University of British Columbia, Vancouver
GEOS 300 - Microscale Weather and Climate
Knox

Study Questions - Lecture 22

1. You measure a covariance $\overline{w'T'} = -0.031\,\mathrm{m\,s^{-1}\,K}$. Average air temperature is 10°C. Calculate Q_H. Is this a day-time or night-time situation?

2. You measure a covariance $\overline{w'\rho_v'} = 1.73 \times 10^{-4}\,\mathrm{kg\,m^{-2}\,s^{-1}}$. ρ_v is the water vapour density in $\mathrm{kg\,m^{-3}}$. Average air temperature is 30°C. Calculate Q_E.

3. Determine the Bowen ratio β if $\overline{w'T'} = 0.121\,\mathrm{m\,s^{-1}\,K}$ and $\overline{w'\rho_v'} = 1.21 \times 10^{-4}\,\mathrm{kg\,m^{-2}\,s^{-1}}$. Average air temperature is 20°C.

4. Given is $Q_E = 240$ 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 $\mu\mathrm{g\,m^{-3}}$ of $\overline{w'\rho_{CH_4}'} = 10\,\mathrm{m\,s^{-1}}\,\mu\mathrm{g\,m^{-3}}$. Determine the mass flux density between surface and atmosphere.