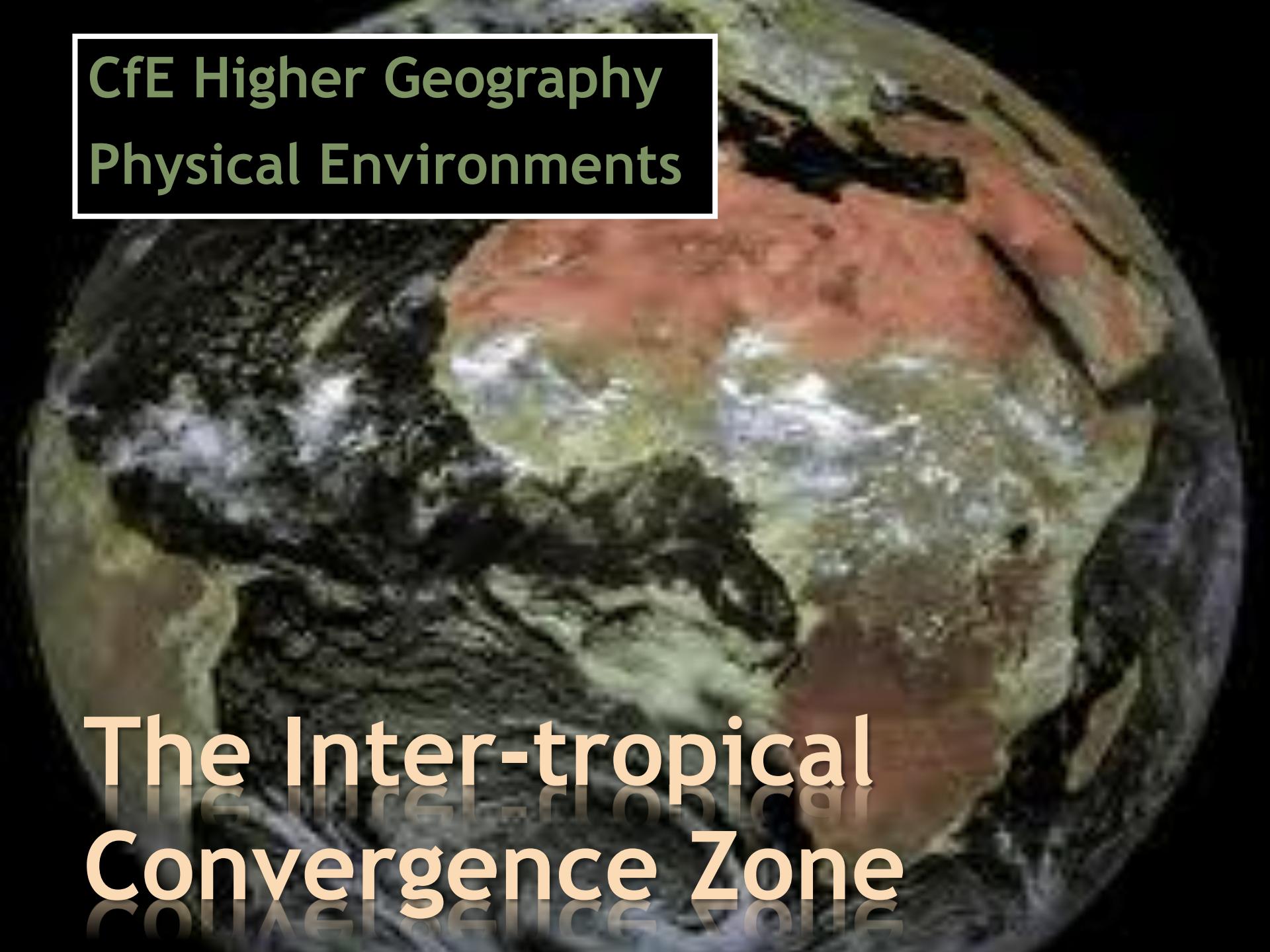


# CfE Higher Geography

## Physical Environments

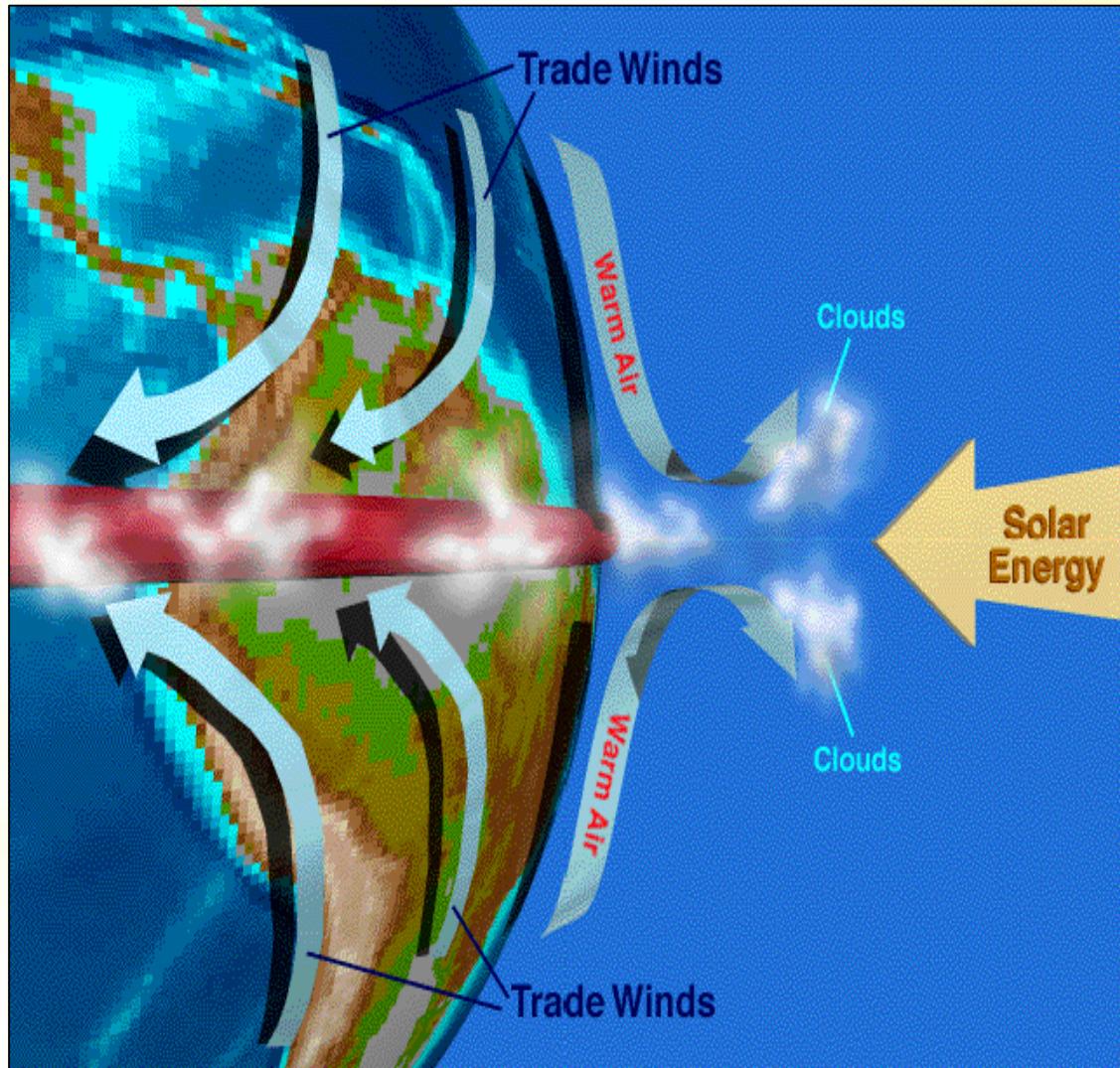
# The Inter-tropical Convergence Zone



# \*Key Idea



We already know that the Equator is a belt where the trade winds converge, bring air from the Tropics to the Equator. It is also a zone of rising air, resulting in low air pressure, cloudiness, frequent thunderstorms, and heavy rainfall. We are now going to find out a bit more about the zone known as the Inter-tropical Convergence Zone (ITCZ)



# \* Recap: Air Masses

- \* An air mass is a large volume of air with uniform characteristics of temperature and humidity, acquired from its source region (where it comes from).
- \* The characteristics of the air mass are determined by the climate of the place where it originated. For example if an air mass forms in a warm, dry place such as a desert, it will bring warm, dry weather conditions to the areas over which it passes.
- \* Air masses which form over oceans are termed “**MARITIME**”. These will bring wet weather.
- \* Air masses which form over land are called “**CONTINENTAL**” These will bring dry weather.
- \* Air masses are also called POLAR, TROPICAL or ARCTIC depending on where they formed.
- \* Therefore, an air mass originating over land in a tropical area is named **TROPICAL CONTINENTAL** ( $cT$  for short). It will bring warm dry weather conditions.

# \*Your Turn: Work it Out!

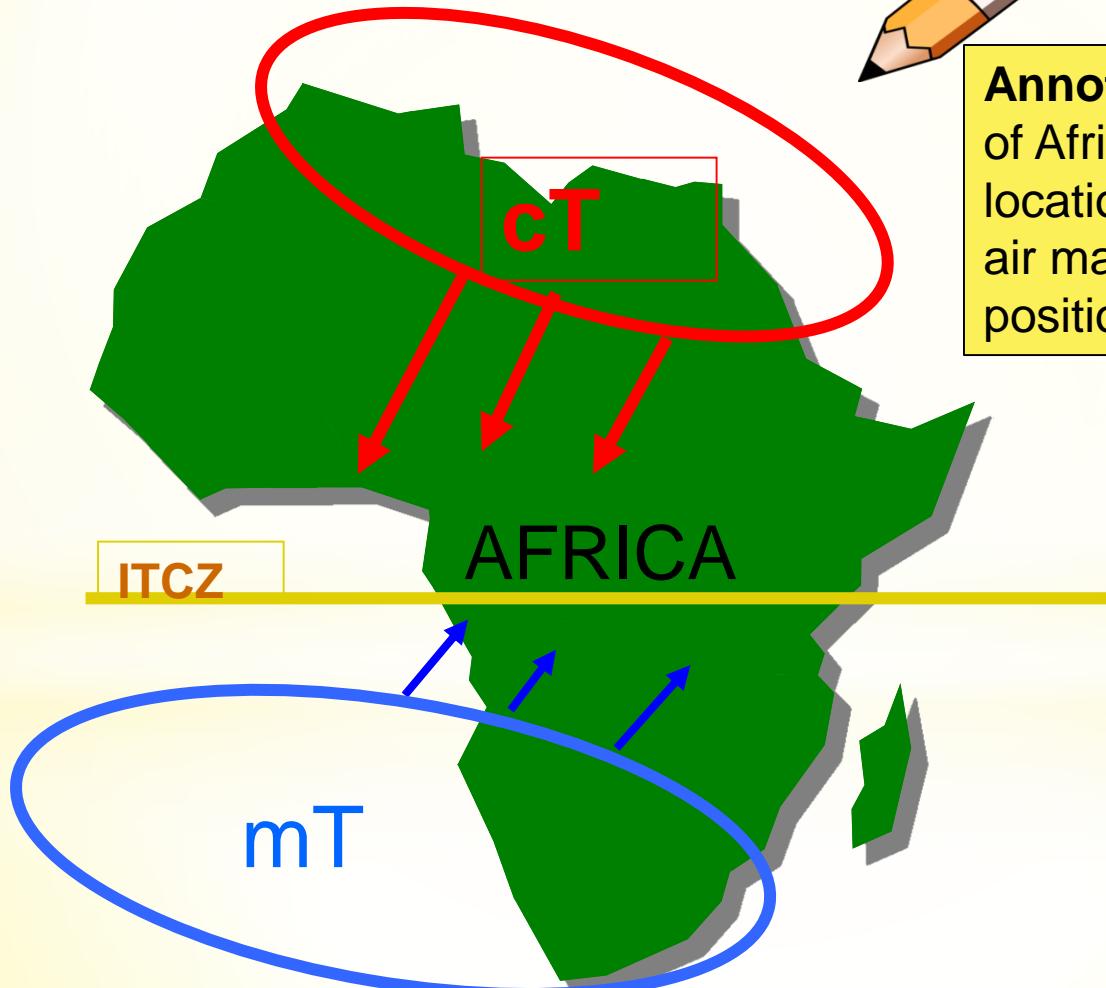
Decide what the following air masses will be called. Write down your answers and beside each describe the weather conditions it will bring.

- a) An air mass forming over an ocean in a tropical area.
- b) An air mass originating over land in a polar area
- c) An air mass originating over an ocean in a polar area.
- d) An air mass originating over an arctic ocean



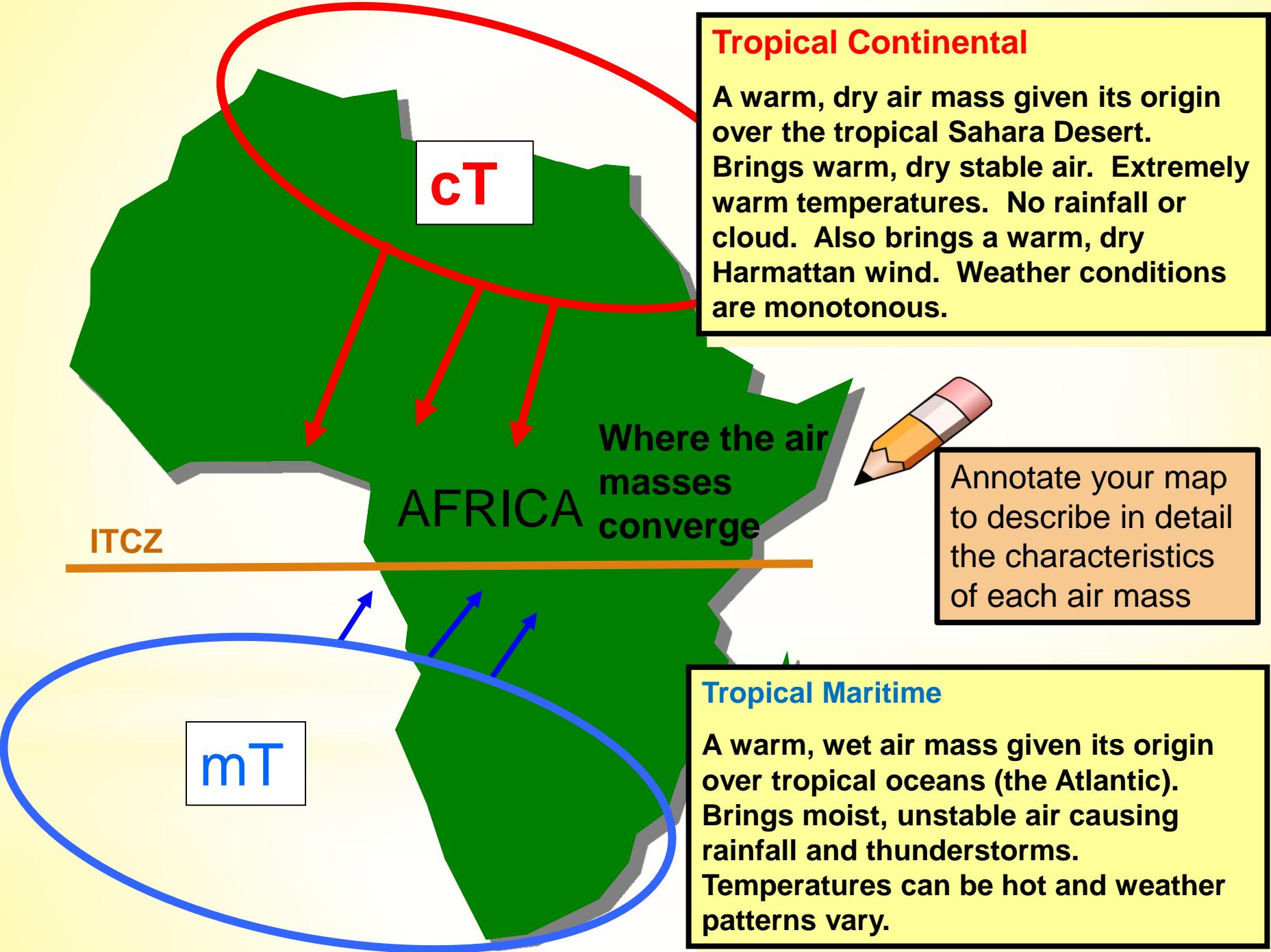
# \* Air Masses over Africa

The main air masses influencing the climate of Africa are **Tropical Continental** and **Tropical Maritime**. Their meeting place (the place where they converge) is known as the **Inter Tropical Convergence Zone (ITCZ)**.



Annotate your blank map of Africa to show the location and names of the air masses, and the position of the ITCZ

From your knowledge, **describe** the weather conditions associated with each of the air masses on the diagram

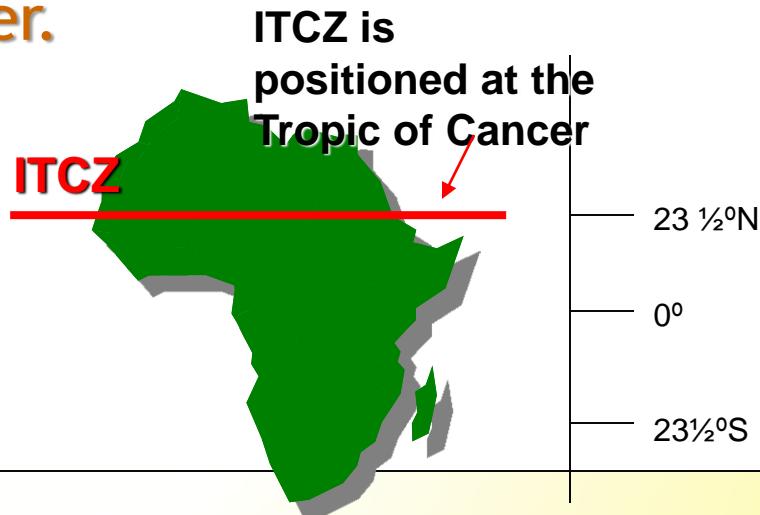
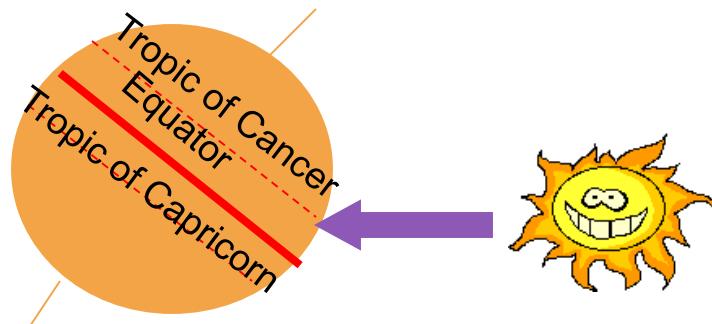


# \* How does the ITCZ and its associated air masses influence the climate of Africa?

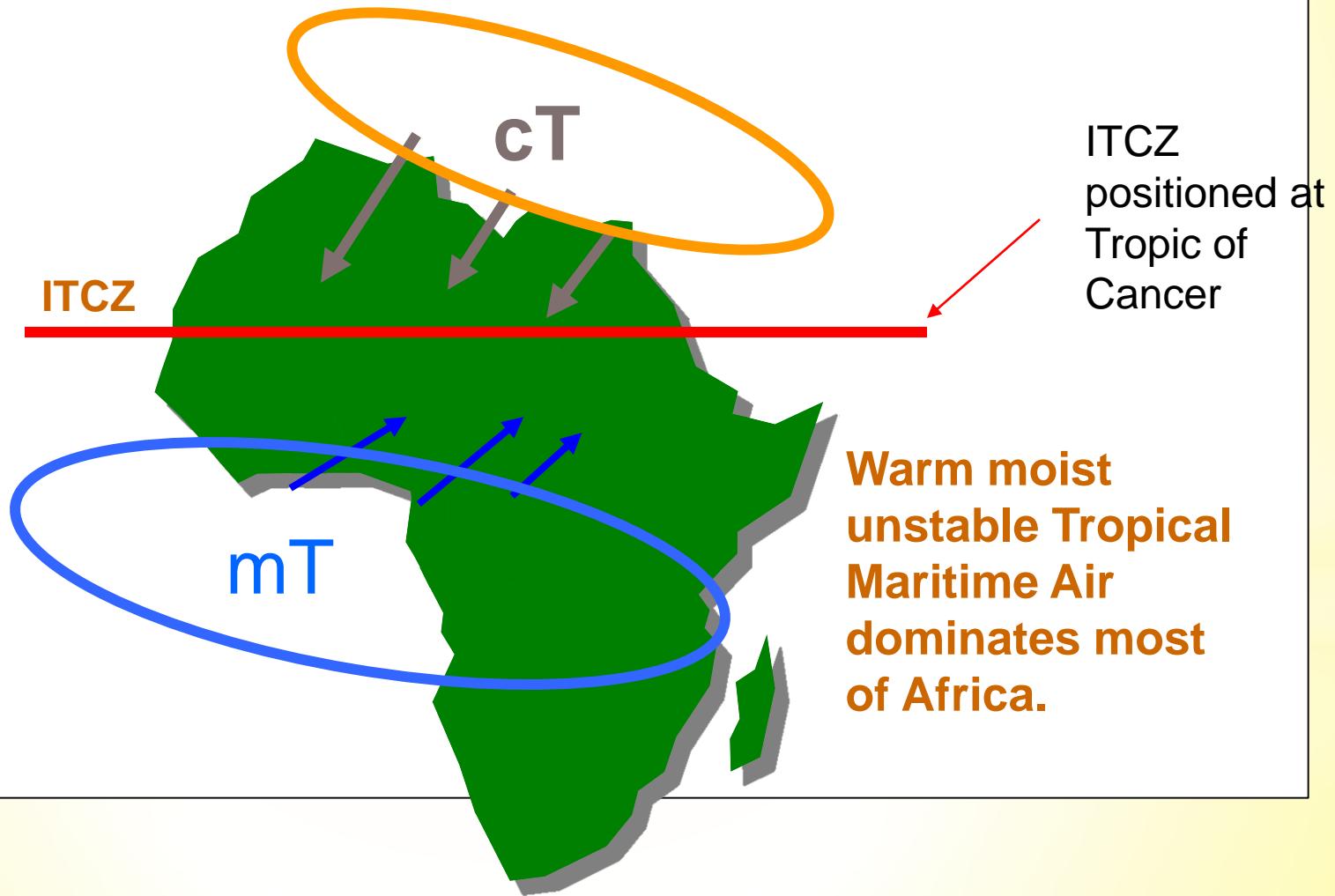
The ITCZ shifts position throughout the year in relation to the apparent movement of the sun because of the way the earth sits on its axis.

## In July

The sun is directly overhead the Tropic of Cancer due to the tilt of the earth. The ITCZ migrates northwards and is positioned over the Tropic of Cancer.

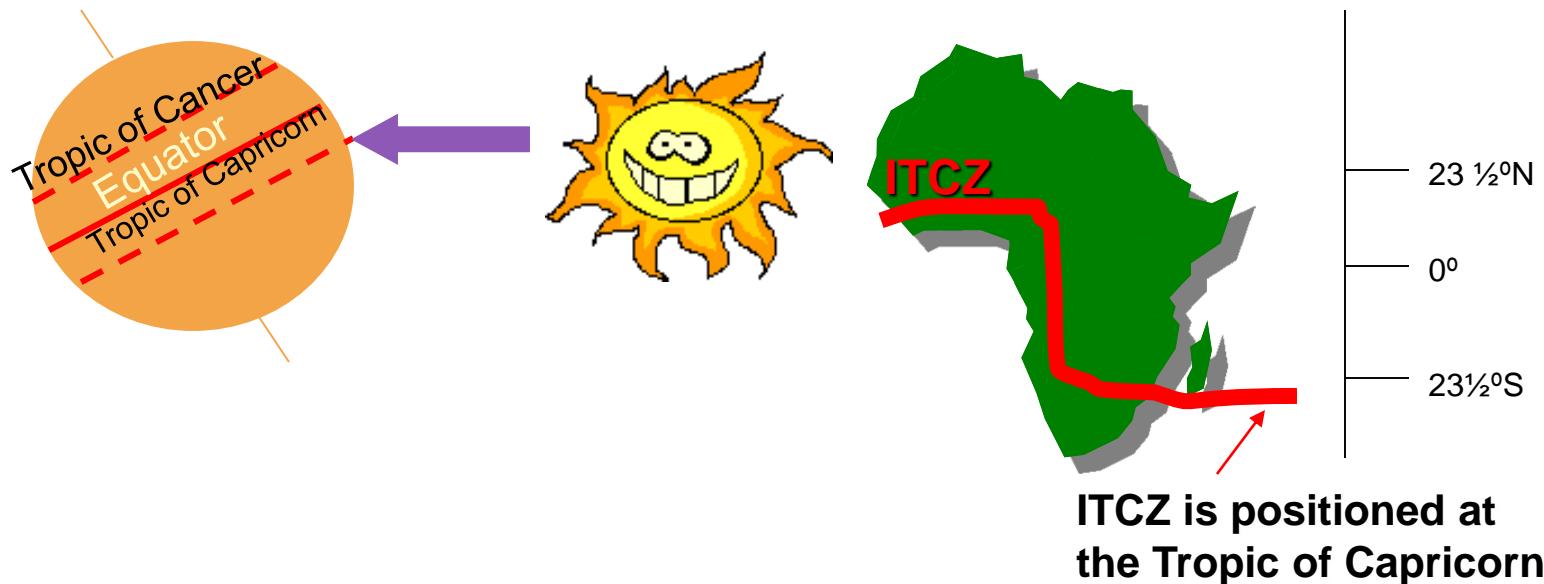


This means that Africa is dominated by the Tropical Maritime air mass, bringing with it warm, wet and generally unstable conditions. This explains why July is Africa's wet season.

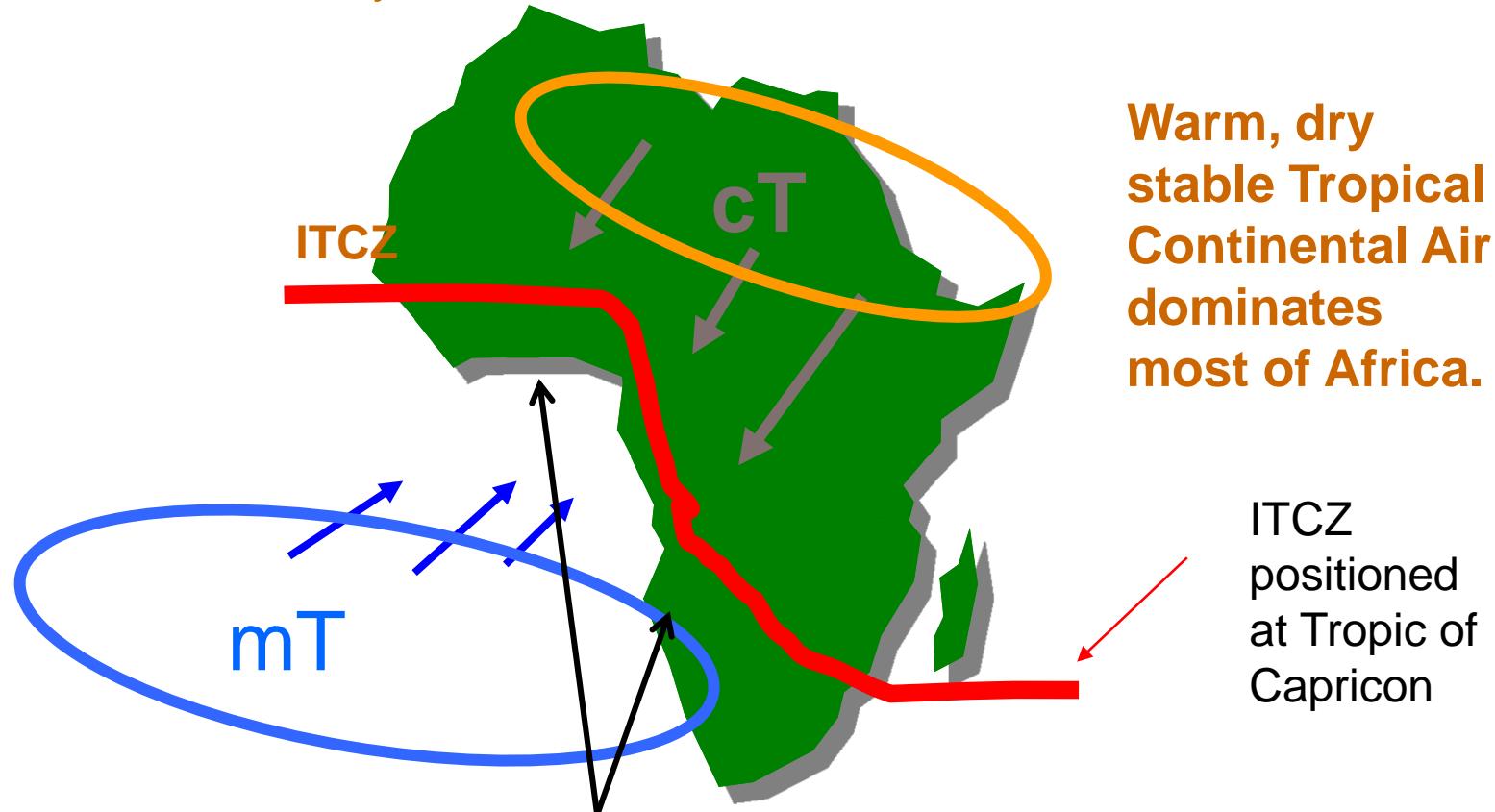


## In January

The sun is directly overhead the Tropic of Capricorn due to the tilt of the earth. Therefore the ITCZ migrates south and is positioned over the Tropic of Capricorn.

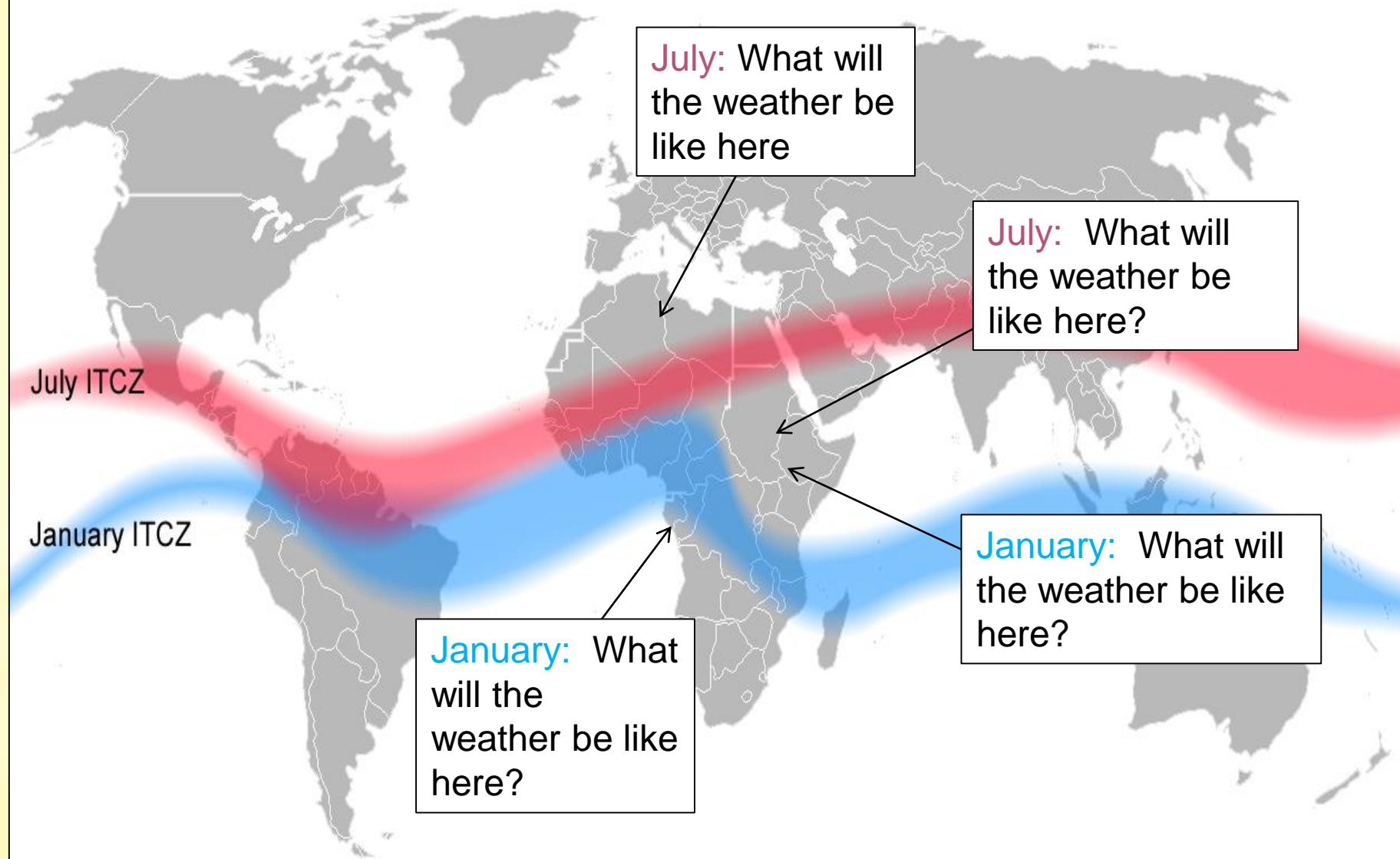


This means that much of Africa is influenced by Tropical Continental air, bringing with it warm, dry stable conditions and the warm, drying Harmattan wind. This explains why most of Africa experiences its dry season at this time of year.



Some western and southern parts of Africa remain under the influence of Tropical Maritime air because the Tropical Continental air mass (above the ITCZ) is not strong enough to push against the dense Tropical Maritime air mass which is moving into the land from the sea.

In March and September the sun sits directly overhead the Equator, so at these times of year the ITCZ is positioned over the Equator.



# Check your Understanding!



Use your notes on the ITCZ to answer the following questions:

- 1) Write a definition for the ITCZ.
- 2) What type of air pressure occurs at the ITCZ?
- 3) What will the weather be like at the ITCZ?
- 4) Why does the ITCZ appear to migrate to different positions throughout the year?
- 5) Where is the ITCZ positioned in a) July b) January c) September?
- 6) Explain why most of Africa experiences warm, wet weather in July.
- 7) Explain why most of Africa experiences its dry season in January.
- 8) Why do some parts of western and southern Africa always experience Tropical Maritime air?

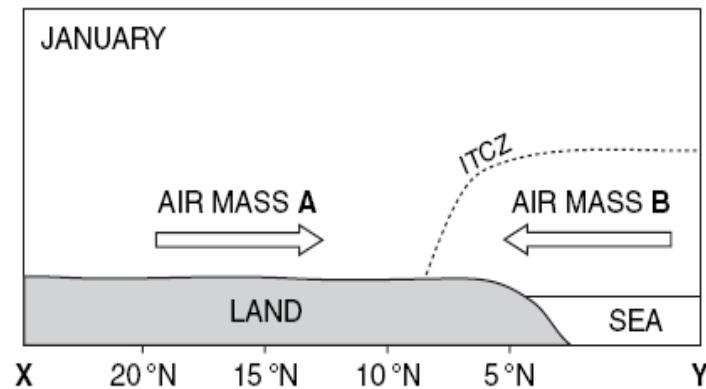


# \*Example exam question (1)

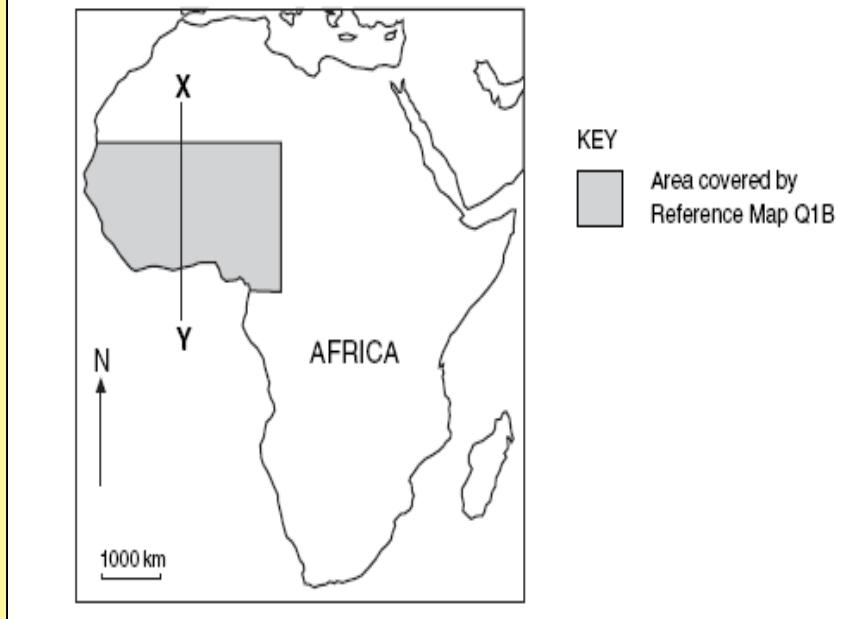
From Higher Paper 1 2007:

Study reference diagrams Q1A and Q1B. Identify air masses A and B, and describe their origin and nature. (3)

Reference Diagram Q1A (The Inter-tropical Convergence Zone (ITCZ))



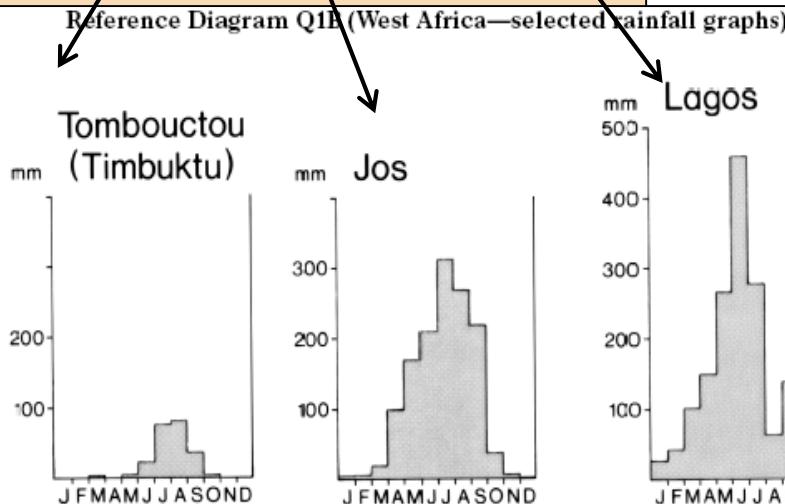
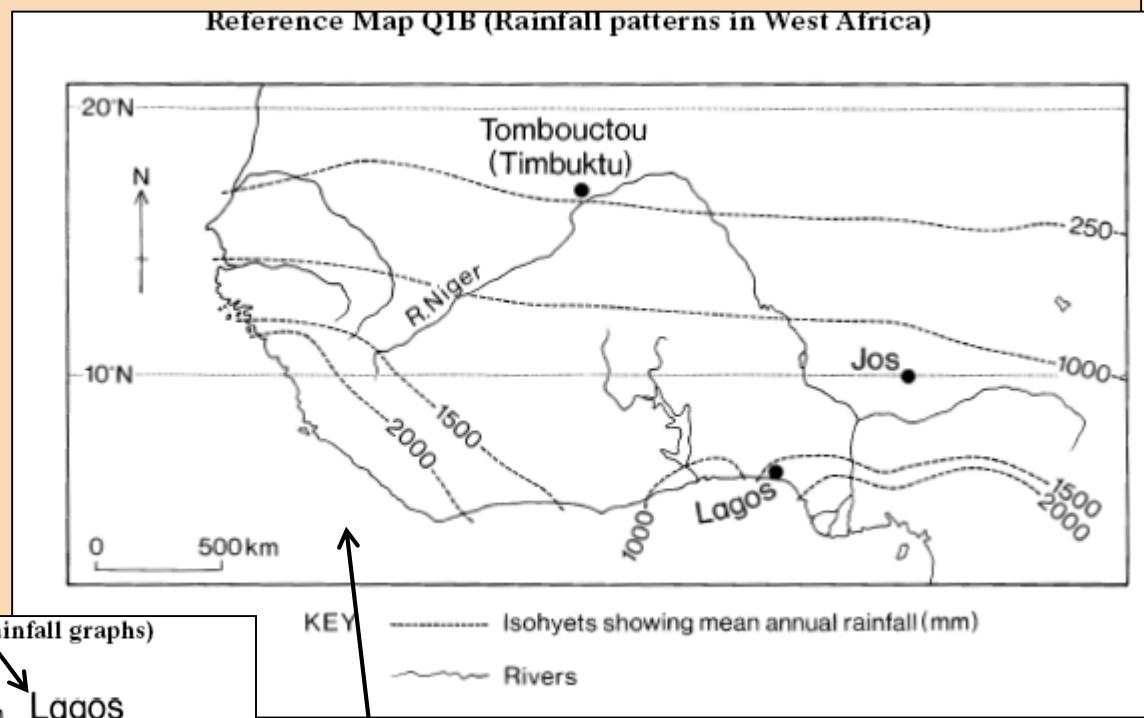
Reference Map Q1A (Location of section X-Y)



## \* Example exam question (2)

Describe and explain the varying rainfall patterns shown in Reference Diagram Q1B. (12)

Take each climate graph and describe the pattern of rainfall.  
Remember to give data from the graphs



Look at the average rainfall data. What patterns can you see? Which area has most / least rainfall on average?

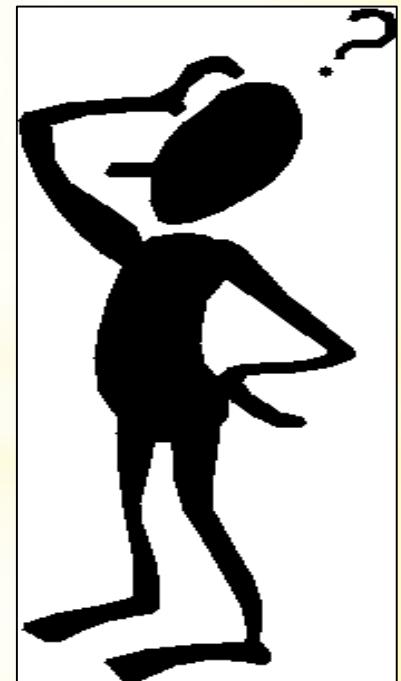
## \* Check your descriptions

Timbukto has on average very little rainfall (only 250mm per annum). It has no rainfall at all in January, February November and December. Jos too has distinct wet and dry seasons, experiencing 1000mm of rainfall per annum, a peak of 300mm in July and minimal rainfall in November, December, January and February. In contrast, Lagos has markedly more rainfall throughout the year, with up to 2000mm per annum, and rainfall peaking twice in the year. (June at 475mm and October at 200mm). It also has no dry months at all.

## \* Now for the explanations!

### Questions to ask yourself:

- 1) why do Timbukto and Jos experience rainfall in July?
- 2) Why do Timbukto and Jos experience no rainfall at all in November, December, January and February?
- 3) Why does Lagos experience more rainfall on average, and gets rainfall throughout the year?
- 4) What is responsible for the twin rainfall peaks in Lagos in June and October?

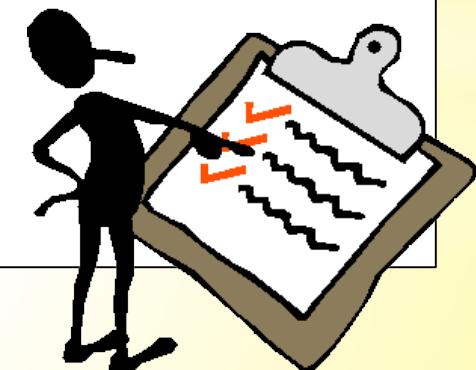


## \* Check your explanations

These patterns can be attributed to the movement of the ITCZ and its associated air masses. Lagos is under the influence of warm moist Tropical Maritime air for most of the year, which explains its higher annual rainfall amounts and lack of dry season. Its twin rainfall peaks are caused by the ITCZ migrating northwards and southwards in relation to the position of the sun.

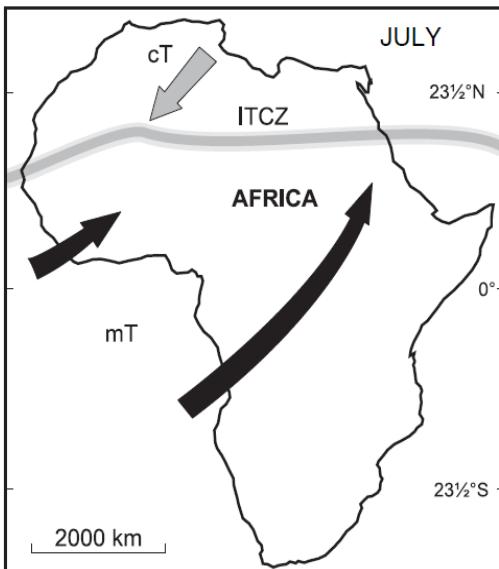
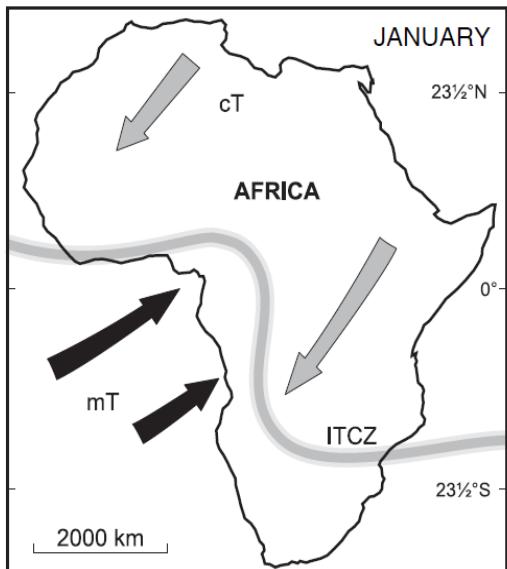
Timbukto and Jos in contrast are much further North than the ITCZ in January, which is positioned at the Tropic of Capricorn. This will result in Timbukto and Jos being influenced by warm, dry Tropical Continental air, which explains why they have either no or very little rainfall during these months.

In June and July Timbukto experiences its highest rainfall amounts because the ITCZ has migrated northwards due to the position of the sun overhead the Tropic of Cancer. This results in Timbukto experiencing Tropical Maritime air at these times, hence this is when it gets the majority of rainfall. Similarly, this is why Jos experiences its highest rainfall totals (300mm and 275mm respectively) in July and August.



\*Collect a copy of the Higher 2011 Atmosphere Questions.

Maps Q1A: Location of selected air masses and the ITCZ in January and July



**Key:**

mT = Maritime Tropical

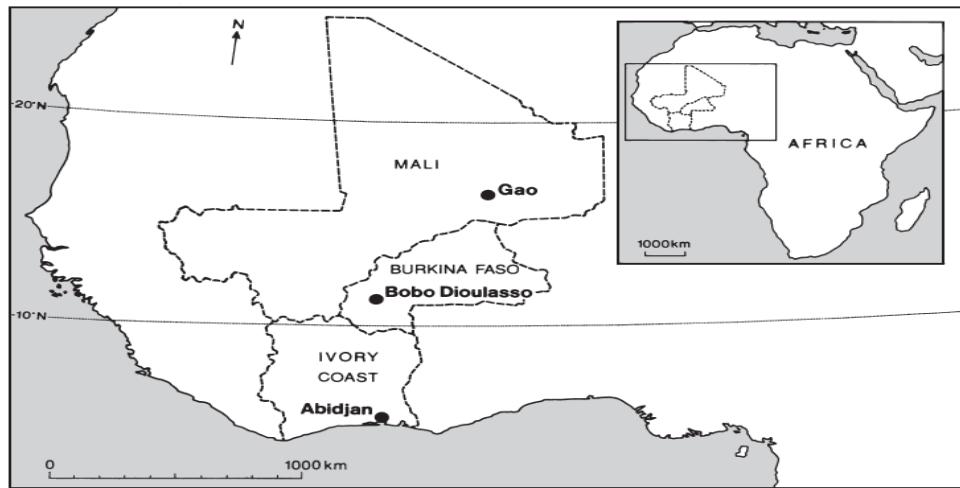
cT = Continental Tropical

ITCZ = Inter Tropical Convergence Zone

**a) Describe the origin, nature and characteristics of the Maritime Tropical and Continental Tropical air masses. (3 marks)**

\***Homework**

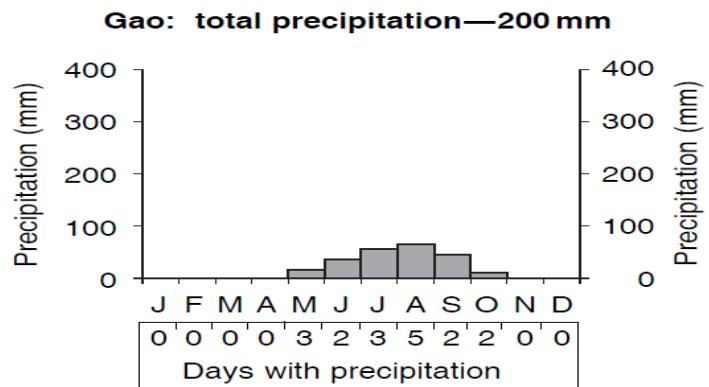
### Map Q1B: West Africa



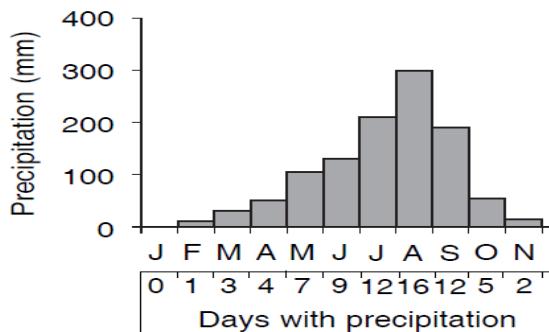
## \* Homework

b) Describe and explain the variation in rainfall within West Africa. (6)

Diagram Q1: Average Monthly Rainfall/Days with Precipitation



Bobo-Dioulasso: total precipitation—1000 mm



Abidjan: total precipitation—1700 mm

