Croix Christenson,
Lecture **2/2/09 Guest Speaker Dr. Olivier Paulius** Presented **2/4/09**

Buoyancy Force

Buoyancy greater then zero (+) corresponds with upward acceleration
Buoyancy less then zero (-) corresponds with downward acceleration

$$f_B = \frac{(T - T')}{T'} g$$

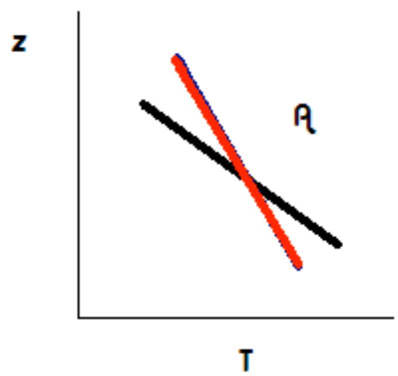
If T > T' then upward acceleration should be expected
If T < T' then downward acceleration should be expected

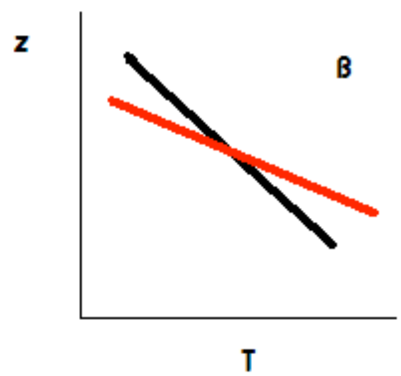
NOTE: T= temperature of parcel T'= temperature of surroundings

Dry Adiabatic lapse rate of Atmosphere and stability

$$\frac{dT}{dz} = -\frac{g}{C_p} = -10\frac{K}{km}$$

K=Kelvin, km=kilometers, dz=change is height, dT=change in Temperature, g=gravity, Cp=specific heat at constant pressure





Graph A, is an example where the T(z) observed is less then the dry adiabatic lapse rate resulting in stable atmospheric conditions. In stable atmospheric conditions, the system (atmosphere) responds to a small perturbation by returning to its original state.

Graph B, is an example where the T(z) observed is greater then the dry adiabatic lapse rate resulting in unstable atmospheric conditions. In unstable atmospheric conditions, the system (atmosphere) responds to a small perturbation by tending to accelerate irreversibly away from its original state.

Key
z=height
T=Temperature
RED=T(z) observed
BLACK= Dry lapse rate ~10K/km

First Law of Thermo dynamics (with enthalpy)

dh – **α***dp = Q = 0

for an adiabatic process, where, dh=enthalpy, h=CpT, **α**=specific volume, dP=change in pressure