

Study Questions - Topic 5

1. Use the web applet on modelled extraterrestrial irradiance to answer the following questions:

Use the following link: <https://geog321.github.io/applets/latitude/index.html>

(a) At what latitude do we expect the highest yearly total K_{Ex} ? What is the consequence of this on global circulation?

(b) At what latitude do we expect the maximum daily total K_{Ex} ? How can we explain this?

(c) For Montreal QC, when do you expect the highest K_{Ex} , and when the lowest?

2. If at $\lambda = 600$ nm, the spectral absorptivity of a completely opaque object is equal $\zeta_\lambda = 0.75$, what is its spectral reflectivity α_λ ?
3. In the PAR range, a green leaf shows a reflectivity of $\alpha_{PAR} = 0.11$ and a transmissivity $\psi_{PAR} = 0.08$ (assume constant values across the PAR range). If the incident PPFD on the leaf is $800 \mu\text{mol s}^{-1} \text{m}^{-2}$, calculate the absorbed PPFD.
4. Calculate the bulk Atmospheric Transmissivity a for Montreal, QC at 14:00 on February 15th if a pyranometer measures $K_\downarrow = 298 \text{ W m}^{-2}$.
5. Assume that transmissivity a does not change over that day, and calculate K_\downarrow for 10:00 (same location, same day).