CEE3430 Engineering Hydrology

Homework 2. Evaporation

Date: 1/19/11
Due: 1/24/11

Objective. The objective of this homework is to gain experience in calculating atmospheric properties and evaporation.

1. Bedient 1.9

2. Bedient 1.22

3. At a weather station near a lake the following measurements are made.

   - Air pressure 900 mb
   - Air Temperature 20 ^{o}C
   - Dew Point 12 ^{o}C
   - Net radiation 300 cal cm^{-2} day^{-1}
   - Wind Speed 3 m/s at a height of 2 m.
   - Water temperature 22 ^{o}C

   a) Calculate the vapor pressure, relative humidity and latent heat of evaporation.

   Assume that there is negligible advected energy or change in energy stored in the lake. Estimate the rate of evaporation from the lake using the following methods. In the Mass Transfer and Combined methods use equation 1-13 with b=0.0118 cm day^{-1} m^{-1} s mb^{-1} (Lake Mead).

   b) Mass Transfer (Equation 1-13)
   c) Energy Budget Method (Bowen Ratio) (Equation 1-15 and 1-16)
   d) Combined Method (Penman) (Equation 1-17)
   e) You have learned that evaporation is a function of wind speed. Suppose the wind speed were to drop from 3 m/s to 1 m/s. Estimate the change in evaporation by each method. Explain your results.