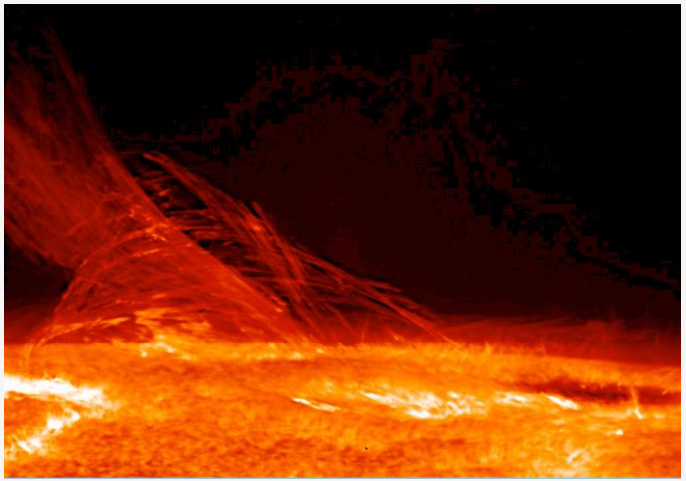
Third Generation PV and Other Ways to Utilize Solar Energy

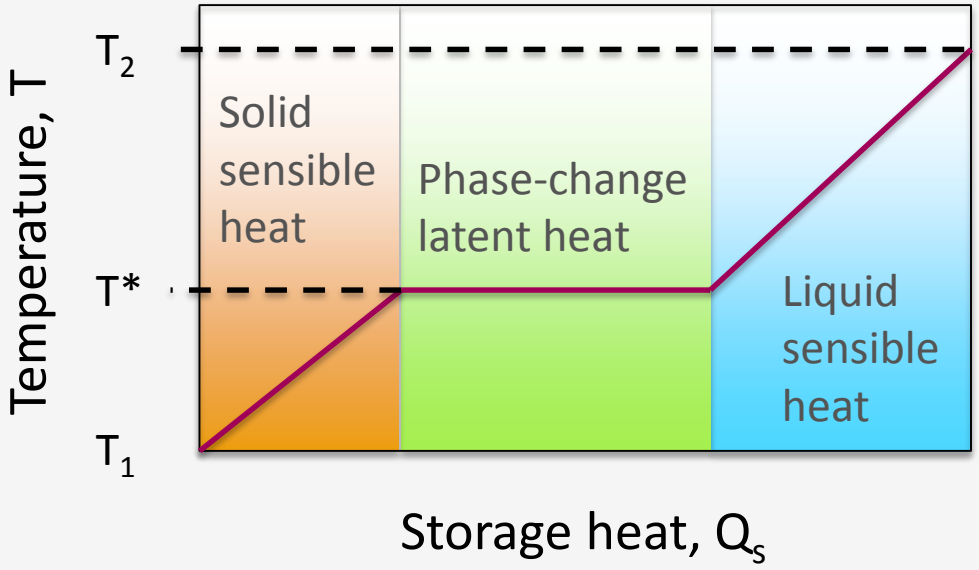
Solar Thermal Energy I - Basic Principles

Week 6.2.1

Arno Smets

Heat





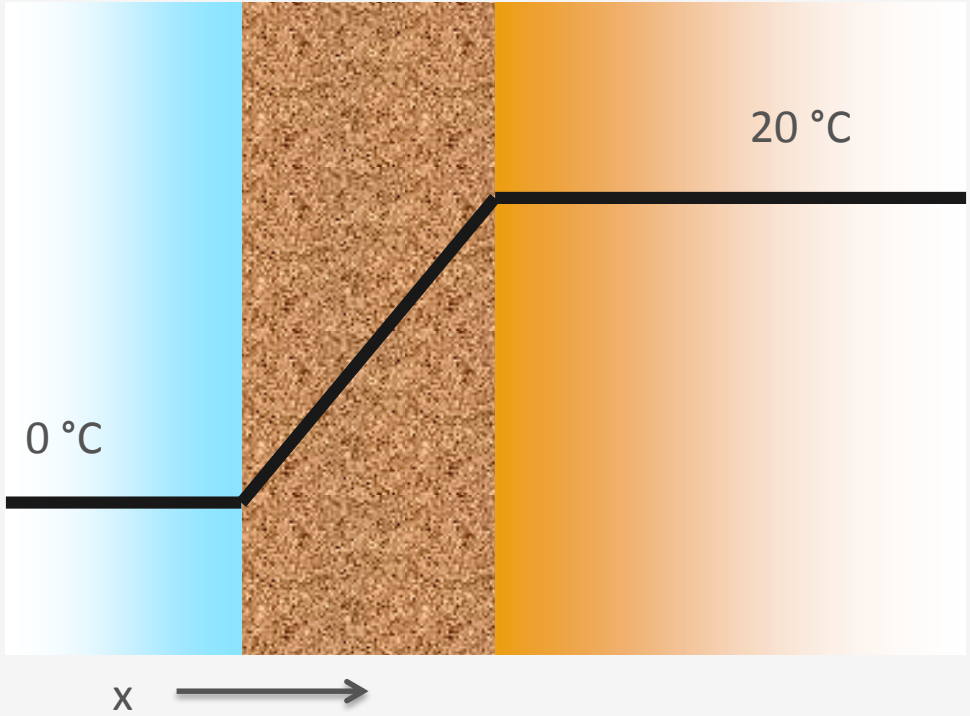
Sensible heat:

$$Q = mC_p(T_2 - T_1)$$

Latent heat:

$$Q = m\lambda$$

Conduction

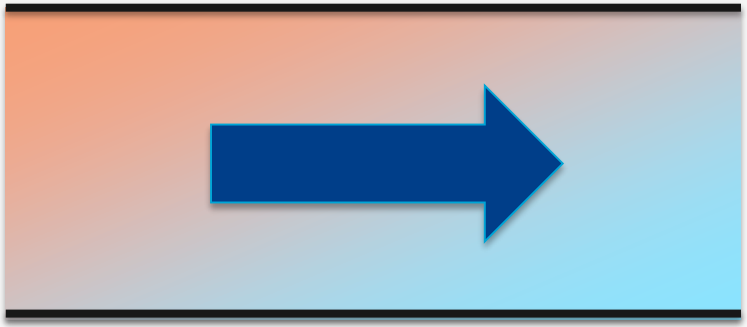


Fourier's law

$$Q_{cond} = -kA\frac{dT}{dx}$$

Convection

Forced convection



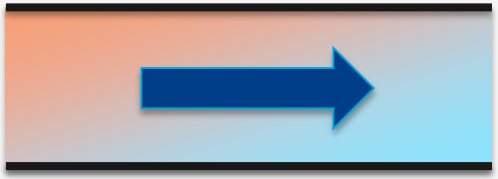
Natural convection

Convection

Newton's law

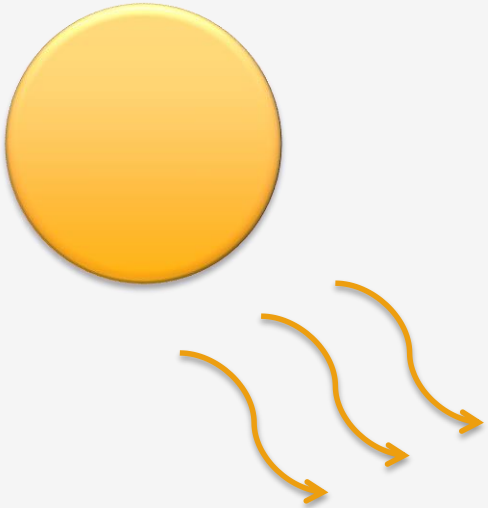
$$Q_{conv} = -hA\Delta T$$

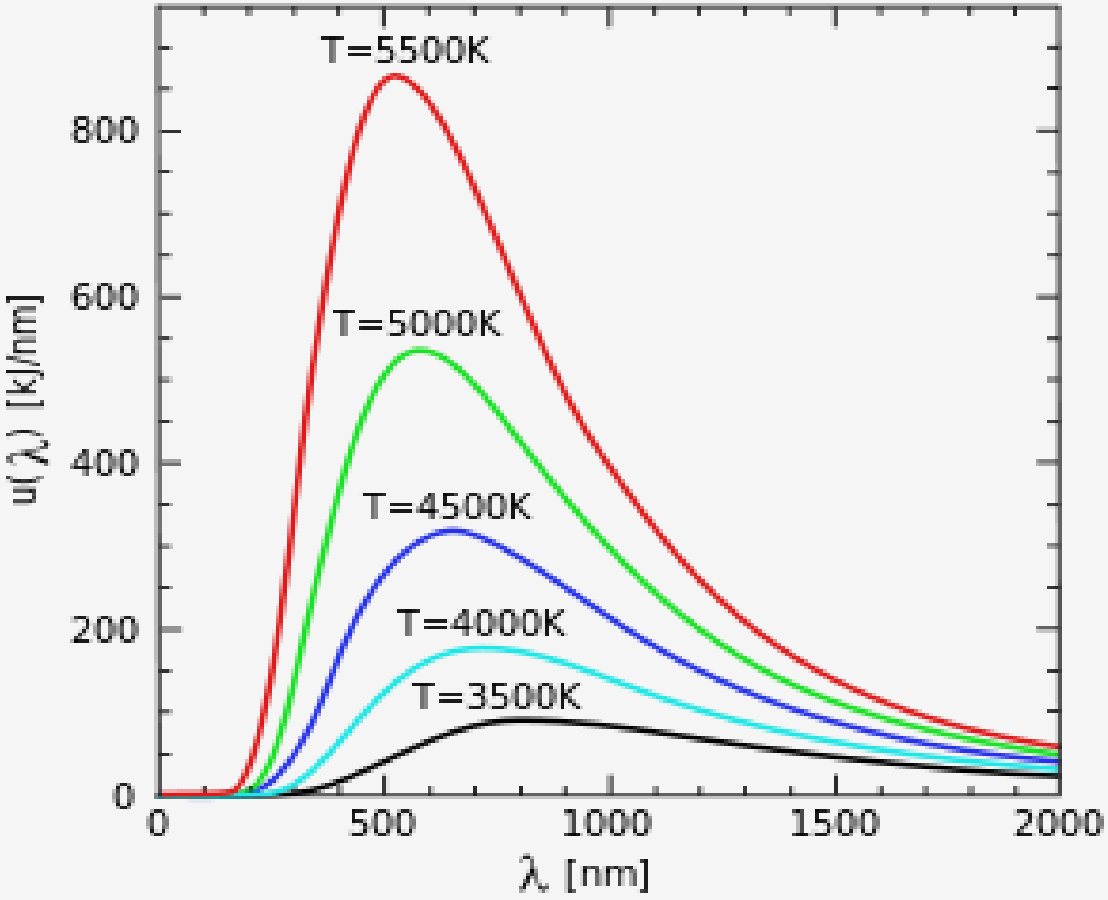
Forced convection



Natural convection

Radiation





http://en.wikipedia.org/wiki/Thermal_radiation

Radiation

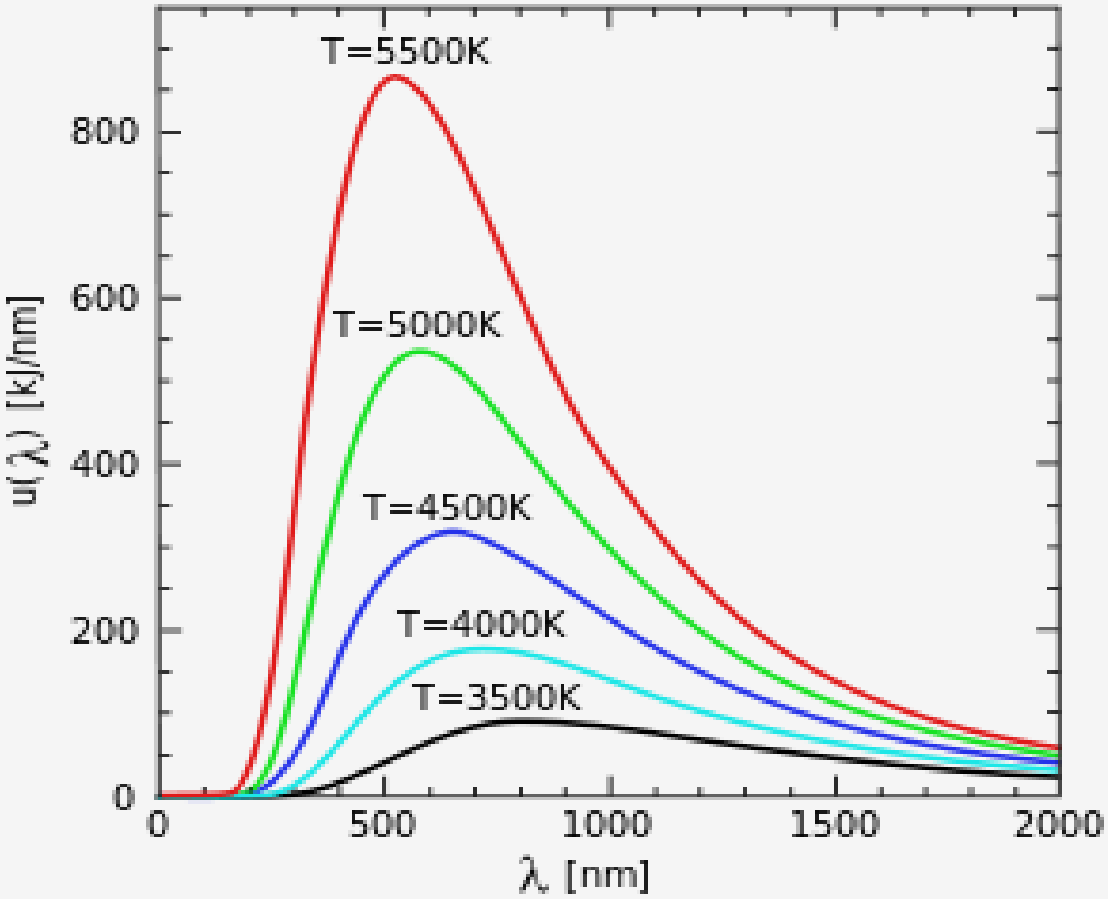
Black body:

$$E_b = \sigma T^4$$

Grey body:

$$Q = \varepsilon A \sigma ({T_2}^4 - {T_1}^4)$$

$\sigma = 5.6697 \times 10^{-8}\ W/m^2K^4$



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