Class 4a: Atmospheric moisture
Introduction to water

• Earth’s temperature $\rightarrow$ special properties of water
Introduction to water

• Energy needed to change state
Evaporation

• How does water evaporate?
Evaporation

- Water vapor stores latent heat
- *Vapor pressure*: pressure exerted by water vapor
Vapor pressure
Evaporation

• How quickly does water evaporate?
Humidity

• *Absolute humidity*: ratio of water vapor to a given *volume* of air

• *Specific humidity*: ratio of water vapor to a given *mass* of air
Humidity

- **Relative humidity**: ratio of water vapor to maximum water vapor capacity
Dew point

• When air cools, water vapor capacity ______ and relative humidity ______
Condensation

- *Condensation*: water vapor becomes liquid, releases latent heat
Lapse rates

• *Normal lapse rate*: $3.5^\circ F/1000$ feet
Adiabatic processes

- Air changes temperature by convection, not conduction
Adiabatic processes

• If a rising parcel of air cools to its dewpoint, then ______ occurs
Adiabatic processes
Stability of air

• Buoyancy: tendency of an object to rise
Stability of air
Stability of air

- Stability: normal lapse rate of surrounding air is *less than* DALR
Stability of air

- Unstable air: normal lapse rate of surrounding air is greater than DALR
Stability of air

• *Conditionally unstable* air: stable up to a point
Stability of air