

## Study Questions - Lecture 11

1. At 11:30 in the morning, we measure a soil heat flux density  $Q_{G(5\text{cm})}$  of  $25 \text{ W m}^{-2}$  using a heat flux plate installed at 5 cm depth. Calculate the soil heat flux density at the surface  $Q_{G(0)}$ , if the soil's heat capacity in the layer from 0 to 5 cm depth is  $2 \text{ MJ m}^{-3} \text{ K}^{-1}$  and the temperature in the same layer changed from  $24.8^\circ\text{C}$  at 11:00 to  $25.3^\circ\text{C}$  at 12:00.
2. For the same soil, at 20:30 in the evening, we measure a soil heat flux density  $Q_{G(5\text{cm})}$  of  $-12 \text{ W m}^{-2}$ . Calculate the soil heat flux density at the surface  $Q_{G(0)}$ , if the temperature in the layer from 0 to 5 cm depth changed from  $7.5^\circ\text{C}$  at 20:00 to  $7.0^\circ\text{C}$  at 21:00.
3. What is meant by "heat sharing"?
4. Calculate the sensible heat flux  $Q_H$  at 11:30 for the example in Question 1, if the soil's thermal conductivity is  $k = 0.27 \text{ W m}^{-1} \text{ K}^{-1}$  and the atmospheric thermal admittance  $\mu_a$  is  $\approx 5000 \text{ J m}^{-2} \text{ K}^{-1} \text{ s}^{-1/2}$ .