

Unit 13 Applications Physical Hydrometeorology

1. All students: Calculate the volumetric heat capacity of a soil that has a porosity of 0.4, a soil material specific heat capacity of 800 J/kg/K, soil bulk density of 1600 kg/m³, air density of 1.29 kg/m³, soil ice content of 0.02, and a soil volumetric water 0.2.
2. Graduate students: Calculate the hourly change in soil temperature at 1, 5, 10, 20, 40 and 100 cm depth assuming a volumetric heat capacity of $1.6 \cdot 10^6 \text{ J K}^{-1} \text{ m}^{-3}$, and a thermal conductivity of $0.24 \cdot 10^{-3} \text{ W/(m K)}$. Assume a soil temperature profile with a temperature decrease of 6.85K/1m. The surface temperature is 285K. Tip: Save time by using an excel spread sheet.