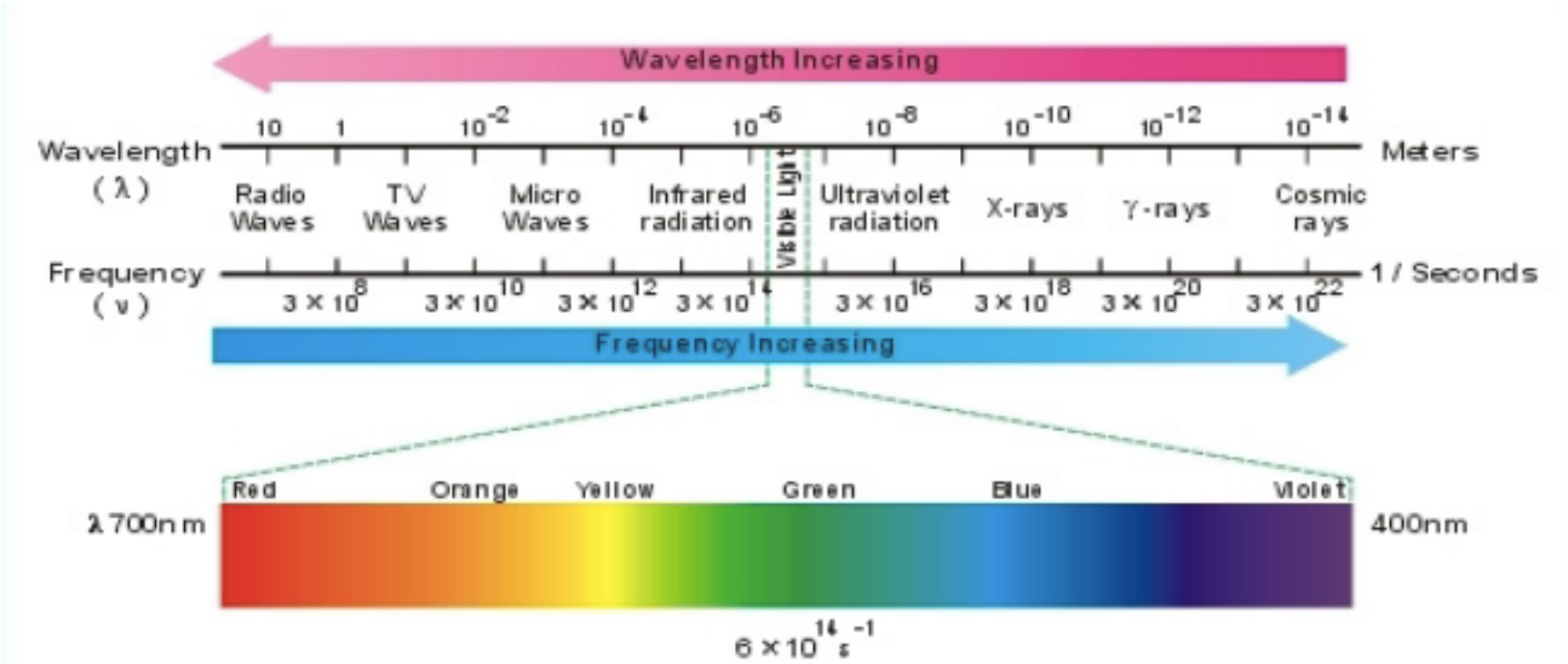
- Useful webstites:
- Arduino -
  - blog with projects inspiration
  - forum good for help
- Sparkfun
  - Kits getting start - sensing
  - http://www.sparkfun.com/categories/157
- Adafruit - data logging shield
- 4PCB.com
- http://tronixstuff.wordpress.com/
- Even just Google searches
- http://www.digi.com/xbee/

www.arduino.com

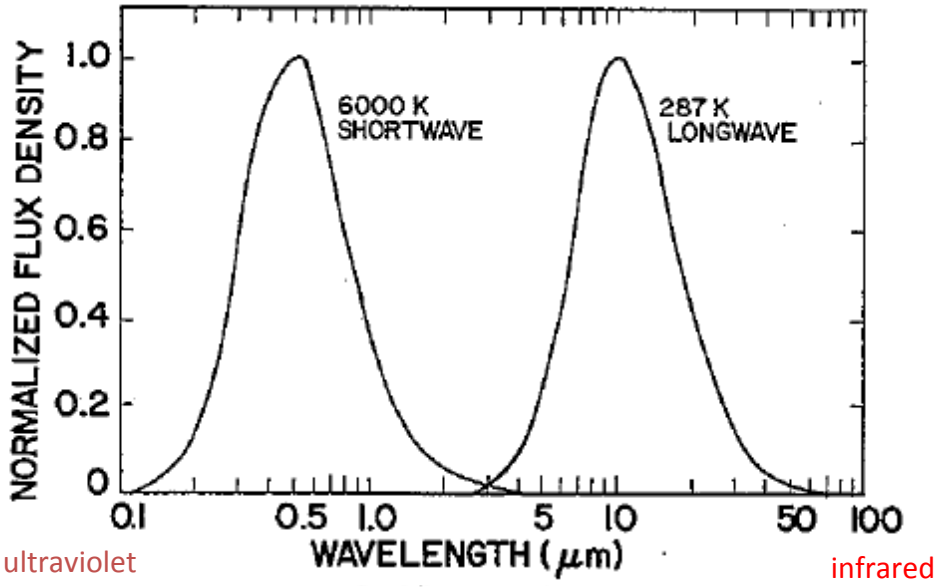
LEMS
Local Energy-budget station



Electromagnetic Spectrum

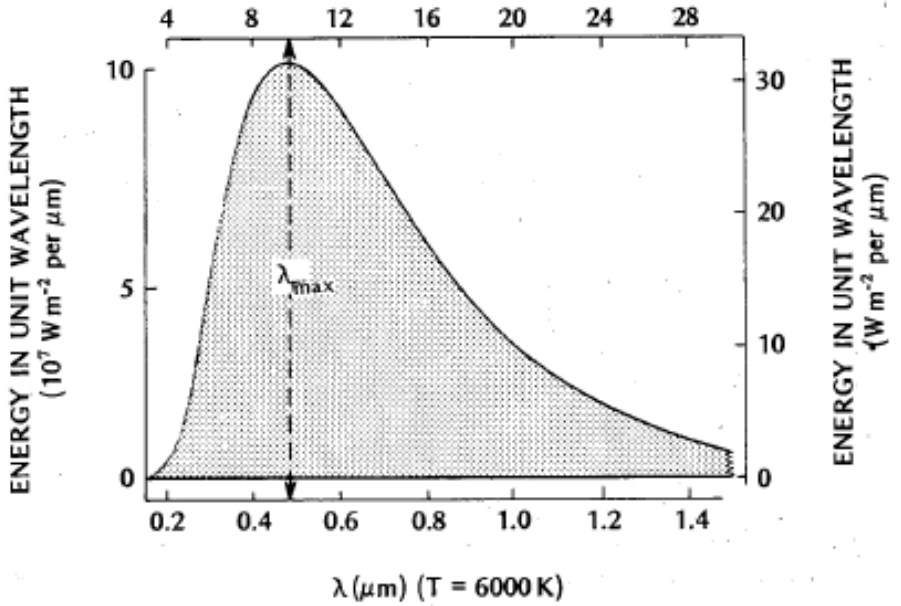


Shortwave & Longwave Radiation



ultraviolet

infrared



<u>Wien's Law</u> – Wavelength of maximum spectral emissive power

$$\lambda_{\max} = \frac{2897}{T_{abs}}$$