

Unit 8 Applications Physical Hydrometeorology

Please solve the problems assigned for your class level, scan the solutions and email them to me using your @alaska.edu email address by the deadline.

1. **All students:** Calculate the amount of heat added to a snowpack at 0°C from 50 mm of rainfall with a temperature of 1°C on a spring day.
2. **ATM425:** Calculate the water output from snowmelt on a day when the total net energy input is 50000 J m^{-2} . Discuss which assumptions you have to make and why you made them?
3. **ATM625:** On a day the following conditions were observed: Incoming solar radiation was 590 W/m^2 ; snow albedo was 0.92; snow temperature was -8°C ; incoming longwave radiation was 10% of the longwave emission from the snowpack; and the emissivity of the snow was 0.97. Set up the energy budget and calculate the net incoming shortwave radiation, longwave emission from the snowpack, and net radiation.
4. **ATM625:** Calculate the energy available for snowmelt and the depth of water equivalent melted when net shortwave radiation, net longwave radiation, sensible and latent heat flux (densities), ground heat flux are 500 W/m^2 , -300 W/m^2 , 360 W/m^2 , -210 W/m^2 , and 60 W/m^2 , respectively.