University of British Columbia, Vancouver
GEOB 300 - Microscale Weather and Climate
Knox
January 29, 2020

Study Questions - Lecture 12

1. How does the amplitude and phase lag of soil temperatures in a completely dry soil depend on (a) depth, and (b) soil organic matter content (at constant porosity)?

2. Calculate the angular frequency for a diurnal ω_d and an annual temperature wave ω_a.

3. Calculate the daily and annual damping depth D for a mineral soil with a thermal diffusivity $\kappa = 5.0 \times 10^{-7}\,\mathrm{m^2\,s^{-1}}$. How do you interpret your results?

4. For the same soil, calculate when the soil temperature reaches its maximum at 5 cm if the maximum surface temperature is measured at 13:00?

5. In a different soil, you measure the daily maximum 5-cm soil temperature at 15:00 and the maximum 15-cm soil temperature at 18:00. Assume homogeneous soil properties and sinusoidal waves, and calculate the soil's thermal diffusivity κ.

6. Briefly compare the temperature regimes of mineral and organic soils.