McGill University, Montreal
GEOG 321 - Climatic Environments
Knox

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 Vancouver BC, 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 $\psi_\lambda = 0.75$, 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 $800\,\mu mol\,s^{-1}\,m^{-2}$, calculate the absorbed PPFD.

4. Calculate the bulk Atmospheric Transmissivity a for Port Hardy, BC on Vancouver Island, at 14:00 on February 15th if a pyranometer measures $K_\downarrow = 298\,Wm^{-2}$.

5. Assume that transmissivity a does not change over that day, and calculate $K_\downarrow$ for 10:00 (same location, same day).