Forest Hydrology: Lec. 14

Lecture content

- **Transpiration**

  - Sensitivity analyses of the Penman-Monteith equation

The Penman-Monteith equation

Equation obtained based on the energy balance

$$L = \frac{\Delta R_n + \gamma \rho_a c_p \left(e_s(T_z) - e_z\right)/r_a}{\Delta + \gamma(1 + r_c / r_a)}$$

$$E = \frac{\Delta R_n + \gamma \rho_a c_p c_a \left(e_s(T_z) - e_z\right)}{\left[\Delta + \gamma(1 + c_a / c_c)\right] \rho_w \lambda_w}$$

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Application 1

Compute the evapotranspiration rate from the canopy at a pine forest in August.
The following typical conditions apply:

Zveg=1650 cm;
LAI=2.8
Cleaf=0.2 cm/s
P=1013 mb
Rin= 0.00694 cal cm-2 s-1
Albedo=0.18
Rout=-0.00138 cal cm-2 s-1
Ta=19.2°
Relative humidity=0.54
Wind velocity=300 cm/s

Sensitivity analysis

Group 1:

Analyse the effect of weather conditions

Group 2:

Analyse the effect of Zveg, of LAI and of fs

Group 3:

Analyse the effect of soil moisture and Cleaf