

Atmospheric Sciences 5130
Exercise #4
Due Friday, February 10, 2012

This exercise deals with moist (saturated) adiabatic processes and the skew T -log p chart: calculating liquid water and total water mixing ratios.

1. A parcel ascends adiabatically over a mountain range starting from 950 mb, where $T = 23^{\circ}\text{C}$ K and mixing ratio = 12 g kg^{-1} , to 550 mb. Then it descends adiabatically back down to 950 mb.
 - (a) Complete the following table of parcel properties. The parcel ascends from time 1 to time 4, then descends. from time 4 to time 6.

time (arbitrary units)	1	2	3	4	5	6
pressure (mb)	950		675	550		950
temperature (T , $^{\circ}\text{C}$)	23					
saturation mixing ratio (w_s , g/kg)		12			8	
water vapor mixing ratio (w , g/kg)	12	12			8	8
liquid water mixing ratio (w_l , g/kg)	0					
total water mixing ratio ($w + w_l$, g/kg)	12		10	8	8	
Relative humidity (percent)		100	100	100	100	

- (b) Plot the parcel's temperature and dewpoint temperature versus pressure during ascent and descent on a skew- T log p diagram. *Label each point with its corresponding time.*