Unit 3 Applications Physical Hydrometeorology

Solve the problems assigned at your class level and to all students. Scan the solutions and send them to me by email prior to Thursday 2359 AST.

All students:

1. An air parcel encounters a 2 km high mountain range and is forced to rise. At the bottom of the mountain, its temperature and dew point temperature are 10 and 8°C, respectively. The saturated lapse rate is 0.5°C/100m. Assume that all condensate falls out on the upwind side of the mountain. Determine cloud base height, the temperature and dew point temperature at cloud base, temperature and dew point temperature at the top of the mountain. Calculate the heat release due to condensation and the gain in potential energy of the air parcel. Determine the internal energy of the air parcel at the bottom and top of the mountain. How much water did the air parcel loose? If the air parcel rises with 0.1 m/s, in which time will it reach the mountain top, when the slope has a length of 4 km? What would the precipitation rate (mm/hr) and accumulated precipitation of the event be when orographic lifting were to last over 6h? Can you set up an energy budget? If so, how would it look like and what assumptions would you need to make. If not, give reasons.