Atmospheric Stability

Stable Air

- Stable air resists vertical displacement; if displaced vertically, a parcel returns to its original position
  - Causes of stable air:
    1) Radiational cooling
    2) Influx of cold air (cold air advection)
    3) Air moving over a cold surface
  - If forced to rise, stable air spreads horizontally, forming flat, layered clouds (stratus types)
  - Sinking, stable air may create a subsidence inversion (found in most high pressure systems)

Neutral Air

- Neutral air, if displaced, will remain in its new position

Unstable Air

- Unstable air, if displaced vertically, will rise or descend until a parcel reaches the same temperature as its environment
- Causes of unstable air:
  1) Daytime solar heating
  2) Influx of warm air (warm air advection)
  3) Air moving over a warm surface

Each of these mechanisms can destabilize the atmosphere!

Environment vs. Parcel Temperatures

- The temperature of a displaced air parcel is compared with the environmental temperature
- The vertical environmental temperature profile is given by the environmental lapse rate