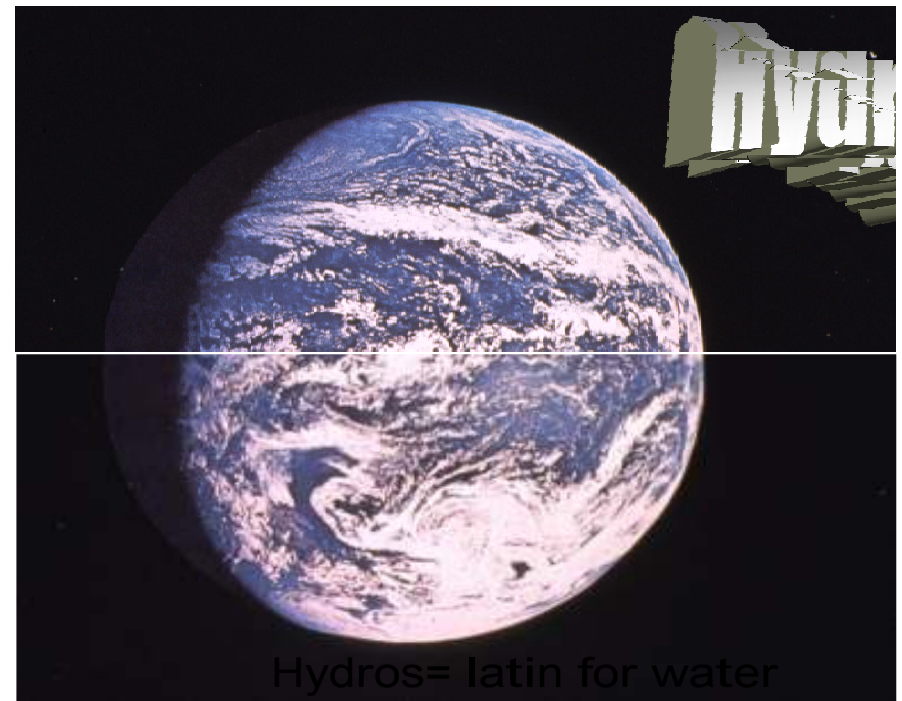


# PHYSICAL GEOGRAPHY

## Hydrosphere



## Hydrosphere

Key Concepts

- Water Cycle
- Precipitation
- Water Balance
- Humidity, Cooling, Condensation
- Adiabatic Changes
- Clouds
  - cumulous, stratus, cirrus, fog

## Hydrosphere

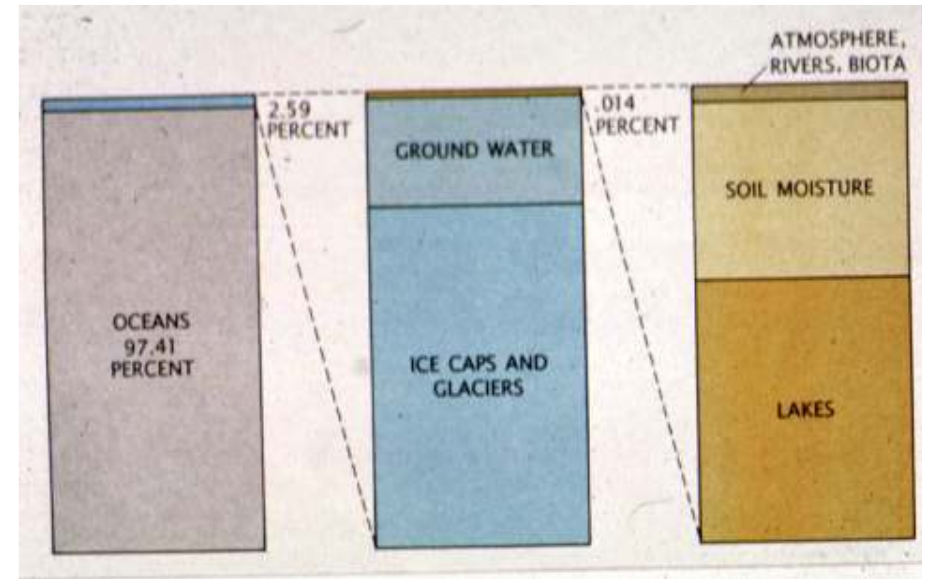
- The earth's water is found as a
  - LIQUID in rivers, lakes, oceans, rain
  - GAS in our atmosphere
  - SOLID in snow and ice
- 71% of the earth's surface is covered by water

# Hydrosphere

Liquid

Solid

Gas

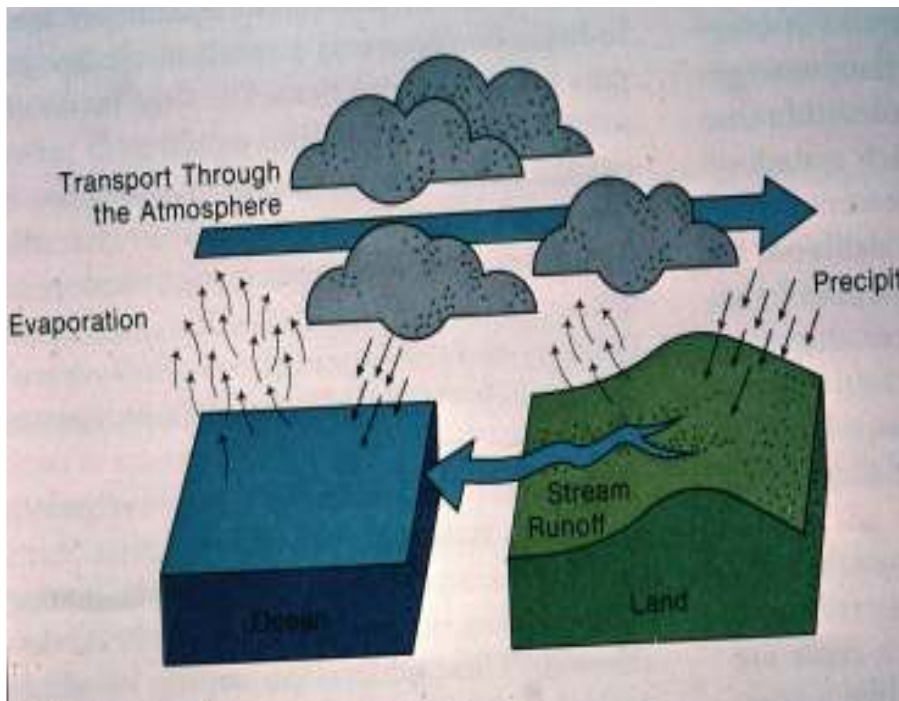


## The Significance of Water

- Water is vital to all life, cell growth, photosynthesis and the absorption of nutrients
- Water is temporarily stored in living beings

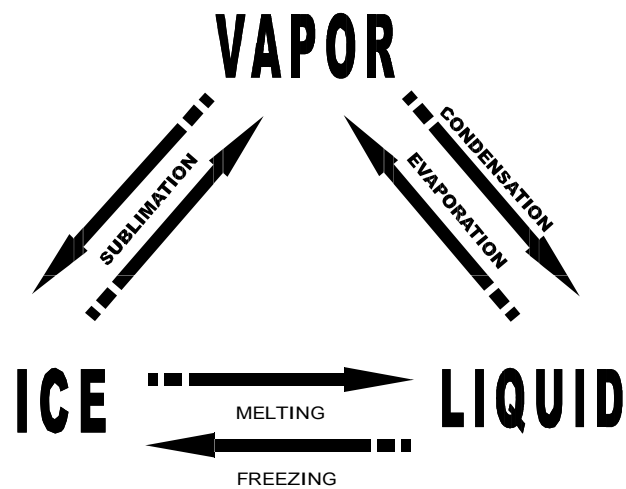
## The Water Cycle or Hydrologic Cycle

- The Circulation of water from one part of the earth to another
- The water of the oceans & the air of the atmosphere combine to deliver enormous quantities of moisture to the land masses
- Process reliant on the ability of water to change from a liquid state to a vapor



## Processes of the Hydrologic Cycle

- **Evaporation** - the transformation of water from a solid or liquid to a gaseous state
- **Condensation** - transformation of vapor into a liquid
- **Precipitation** - liquid or solid water that falls from the atmosphere to the earth's surface



## Types of Precipitation

- **convective precipitation** - from a surface heating up (thermal low) with intensity of precipitation
- **frontal precipitation** - collision of cold and warm air masses
- **Orographic precipitation** - air forced to rise & cool due to landforms

## Forms of Precipitation

- Rain
- snow
- sleet
- hail



## Water Balance

the balance between the receipt and loss of moisture

- Addition
  - precipitation
  - retention in the soil
  - vegetation
  - lakes, streams, rivers
- Losses
  - evaporation into the air
  - transpiration

**Precipitation > Losses = Favorable Water Balance**

**Precipitation < Losses = Unfavorable Water Balance**

## Factors Influencing the Water Balance

- relative location to earth's waters
- prevailing winds
- mountain barriers
  - windward/leeward
- air temperatures
  - evaporation rates
- vegetation cover
- soils
- urbanization

## Geography of Water Balances

- Unfavorable Balance
  - North Africa
  - Australia
  - Central Asia
  - American Southwest
  - Tropics (10-30)
    - considerable evaporation
- Favorable Water Balances
  - Equatorial Zone
  - Polar Regions
  - Windward sides of Mountains in Prevailing Winds
  - Desert Belts

## Humidity, Cooling, Condensation & Clouds

- Humidity – the amount of water vapor suspended in the air as a gas
  - atmospheric water vapor
- Relative Humidity – the amount of water vapor present compared to what the air could hold before it rains

# Humidity, Cooling, Condensation & Clouds

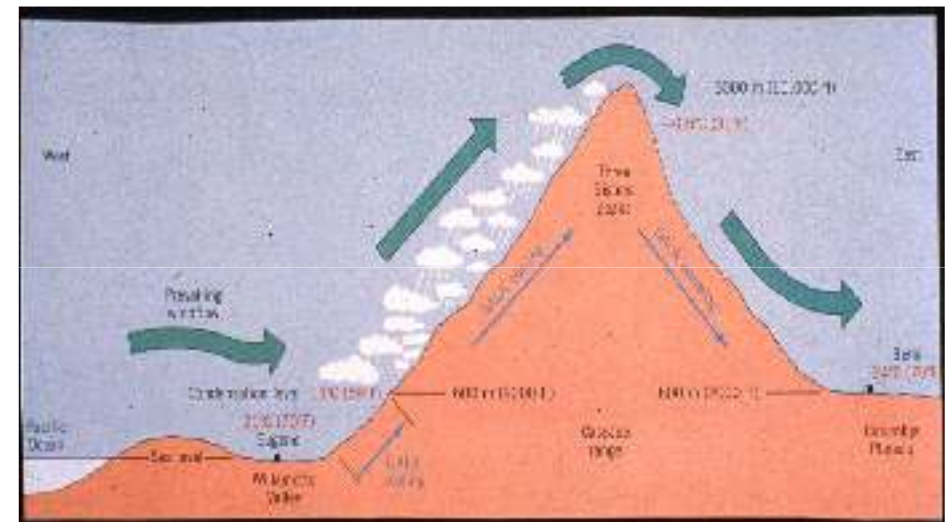
- Dewpoint **lowering** of temperature to reach condensation
  - 100% relative humidity
- Water Vapor Capacity **how much** vapor the air can hold
  - moisture capacity varies with temperature

# Adiabatic Changes

- Changes in temperature as air moves upward
- Rising air expands as it moves upward into levels which have a lower density
  - expansion occurs in the cooling process
- Descending air moving into an area of greater air density is compressed
  - compression occurs in the warming process

# Adiabatic Changes

- Dry Adiabatic Rate **the rate at which dry (vapor) vertically moving air masses change temperature**
  - 5.5 degrees for each 1000 ft.
- Wet Adiabatic Rate **the rate at which wet (condensed liquid) vertically moving air masses change temperature**
  - 3.2 degrees per 1000 ft.



## What is a Cloud?

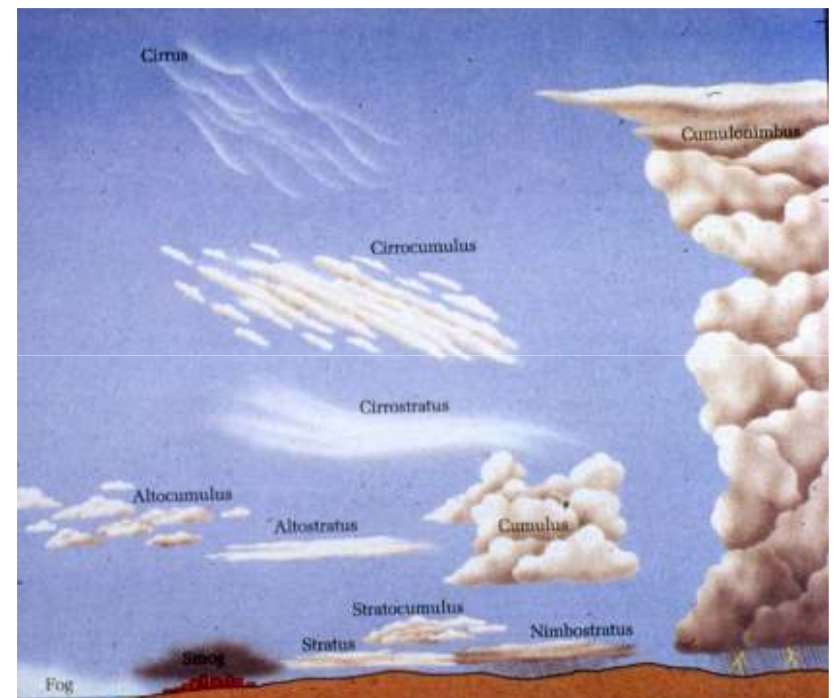
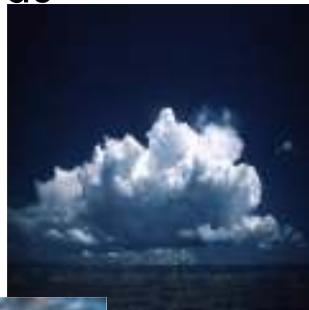
- Suspended condensation droplets in the air



## How Are Clouds Formed?

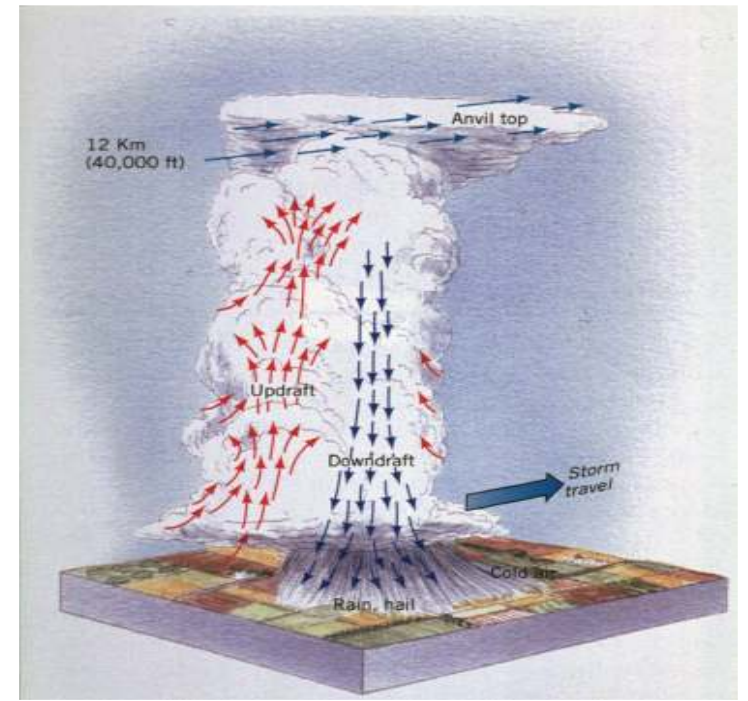


## Types of Clouds











## Rain Clouds

- Nimbus = rain
- Nimbostratus
- Cumulonimbus



## Combination Clouds

- Stratocumulus
- Altocumulus
- Cirrocumulus





## Combination Clouds

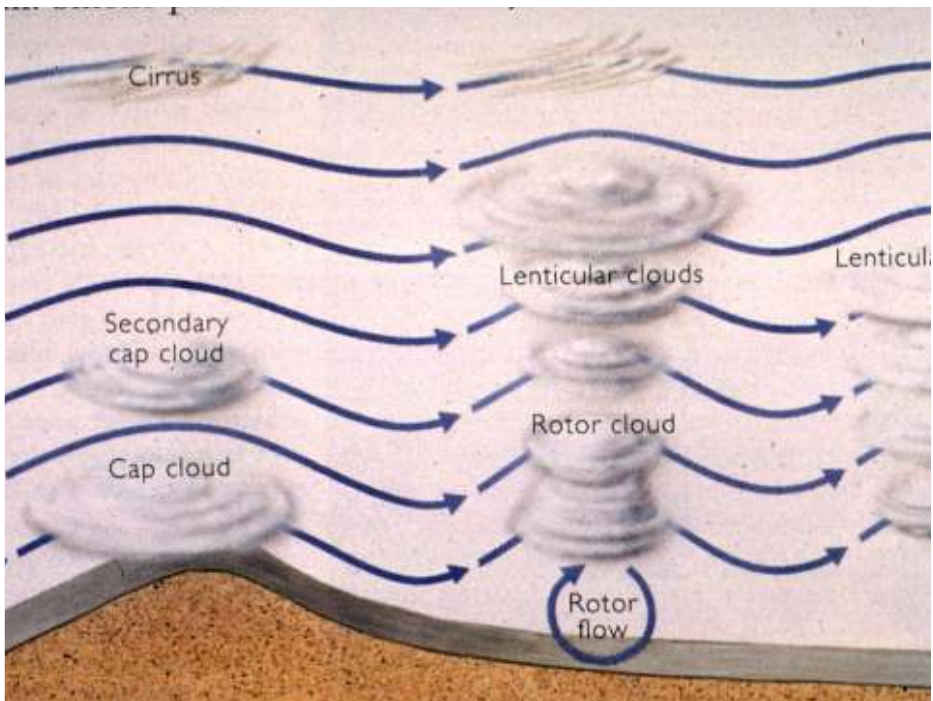
- Nimbostratus
- Altostratus
- Cirrostratus



## Combination Clouds

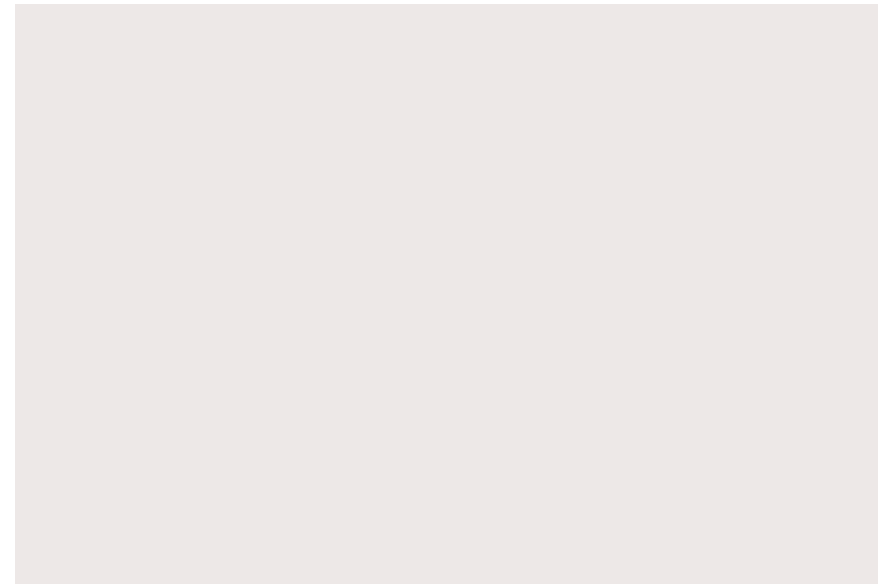
- Cirrocumulus
- Cirrostratus

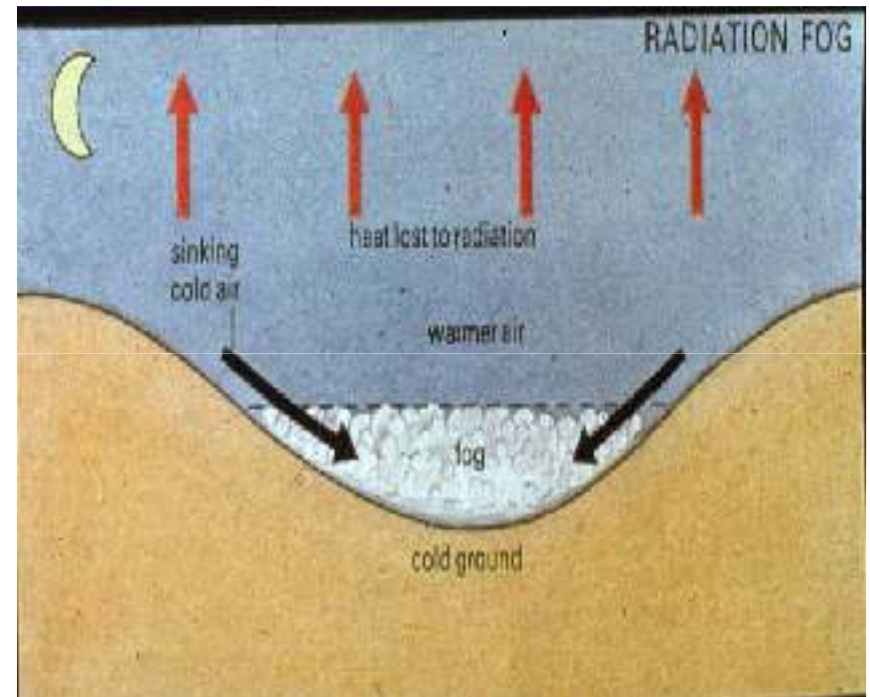
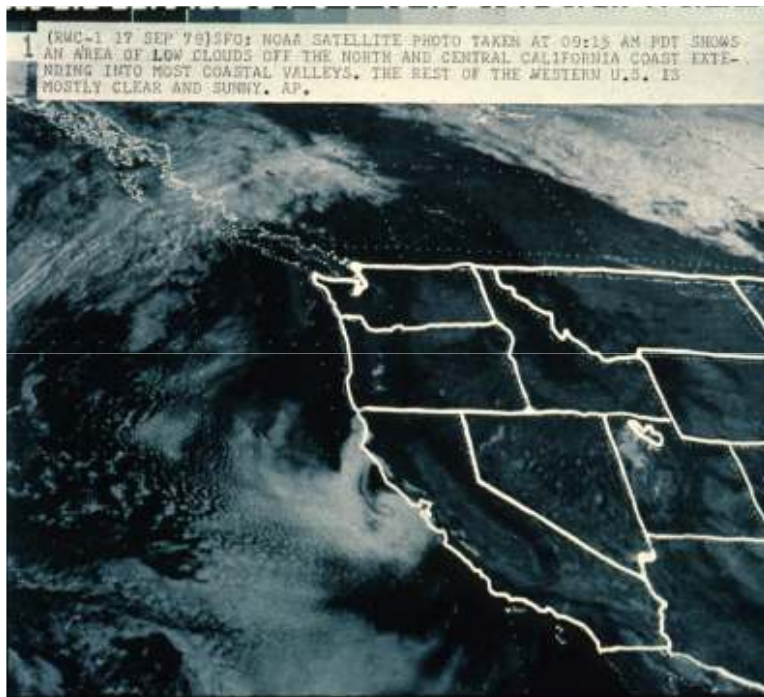
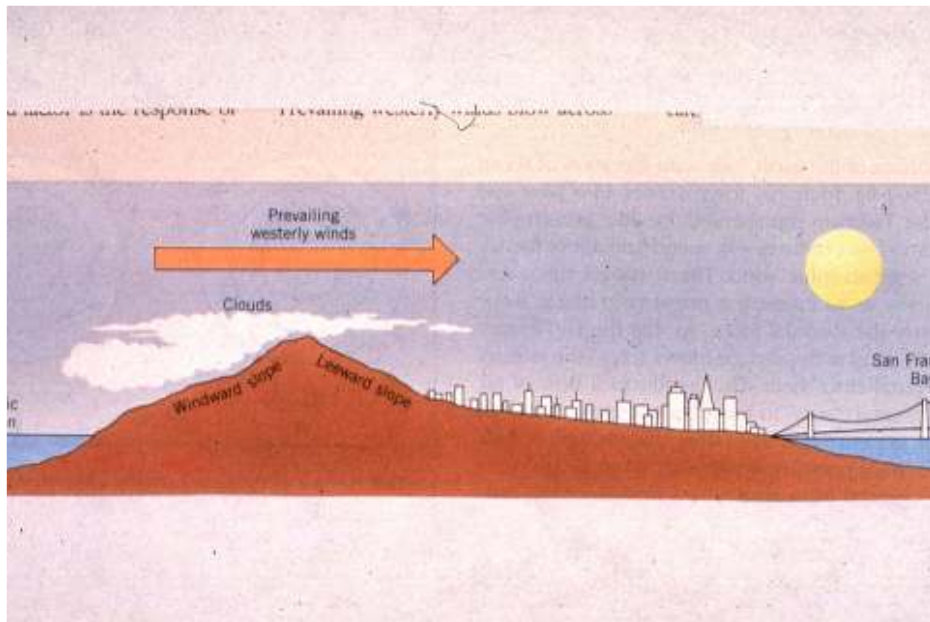




## What is Fog?

- Clouds touching the ground
  - usually caused by cold water or cold ground which causes the moisture in the air to condense into droplets







# Hydrosphere

## Key Concepts

- Water Cycle
- Precipitation
- Water Balance
- Humidity, Cooling, Condensation
- Adiabatic Changes
- Clouds
  - cumulous, stratus, cirrus, fog

PHYSICAL GEOGRAPHY  
Hydrosphere