HANDOUT

ATMOSPHERE & ENERGY BALANCES

Basic Processes in Atmospheric Heating/Cooling

1) **Transmission** - passage of shortwave (UV, visible, near BR.) radiation inputs & long wave (thermal IR) radiation outputs thru either the atmosphere or water

2) **Emissivity** - the fraction of the radiation emitted by an object to the maximum possible radiation it can emit

3) **Refraction** - bending of em waves when insolation enters the atmosphere or another medium (ex: rainbow, mirage, sunrise & sunset)

4) **Reflection** - portion of arriving insolation that is returned directly to space without being absorbed or performing any work

5) **Albedo** - reflective quality of a surface; percentage of insolation that is reflected
   a) Dark color - low (ex: road); light color - high (ex: snow)
   b) Smooth - greater (ex: grass); rough - lesser (ex: forest)
   c) Low angle on water - greater; high angle - lesser

6) **Scattering** - change in direction but not wavelength of light waves; shorter waves are scattered more than longer waves. So, that is why on a clear day the sky appears blue & smog & haze produces a white sky (the larger particles scatter all wavelengths). Also direct rays experience less scattering & low angle rays experience more, so sunrises & sunsets are orange & red; cooling effect

7) **Absorption** - ability to assimilate energy from the waves that strike it; dark absorbs better than light; warming effect

8) **Transfer of Heat Energy**
   a) **Conduction** - movement of energy from molecule to molecule (ex: surface energy budgets, land-water temperature differences, soil temperatures)
   b) **Convection** - transfer of energy by bodily movement involving vertical motion (ex: atmospheric & oceanic circulation, air mass movements, and movements in the crust)
   c) **Advection** - transfer of energy by bodily movement involving horizontal motion (ex: horizontal movement of winds from land to sea)