

Homework #2 – Due 1/31/2013

Given the tethered balloon data set:

1. Write a computer program to read in the data set, calculate and plot the temperature, potential temperature, virtual potential temperature. Compare and discuss the potential temperature and virtual potential temperatures. Why do they differ?
2. Compare the potential temperature calculations to using the balloon based pressure measurements with $\theta(z) \cong T(z) + \Gamma z$. Calculate and plot the difference? What is the difference?
3. Finish the virtual temperature derivation from class by showing:

$$T_v = T \left(\frac{1 + \frac{r}{\epsilon}}{1 + r} \right) = T \left(1 + \frac{1 - \epsilon}{\epsilon} q_v \right)$$

4. Using the tethered balloon data, calculate the Bowen ratio in the lower 20 meters assuming linear gradient approximations for the potential temperature and relative humidity.