Clouds and Precipitation
Pressure and Wind

Stability of Atmosphere
- Air rises due to a number of factors
  - Can calculate the new temperature
  - Use the adiabatic lapse rate:
    - Dry for unsaturated
    - Wet for saturated
  - Compare the temperature of the air that has risen to the temperature of the air at that height
  - Use the environmental lapse rate
    - Higher density air that has risen is stable (cooler)
    - Lower density air that has risen is unstable (warmer)

Stability
- Environmental lapse rate
  - 5°C/1000 m
- Dry adiabatic lapse rate
  - 10°C/1000 m
- Rising air is cooler than area it rises into
- Stable!!

Cloud Development
- Air cools upon rising
- Cools to dew–point temperature
- Condensation begins
- "Lifting condensation level"

Cloud Shapes
- Cirrus—curl (of hair): thin wisps
- Stratus—blanket: extensive layers
- Cumulus—pile: puffy masses
  - Additional modifier of name
    - Nimbus = rain
      - Cumulonimbus: puffy rain clouds
      - Nimbostratus: layered rain clouds

Cloud Groups
- High clouds—6000 m or more above surface
- Middle clouds—2000 m to 6000 m above
- Low clouds—less than 2000 m above surface
- Clouds of vertical development
  - Present through more than one level
  - Product of atmospheric instability
Cloud classification—left

- Cirrocumulus
- Cirrostratus
- Altocumulus
- Altostratus
- Nimbostratus
- Cumulus
- Cumulonimbus
Cloud classification—right

Fog—Golden Gate Bridge

Fog—Tule Fog

Willamette Valley Fog

Weather radar display

Storms of 2011

- Tornadic activity at all time high in May
- Wide swath across southeast

High rainfall led to severe flooding

- 75-year flood?
- Last happened in 1937…
- Some areas are at record levels
Condensation in clouds

Collision

Coalescence

Bergeron Process of ice-crystal growth

Bergeron Process
- Snow falls from clouds
- Melts as it is falling
- Result is rain
- Most common method of precipitation in the mid-latitudes

Forms of precipitation
- Mist: tiny droplets
- Drizzle: small droplet
- Rain: larger drops
- Sleet: small frozen raindrops
- Glaze: rain that freezes upon contact
- Rime: frost deposition
- Snow: solid flake-shaped crystals
- Hail: solid concentric balls
- Graupel: collected snowflakes

Glaze ice

Rime ice

Pogonip

http://grannysatticquilts.com/pogonip.html

Precipitation measurement