

Study Questions - Lecture 23

1. You measure a covariance $\overline{w'T'} = -0.031 \text{ m s}^{-1} \text{ K}$. Average air temperature is 10°C . Calculate Q_H . Is this a day-time or night-time situation?
2. You measure a covariance $\overline{w'\rho'_v} = 1.73 \times 10^{-4} \text{ kg m}^{-2} \text{ s}^{-1}$. ρ_v is the water vapour density in kg m^{-3} . Average air temperature is 30°C . Calculate Q_E .
3. Determine the Bowen ratio β if $\overline{w'T'} = 0.121 \text{ m s}^{-1} \text{ K}$ and $\overline{w'\rho'_v} = 1.21 \times 10^{-4} \text{ kg m}^{-2} \text{ s}^{-1}$. Average air temperature is 20°C .
4. Given is $Q_E = 240 \text{ W m}^{-2}$ at 20°C air temperature. Determine the covariance $\overline{w'q'}$, where q is the specific humidity (in g water vapour per kg air ,i.e. g kg^{-1}).
5. Over a rice paddy you measure a covariance between vertical wind and methane concentration ρ_{CH_4} in $\mu\text{g m}^{-3}$ of $\overline{w'\rho'_{\text{CH}_4}} = 10 \text{ m s}^{-1} \mu\text{g m}^{-3}$. Determine the mass flux density between surface and atmosphere.