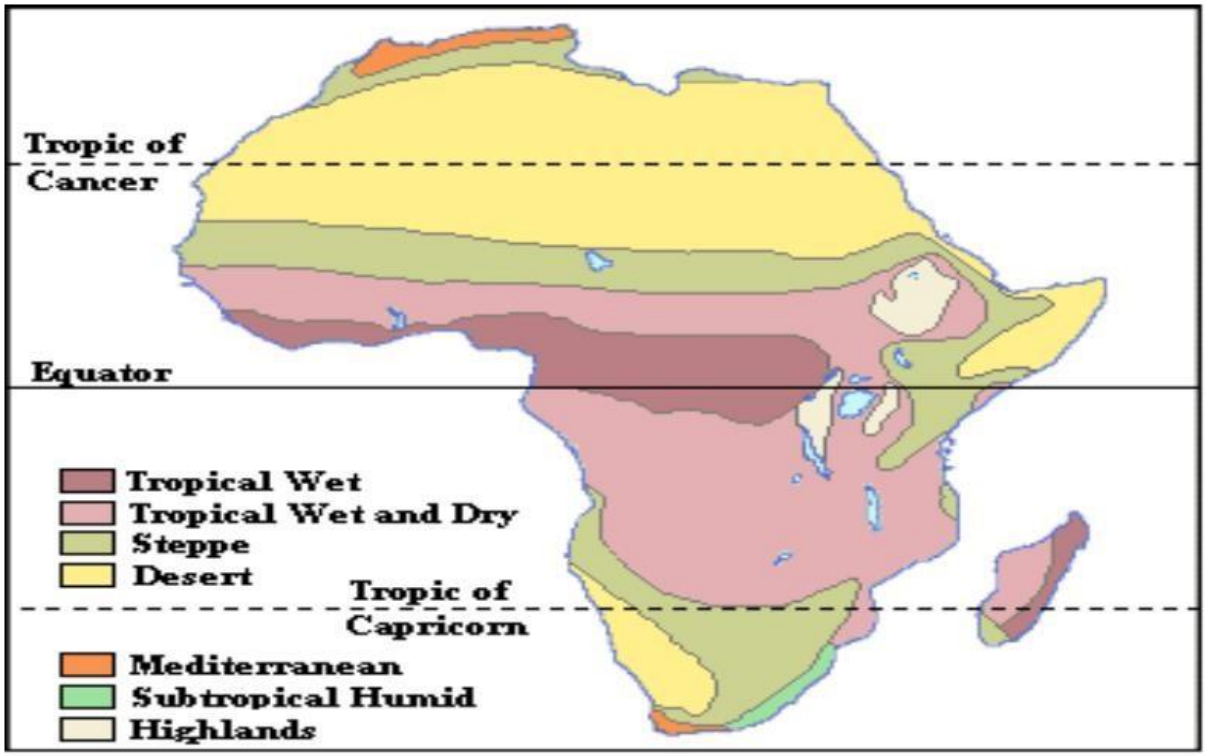
CLIMATE OF AFRICA

Climate is the average weather condition observed and recorded for a given region after a long period of time between 30 to 35 years e.g. desert, equatorial, Mediterranean, montanne, etc.
Weather is the daily atmospheric condition observed and recorded for a particular place at a given time e.g. sunny, rainy, windy, cloudy, etc.

Africa experiences a variety of climate patterns all the way from the north down south as well as from the west to the east e.g.

- Mediterranean
- Hot desert and semi-desert
- Tropical/ savanna
- Equatorial
- Tropical maritime
- Mountain/montanne
- Warm temperate continental

Sketch map showing climatic patterns



Factors influencing climate

- **Relief**- area with mountains and highlands tend to have cool wet climatic conditions due to the interference of moist laden winds that are forced to raise forming relief rainfall on the windward side and descending dry winds on the leeward side. On the other hand, plateaux and flat areas differ in climatic conditions due to lack of intercepting relief.

- **Aspect**- slopes that are directly facing the sun receive solar radiation tend to have high temperatures unlike the other side in the shadow zone receiving low cool temperatures

- **Apparent movement** of the sun- this concerns the movement of the over head sun north or south of the equator forming a low pressure belt. On June 21st, the overhead sun in the north creates a vacuum attracting the northeast trade winds from the Arabian desert and southeast trade winds from the Indian Ocean giving rise to the inter-tropical convergence zone. This causes high temperatures with heavy rainfall in the northern hemisphere (summer conditions) and cool conditions in the southern hemisphere (winter condition). The reverse is true on 22nd December in the south.

- **Altitude**- areas near the sea level (0m) tend to experience very high temperatures due to absorption of solar radiation by the earth crust which is later reflected and scattered to the surrounding areas. Areas which are many meters above the sea level (1000m+) tend to have relatively cool climatic conditions due to moisture in the atmosphere and nearness to the condensation level. This explains the cool climatic conditions in the highland or mountain areas

- **Vegetation cover**- areas which are highly vegetated or are having luxuriant vegetation tend to receive cool or mild or wet climatic conditions through evapo-transpiration where vapor is released into the atmosphere forming convectional rainfall. The reverse is true in areas with scanty vegetation or bare ground.

- **Distance** from large water bodies- areas near large lakes and seas/oceans experience wet climatic conditions due to the land and sea breeze effect. This is so because moisture from either land or lake/sea/ocean evaporates to form on-shore or off-shore rainfall which is not the case in areas which are far from water bodies

  (this only applies where other factors don't exist).

- **Latitudes**- areas which are near and those crossed by the equator tend to have wet climatic conditions with a double maxima (two rainfall peaks) caused by the equinox when the overhead sun is directly above the equator on 21st march and 23rd September. The areas that

are far from the equator have a single maxima (one rainfall peak) leading to relatively dry climatic conditions.

- **Prevailing winds**- Africa is influenced by two great trade winds i.e. the **Northeast trade** winds from the **Arabian desert** bringing with it dry conditions that explain the desert and semidesert conditions in Somalia, Egypt, Sudan, Libya, Tunisia, etc plus the **southeast trade** winds from the **Indian ocean** bringing heavy moisture that explains the wet conditions in many parts of eastern Africa, Mozambique, Swaziland and south Africa.

- **Human activities**- practices engaged in by man affect the climate of an area on a micro and macro level. Activities like bush burning, deforestation, swamp reclamation, charcoal burning, etc destroys the vegetation cover and disorganizes the hydrological cycle and discharge of moisture into the atmosphere to cause rainfall. The reverse is true in areas which are not tampered with by man.

- **Ocean currents**- these affect climate with respect to their origin e.g. the cool currents bring cool climatic conditions in the southwestern areas like Walvis bay, Namibia and northwest coast of Tunisia, Morocco, etc while the warm currents bring about warm climatic conditions causing convectional on-shore rainfall in those areas like Durban, Natal, Mozambique, Madagascar in the southeast and Tema, Accra, Lagos, port Harcourt, etc in the west.

- **Industrialization**- this concerns the discharge of dangerous gases into the atmosphere which affect the ozone layer that filters the dangerous sun rays like ultra-violet and infra-red that tend to increase atmospheric temperatures. Thus areas which are highly industrialized experience warm climatic conditions brought by the depletion of the ozone layer coupled with the emission of heat from industrial machines and vice versa where other factors are not dominant).

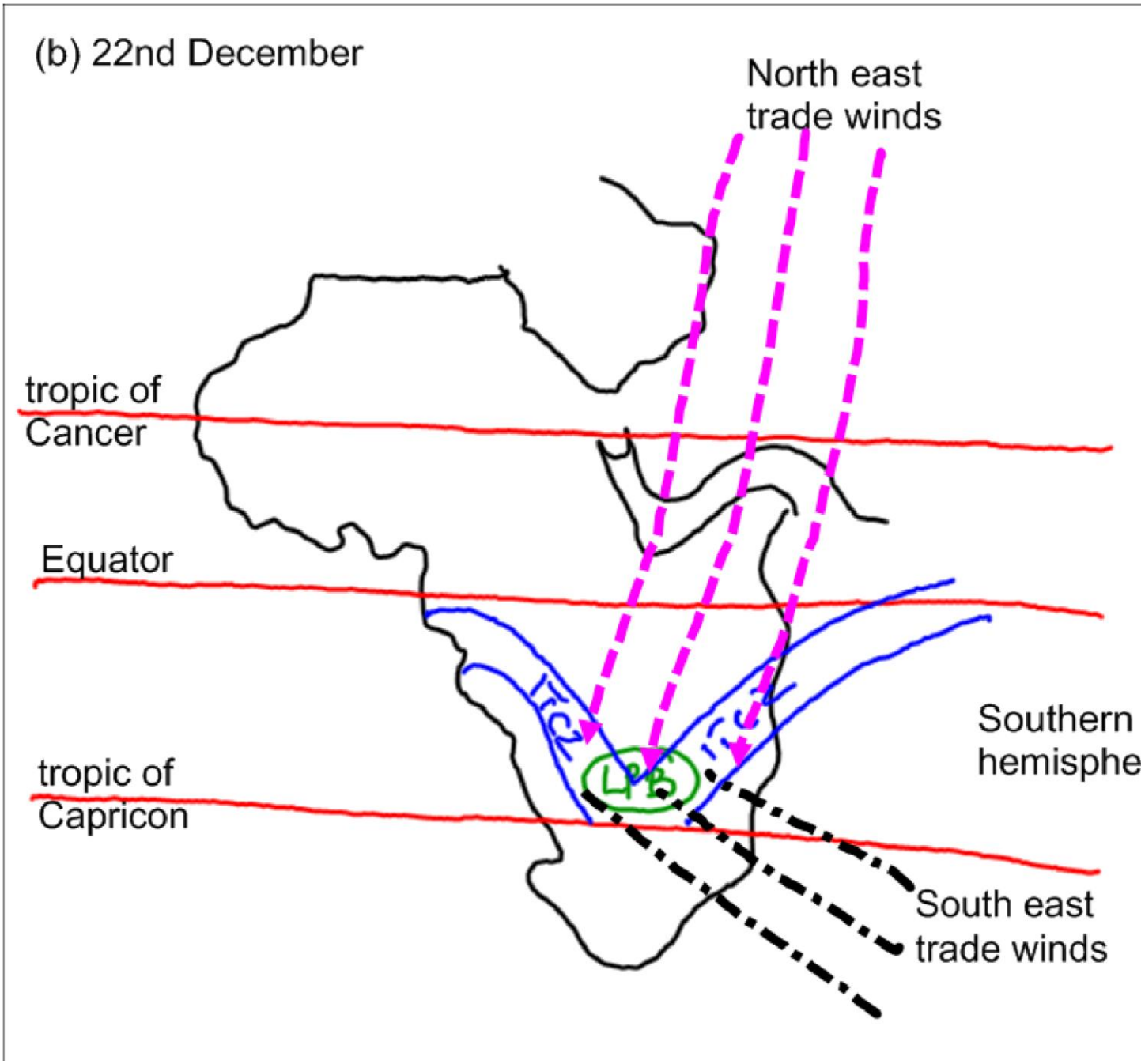
Influence of the Inter-Tropical Convergence Zone

The apparent movement of the overhead sun north or south of the equator brings about a geographical phenomenon referred to as the inter-tropical convergence zone concerning the movement of the great easterlies i.e. the northeast trade winds from the Arabian desert and southeast trade winds from the Indian Ocean.

- **21st march and 23rd September**- this is when the overhead sun is directly above the equator leading to the equinox which brings about a double maxima (two rainfall peaks). Areas near and those crossed by the equator receive high temperatures and heavy convectional rainfall

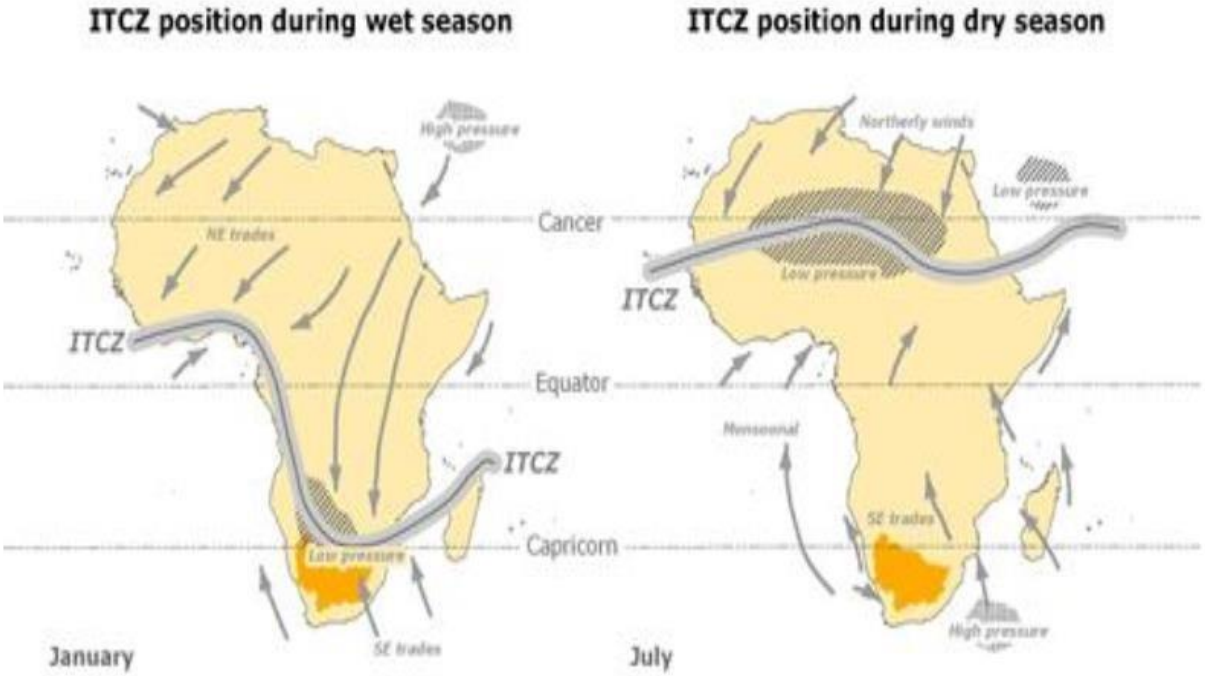
- **21st June**- this is when the overhead sun is seemingly moving northwards near the Tropic of Cancer bringing about very hot temperatures that form a low pressure belt. This low pressure belt attracts the northeast trade winds from the Arabian desert and southeast trade winds from the Indian ocean north of the equator forming convectional rainfall. The north therefore will have 'summer conditions' i.e. high temperatures with heavy rainfall while the south will have 'winter conditions' i.e. cool and wet.

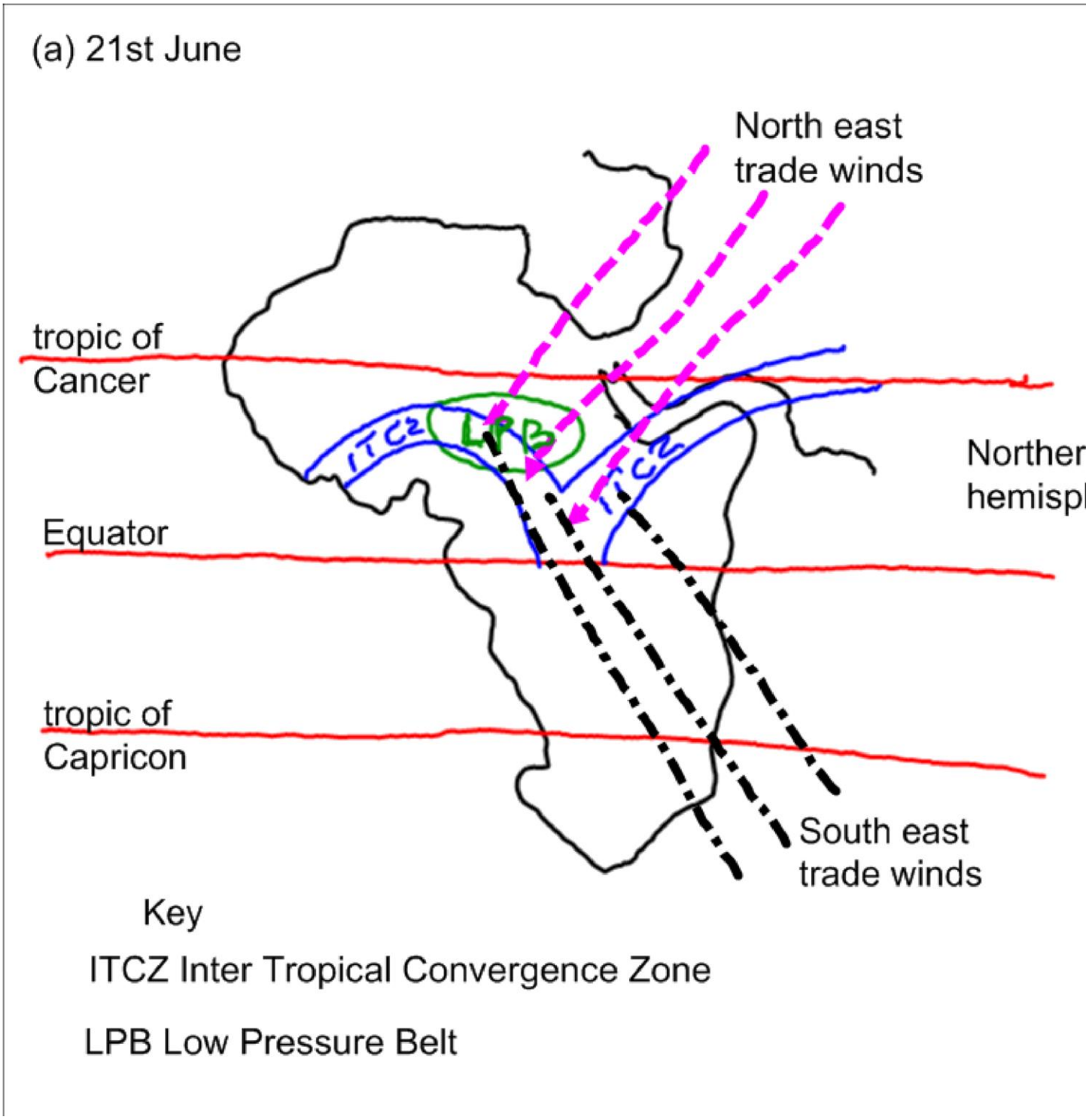
- **22nd December**- this is when the overhead sun is seemingly moving south near the Tropic of Capricorn bringing about very hot temperatures that form a low pressure belt. This attracts the northeast and southeast trade winds south of the equator. This brings about high temperatures with heavy rainfall in the southern part of Africa except for the Mediterranean areas like Cape town influenced by the Benguela current. Illustration (sketch map showing the ITCZ) on 22nd December.



(a) 22nd December

(b) 21st June


ITCZ position during wet season
ITCZ position during dry season
High pressure
NE trades
ITCZ
Cancer
Equator
ITCZ
Capricorn
Low pressure
SE trades
January
Northerly winds
Low pressure
Low pressure
ITCZ
Monsoonal
SE trades
High pressure
July



Effects of the Inter-Tropical Convergence Zone

- Brings about climatic subdivisions with respect to the apparent movement of the overhead sun i.e. if the overhead sun is in the north, it experiences 'summer conditions' while the south experiences 'winter conditions'.
- Helps show rainfall patterns with respect to latitude i.e. areas near or crossed by the equator receive double maxima while those far from the equator receive a single maxima.
- Shows the direction of flow in the northeast and southeast trade winds which follow the low pressure belt created either in the north or south of the equator.

Climate types

As noted earlier, Africa experiences a variety of climatic patterns stretching from the north through the central to the south and from the west to the east.

Equatorial climate

This is experienced between 0° to 5° south and north of the equator particularly in the western part of Africa e.g. Nigeria, DRC, Cameroon, Gabon, Central African republic, etc. As for East Africa, it receives modified equatorial climate influenced by the mountains and highlands.

Summary table

Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp	23	23	23	22	22	22	21	22	22	22	22	23
R'fall	40	70	150	230	205	115	65	80	195	225	150	50

Characteristics

- Receives rainfall throughout the year
- Has two rainfall peaks between March to May and September to November
- Rainfall totals range from 1500 mm and above
- Rainfall is convectional in nature due to hot temperatures causing evapo-transpiration
- Temperatures are relatively hot ranging between 21°C and 23°C evenly distributed throughout the year
- It has a small annual temperature range of approximately 2°C (23°C- 21°C=2°C)

- Experiences high humidity due to abundant vapour r being discharged in the atmosphere throughout the year

Economic activities

- Agriculture e.g. cocoa in Ghana, palm oil in Nigeria, rubber in Liberia, sugar cane and banana in DRC due to heavy rainfall.
- Fishing e.g. river Congo in DRC, river Niger in Nigeria, etc due to heavy rainfall that fills the water bodies.
- Forestry and forest conservation in Cameroon, DRC and Gabon due to the rain that support tree growth
- Lumbering due to abundant flora e.g. in Gabon, DRC, etc
- Tourism due to abundant fauna and flora
- Wild life conservation due to abundant fauna and flora
- Mining of oil in Nigeria, gold and uranium in DRC, etc
- Educational research and study in botany, zoology, etc
- Hunting of wild game in the forests.

Likely problems

- Pests, disease vectors and man eaters

- Seasonal flooding due to heavy rains
- Difficulty in construction of transport and communication networks due to dense vegetation diverse drainage and heavy rainfall.
- Landslides, mud flows and rock fall in mountainous areas due to water infiltration coupled with gravitational pull
- Soil erosion on steep slopes and plains with bare ground
- Soil infertility caused by leaching where soil nutrients are dissolved vertically and horizontally

Tropical climate

This is experienced between 5° to 15° north of the equator extending to 23° south of the equator. This stretches from West Africa through east and central to southern Africa.
It is sometimes referred to as Savanna or Sudan climate and the most extensively experienced in Africa.

Summary table

Mont	J	F	M	A	M	J	J	A	S	O	N	D
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Temp	22	23	22	21	20	18	17	18	20	23	24	24
R'fall	250	175	100	25	20	00	00	00	00	50	100	175

Characteristics

- Receives two distinct climatic seasons i.e. wet season from October to march and dry season from June to September
- Day times are always very hot while the nights are cold
- Rainfall totals are approximately 860 mm per annum
- Rainfall is convectional in nature due to the hot temperatures especially in 'summer'
- Temperatures are relatively hot ranging between 17°C and 24°C
- Annual temperature range varies from 4°C to 9°C

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- Rainfall is received mainly in ‘summer’ while the ‘winters’ are dry
- Rainfall is unevenly distributed

Economic activities

Agriculture especially annual crops like beans, groundnuts, etc

- Hunting due to abundant fauna
- Livestock farming due to abundant flora.
- Charcoal burning due to abundant flora(woodland)
- Bee keeping due to abundant pollination of the flora.
- Tourism due to abundant fauna and flora in the grass land
- Mineral mining e.g. gold in Mwadui- Tanzania and Witwatersrand- South Africa
- Wild life conservation in national parks and game reserves
- Educational research and study in zoology.

Likely problems

- Unreliable rainfall limiting agriculture i.e. the rainfall received is only 860mm per annum, that doesn’t allow them to grow perennial apart from annual crops.
- Occasional wild fires due to friction of dry leaves and branches

- Occurrence of pests and disease vectors together with man eaters
- Soil erosion due to limited vegetation and bare ground.
- Over grazing arising from over stocking

Mediterranean climate

This is experienced in the northern extreme of Africa in Morocco, Tunisia, Algeria and extreme south particularly Cape Town in South Africa.

Summary table

Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp	21	20	20	17	15	13	12	13	15	16	18	20
R'fall	12	12	15	50	90	110	87	87	50	35	20	15

Characteristics

- Has four distinct climatic seasons i.e. spring, summer, autumn and winter
- Rainfall totals range between 500 to 1000 mm per annum
  Occurrence of fog due to heavy moisture brought by the cool Banguela current failing to evaporate to form convectional rainfall
- 'Summers' are relatively hot and dry while the
  'winters' are cold and wet.
- Summers are generally sunny

Economic activities

- Agriculture especially fruits and cereals like apples, orchards, citrus fruits, barley, wheat, etc
- Tourism due to the climatic conditions like those in Europe

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- Marine fishing near the coast of Atlantic ocean for whales and sharks
- Animal rearing e.g. merino sheep for wool and mutton, cows for milk and beef
- Forestry and forest conservation
- Mineral mining at small scale like tin and copper in south Africa

Likely problems

- Occasional fog causing difficulty in visibility
- Temperatures in 'winter' tend to be very low causing severe coldness
  Sometimes the 'summers' get very dry affecting grazing and cultivation

Hot desert and Semi desert climate

This is experienced in the tropical belt of North Africa i.e. Sahara desert, and the Mediterranean coastal lands i.e. Kalahari and Namib deserts of southwest Africa.
Africa has two categories of deserts i.e.

Marine deserts- those next to large water bodies influenced by cold ocean currents like the Namib desert in southwest Africa

Continental deserts- those found in the interior of the continental mass like the Sahara desert in the north and Kalahari desert in the southern section.

Summary table

Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp	12	15	20	25	30	35	37	36	33	26	20	16
R'fall	00	00	03	10	10	35	85	50	13	12	00	00

Characteristics

Rainfall totals range between 250mm and 650mm which sometimes reduces

- Occurrence of strong winds in form of desert storms
- Little and unreliable rainfall affecting human activities

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- Clear sky with little or no cloud cover due to limited humidity
- Rainfall is received in thunder form during the hottest part of the year
- Temperatures between day and night have a remarkable range which is high
- Dominated by sandy soils
- Bare ground with scattered vegetation

Economic activities

- Tourism due to the hot conditions good for the temperate people
- Desert sports e.g. motor rallying and motorcycling
- Filming due to the brightness of the environment for easy scene capturing
- Normadic pastoralism like the Fulani and Tuaregs of north Africa
  Irrigation farming like the Gezira scheme of cotton in Sudan along the Nile and Richard Toll scheme in Senegal along R.Senegal.

Likely problems

- Limited open surface water due to high evaporation rates
- Prolonged drought as evident in the table i.e. dry spell
- Deadly fauna like scorpions, poisonous snakes, etc
- Airborne diseases due to dryness, storms, etc
- Infertile sandy soils affecting agriculture

Tropical Maritime climate

This is experienced in the coastal areas of eastern Africa stretching from Kenya, Tanzania and Mozambique influenced by the southeast trade winds (monsoon wind) and the warm Mozambique ocean current

Characteristics

- Generally warm , a little humid and evenly hot Rainfall is received throughout the year due to the warm ocean current and south easterlies causing on-shore rainfall

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- Occurrence of tropical cyclones giving rise to the cyclonic rainfall
- Temperatures are generally hot i.e. 25°C and above

Economic activities

- Tourism due to the warm conditions attracting the temperate dwellers
- Commercial crop cultivation like sisal, cloves, coconuts, etc
- Marine fishing at the shores of the ocean
- Trade and industrialization at major ports like Mombasa in Kenya, Dar-es-salaam in Tanzania, Maputo and Beira in Mozambique
- Recreation i.e. leisure and entertainment at different beaches.
- Education research and study on coastal geomorphology and marine life
- Filming by the music industry due to the beautiful beach scenery

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Warm Temperate climate

This is experienced only in South Africa particularly in the Veld region (Natal province). The climate belt is bordered by the Mediterranean in the west and the Tropical Savanna in the north.

Characteristics

- Warm and humid ‘summers’ with dry ‘winters’
- Temperatures range from 10°C in ‘winter’ to 25°C in ‘summer’
- Rainfall totals range from 500mm to 700mm per annum
- High evaporation rate especially in ‘summer’ due to the high temperatures

Economic activities

- Tourism due to the mild conditions attracting temperate dwellers
- Viticulture/market gardening/dry farming involving growing of fruits and vegetables
- Plantation farming for wheat and sugarcane in Natal
- Industrialization basically agro-based

Elementary mining of tin, copper etc