Final Geography Review

December 2022

Authored for the Geography Curriculum of Semester 1, 2022

- Atmosphere:
  - Made out of 78% nitrogen, 21% oxygen, 0.9% argon, 0.037% carbon
  - Layers:
    - Troposphere:
      - Air closest to the Earth, where we live, where weather is formed, airplanes fly at the top of it
      - 10 miles (16 km) above the surface of the Earth
    - Stratosphere:
      - Ozone layer is part of it (helps shield the Earth from harmful sun rays
      - 30 miles (48 km) above the surface of the Earth
    - Thermosphere:
      - Five times as deep as all other layers combined, very hot (up to 2000 degrees Celsius)
      - 300 miles (483 km) above the surface of the Earth
    - Exosphere
      - Satellites circle the Earth here, fades into spaCe
      - Beyond 300 miles above the surface of the Earth
    - Majority of the atmosphere is contained in the Troposphere (around 75%) and the lower levels of the Stratosphere (around 24%)
    - Air particles become further apart and heat is lost as you rise in the troposphere
  - Weather vs. Climate:
    - Weather: conditions within the atmosphere of an area at a particular timer
    - Climate: refers to the average weather patterns of a particular area over a long period of time (at least 30 years)
    - Factors considered in both are:
      - Temperature
      - Relative humidity and rainfall
      - Pressure and winds
  - Movement of Heat:
    - Convection: transfer of heat through the uneven heating of liquids or gasses
    - Conduction: transfer of heat through an object
    - Radiation: emission or transmission of heat in the form of waves or particles through space or a material medium
  - Solar Radiation:
    - 6% reflected by atmosphere
    - 20% reflected by clouds
    - 4% reflected from surface

- 51% absorbed at surface
- 19% absorbed by atmosphere and clouds

Factors Affecting Temperature:

Latitude:

- Solar incidence: refers to the angle of solar radiation strikes the surface of the earth
- Higher the angle, more intense the sunlight

Altitude:

- Air particles are further apart (less dense) the higher you go in the atmosphere
- Meaning less heat can be absorbed/retained

Maritime/Coastal Influences:

- The oceans cool and warm at a slower speed than that of landmasses
- Areas near coasts or large bodies of water have a more “regulated” temperature
- Have a climate that is highly determined by seas, lakes, and oceans

Cloud cover:

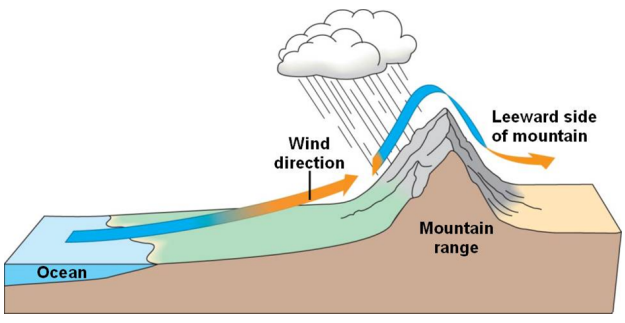
- During the day, cloud cover reflects heat, thus keeping temperatures cooler
- At night, clouds trap heat radiating from the surface of the earth, thus keeping the earth warmer

Precipitation:

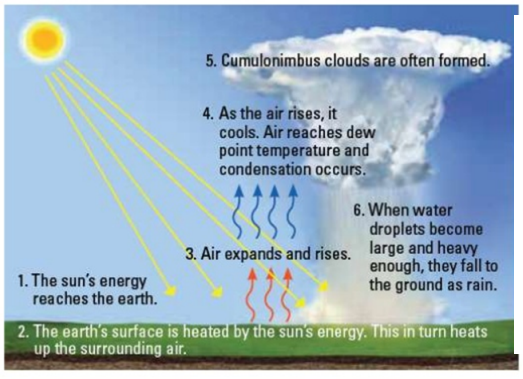
Relative Humidity:

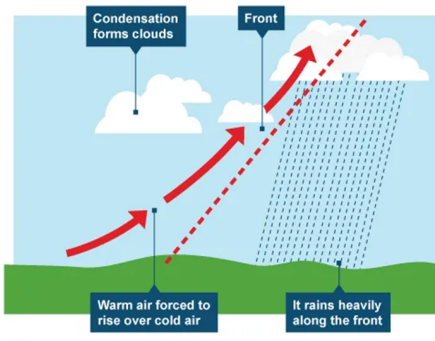
- The ratio of the actual amount of water vapor in the air compared with the maximum amount of vapor that unit can hold at that temperature
- Saturation point:
  - Volume of substances a substance can dissolve
  - Point when substances stop dissolving
- Dew point:
  - Saturation point at a specific temperature

- Three processes which cause rainfall
- Convectional rain:
- Orographic (relief) rain:
- Frontal rain:

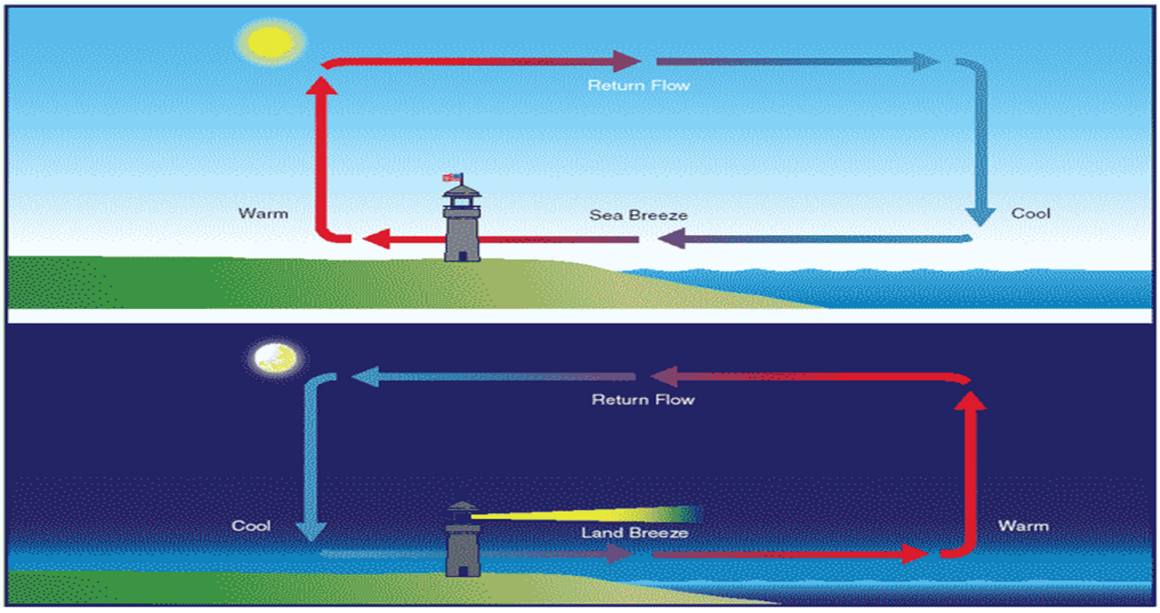


Convectional rain





- Pressure and Winds:
  - Air pressure: the force of air exerted on a unit of area of the Earth's surface by the weight of a column of air above it
  - Factors:
    - Temperature
    - Density
    - Altitude
  - Local Winds:
    - Land breeze
    - Sea breeze



    - Caused by unequal heating and temperature of land and nearby bodies of water
  - Regional/Large Scale Winds:
    - Winds form as air pass between high and low pressure system on the surface of the earth
    - Coriolis Effect:
      - As the Earth spins through space, atmosphere is drawn towards the equator because of its greater terminal velocity
      - Air is drawn to the right in the northern hemisphere
      - Air is drawn to the left in the southern hemisphere
- Weather:
  - Albedo: amount of sunlight reflected/absorbed by an object
  - Urban heat island: low albedo of pavements means hotter urban areas
  - Study of weather–meteorology
  - Study of climates–climatology

        - Iso maps:
            - Weather forecasters use terms like isotherms and isobars very often
            - “Iso” = equal or constant
            - “Therm” = temperature
            - “Bar” = weight or pressure (isobar is a line of constant pressure
            - Isotherm:
                - Isotherm is a line of equal measurement displaying temperature data
                - Colorcode the map
            - Isobar:
                - Show variations in atmospheric pressure from data collected at various stations
                - Isobar maps allow us to predict storm movements, wind directions, and wind speeds
                - All intervals must be labeled
                - All high and low pressure systems must be identified
                - Start at 996 mb and 1024 mb
            - Isohyet map measures precipitation
- Climate and Vegetation:
    - Climate Zone:
        - Climate zone is a physical area that shares similar amounts of temperature and precipitation
        - Climate zones usually change gradually, but sometimes can be abrupt across space
            - Sharp changes in elevation can cause rapid changes to climate
        - Early Classification:
            - First climate model proposed by the ancient Greeks
            - Believed that only “great civilizations” (like themselves) could arise in the temperate zone
            - Three classifications:
                - Torrid zone
                - Temperate zone
                - Frigid zone
            - Though the Greek model of climate zones is useful, it has been significantly expanded
        - Climate considers 3 main measurements (same as weather)
            - Rainfall/Humidity
            - Temperature
            - Pressure/Winds
            - Variety of factors affecting these measurements
                - Solar incidence/intensity

        - Elevation
        - Ocean currents
        - Albedo
        - Volcanism
        - Humans
- Polar Classifications:
    - Exists primarily in places of high latitude and have 3 key classifications
    - Tundra:
        - Warmest month has an average temperature between 0 and 10 degrees Celsius
        - Occur on the northern edges of the North American and Eurasian land masses, and on nearby islands
    - Ice caps:
        - All twelves months have average temperatures below 0 degrees Celsius
        - Dominant in Antarctica and inner Greenland
    - Highland:
        - Average climate for a region above the treeline
        - Similar in characteristics to tundra
- Continental Zone:
    - Humid Continental:
        - A climatic region typified by large seasonal temperature differences, with warm to hot (and often humid) summers and cold (sometimes severely cold) winters
    - Subarctic:
        - Climate characterized by long, usually very cold winters, and short, cool to mild summers
        - Found on large landmasses away from the moderating effects of an ocean
    - Key difference between the two is the type of vegetation
    - Broad leafed trees usually can not survive in sub-arctic climates
- Moderate Zone:
    - Moderate climate zone is characterized by its balanced weather
    - Though precipitation varies throughout its classifications, temperatures tend to be more balanced and regulated
    - Commonly viewed as the temperate zone
    - Mediterranean:
        - Warm, dry summers and mild winters with low amounts of annual precipitation (most of which is received during winter months)

- Marine West Coast:
    - Few extremes of temperature and ample precipitation in all months
    - Located pole ward of the Mediterranean climate region on the western sides of the continents, between 35 and 60 N and S latitude
    - Large amounts of rainfall and balanced temperatures allow for large forest growth = large logging industry
- Humid Subtropical Zone:
    - Major climate type characterized by relatively high temperatures and evenly distributed precipitation throughout the year
    - Found on eastern sides of the continents between 20 and 35 N and S latitude
    - In summer, these regions are largely under the influence of moist, maritime airflow

Dry Climates:

- Arid:
    - Really dry
    - Typically called deserts
    - Between 125 degrees and 30 degrees north and south of the equator
    - Factors:
        - High pressure regions
            - Descending dry air
        - Dry air currents
            - Distance from the oceans
        - Rain shadow
            - Elevation blocking precipitation
        - Cold ocean currents
            - Not enough moisture
        - Sinking dry air/subtropical high-pressure zones are where deserts are most commonly found
    - Can be hot or cold
    - Precipitation in hot and dry deserts and the precipitation in cold deserts is different (usually less than 15 cm a year)
    - Hot and dry deserts usually have very little rainfall and/or concentrated rainfall in short periods between long rainless periods
    - Cold deserts usually have lots of snow–also rain around spring
    - Difference between cold and hot desert is by elevation and latitude
    - Driest desert:

            - Atacama Desert due to an extreme rain shadow effect plus cold ocean currents
        - Largest desert:
            - Antarctic continent
            - Sinking dry air at our poles cause very little precipitation at the poles
            - But low temperature cause any precipitation to accumulate, forming massive ice sheets
    - Semi-Arid:
        - Not as dry, but still dry
        - Typically called steppes
        - Usually in “lee” of mountainous areas, which block large amounts of rainfall
        - Often home to very large grasslands
        - Can be hot or cold, based upon latitude and elevation
        - Cold steppe:
            - Mongolian steppe
        - Warm steppe:
            - Sahel
            - Subject to “desertification”:
                - Expanding of a desert
- Tropical:
    - Much of the equatorial belt within the tropical climate zone experience hot and humid weather
    - There is abundant rainfall due to vertical uplift, or convection in the atmosphere
    - Difference between two types is caused by uneven heating of seasonal monsoon weather patterns caused by earth’s seasonal tilt
    - Tropical Wet:
        - All rainy
    - Tropical Wet/Dry:
        - Have large swing in precipitation
        - No rain in winter

Climographs:

- Graphical representation of a location’s basic climate
- Display data for two variables: monthly average temperature and monthly average precipitation
- Lines are typically used to represent temperature, while bars are used to represent precipitation (discrete vs continuous data)

Extreme Weathers

Cyclones

Cyclone - a system of winds rotating inward to an area of low atmospheric pressure

- Flows counterclockwise in the Northern Hemisphere
- Flows clockwises in the Southern Hemisphere

Classification of Cyclones

- Hurricane: Atlantic, Northeastern Pacific Oceans
- Typhoon: Northwestern Pacific Ocean
- Cyclone: South Pacific, Indian Oceans

Cyclones stage with Origin, Mature and Dissipation Stage.

- They usually need a warm ocean of about 26.5ºC and low latitude to form clouds of up to 10km in the air, and they create low-pressure systems.

- Typhoons cause storm surge, heavy rainfall, and winds.

- Hurricanes are measured by the Saffir Simpson scale, which is affected by Pressure, Wind Speed, Storm Surge, etc.

Coriolis effect causes spin, forming eye
Eye wall has strongest winds
Eye has 950 millibars of pressure (low)
Lowest recorded 877 millibars
Tropical depression -> tropical storm -> hurricane
200 mph in eye wall
Storm surge: wall of water sweeping land
Mostly occur during summer and fall
Begins in sub Saharan deserts
No storms in equator because no rotational energy

Tornados

Tornado - a mobile, destructive vortex of violently rotating winds having the appearance of a funnel-shaped cloud and advancing beneath a large storm system.

Supercell tornadoes:
Formed from supercell storm
High pressure to low pressure, vertical wind, causes circular wind blowing on ground

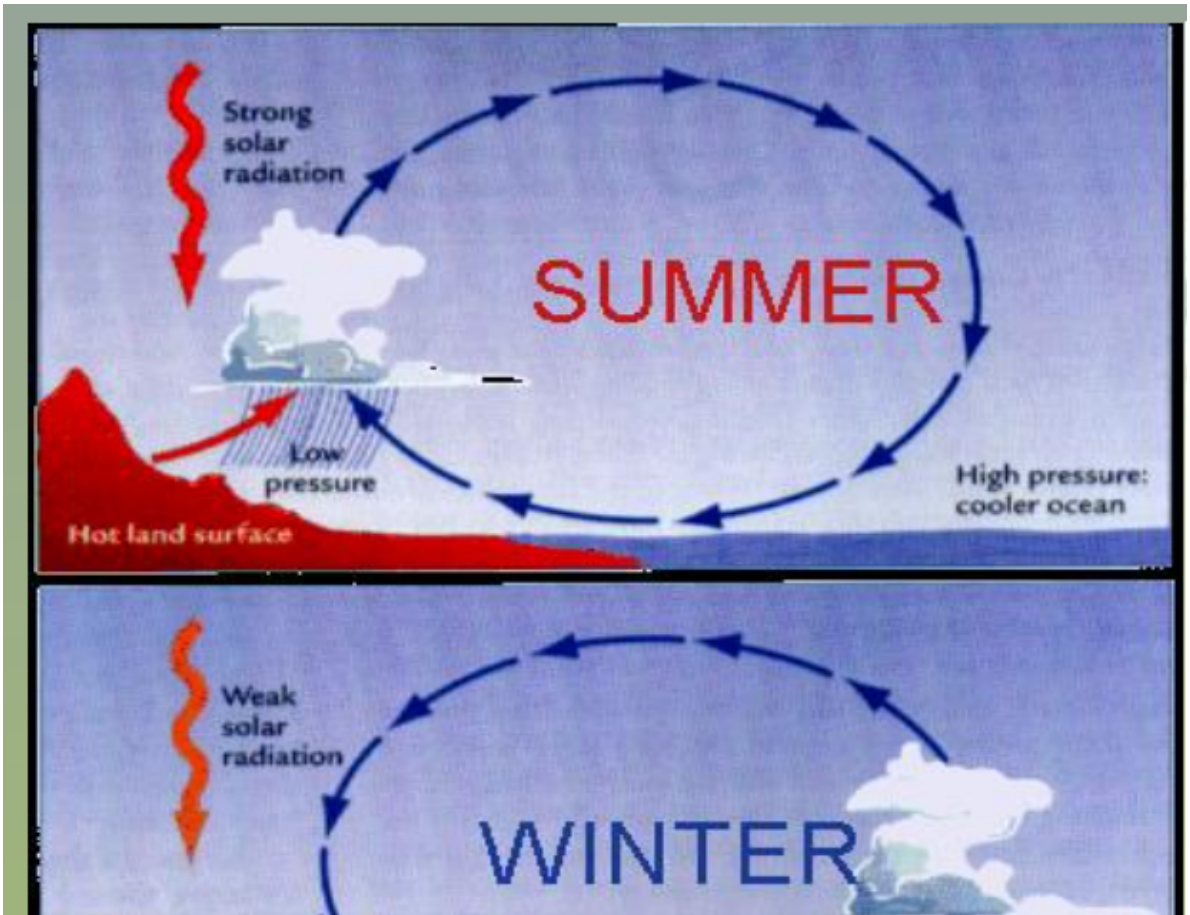
Non-supercell tornadoes:
Formed from non-supercell storms
High pressure to low pressure, wind blowing at different speeds turn into vortex
Updraft: stretches non-supercell, verticalizes supercell

- You usually need a front for a tornado to form.

- The Tornado is formed by the Fujita Scale, but people nowadays tend to prefer the Enhanced Fujita Scale (EF Scale).

Monsoon

Monsoon - Seasonal Shift in the prevailing wind direction that usually brings with it a different kind of weather.



- Usually refers to the Asian Monsoon, where most of the monsoonal seasonal shifts occur.
- The Indian area of Cherrapunji receives an abundance of rainfall during monsoons.

ITCZ - The International Tropical Convergence Zone
- brings unequal land heating between place to place.

Flooding

Flooding - When the banks of a river or coastal shoreline have exceeded past their carrying capacity

-Flood Plain: An area of low-lying ground adjacent to a river which is formed mainly of river sediments and subject to flooding

- Floods can be caused by storm surges, continuous heavy rainfall and snow melt.
- Surface Runoff happens when excessive water causes the land to go with the flood, affecting the soil and bringing silt to other places. It can cause soil erosion and landslides.

Bangladesh is an important site for flooding because of its:
- Rapid elevation change
- Huge amount of seasonal snow melt
- Confluence of two rivers

Flooding can be caused by anthropogenic problems, e.g:
- Deforestation
- Urbanization
- Climate Change

- In response, humans can have better urban planning, vegetation management, and build more dams!!!!!!!!!!

Levees: Earthen or concrete embankments that line the banks of flood prone rivers and coastal areas.

Canals: Used for irrigation of crops, and for the draining of over saturated lands.

Droughts

Drought - a long period when there is an unexpected reduction of rainfall.

- Deserts receive little to no rainfall at all, and they cover nearly ¼ of earth's surface. :c

- Steppe - Transitional area between deserts and forest or plain land
    - (mainly grassland and NOT DESERTS)
    - The Sahel is a warm dry steppe that makes its way all across Southern Africa and expands on in Sahara

- Cause of Drought
    - Naturally: Shortage of rainfall
    - Anthropologically: Population Growth, Excessive irrigation and wells

- Droughts can cause Desertifications and Forest Fires, expanding deserts and killing much wildlife in the process. Humans are adapting to this by cloud seeding (spraying rain artificially smh), afforestation (replanting trees??) and using advanced technology to increase water supplies.

Ecosystems and Biomes

- Ecosystem: A system of interdependent organisms which share the same habitat
- Biomes: communities of ecosystems covering large geographical areas or a region in which ecosystems are commonly found.

- Biomes change with elevation, precipitation, and temperature.
- Biomes consider geographic space

Tropical Rainforest

FOUND IN TROPICAL WET

- 10 degrees North and South of the equator
- Rainforests can be divided up into many ecosystems based on the amount of light each layer can receive (which is proportionate to height).
- Prone to deforestation

Mangrove Forests

TROPICAL WET / DRY

- On the Tropics of Capricorn and Cancer on warm tropical coast lines.
- Different from other forests - composed of halophytes, meaning this plant can live in saline environments

- They extrude salt from their leaves
    - There are 2 types of Mangrove roots:
        - Prop roots: support trees in muddy environment
        - Aerial roots: help take in O2 directly from air because the muddy waters are bad
- Mangroves are viviparous and use propagules to procreate.

Tropical Monsoon Forests

TROPICAL WET / DRY

- North and south of Tropical Rainforests
- Have hot wet summers, warm dry winters
- High biodiversity levels, but not as high as TRF

Temperate Hardwood / Deciduous Forest

HUMID SUBTROPICAL + MODERATE

- Deciduous - annual shed of leaves
- Found in temperate and warmer areas of continental climate zones
- Broad leaved, they change color in response to lower sun coverage

Temperate Coniferous Forest

HUMID SUBTROPICAL + MODERATE

- 40-65ºN - mild summers and long winters
- Commonly referred to as boreal forests or taiga forests
- Contains softwoods (fir, spruce, pine)

Temperate Coniferous Forest

- Limbs: flexible so can hold snow without snapping
- Leaves: needle shaped to hold in moisture, evergreen, contains resin for antifreeze.

Physical Geography of South Asia

Himalayas

- A Long Running Mountain Chain that contains the world's tallest peak

Hindu Kush

- Home to the Karakoram Mountains and the world's second highest peak, K2.
- Lies at the west end of the Himalayas
- It forms a barrier separating Pakistan from Afghanistan to the north, and there are many battles fought on the routes here

Southern Plateau

- The Deccan Plateau has an arid climate because mountains block moisture from the sea.

The major rivers in South Asia are

- Indus
- Ganges
- Brahmaputra

and they carve out the Indo-Gangetic Plain

- The Indus River Valley sees moderate flooding throughout the year, and brings valueless resources to the people living there.
- The Ganges provide crucial irrigation for agricultural lands and carry alluvial soil to alluvial plains, which are converted into rich farmlands.

Maldives

- Archipelago of 1200 small islands, only ~200 are inhabited
- Atolls - low-lying volcanoes and is surrounded by coral reefs and shallow lagoons

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