Exploring Africa with the MapMachine POWERED BY ESRI

An Equator Runs Through It: Seasons in Africa

When is it summertime where you live? Seasons are one of the things that make life on Earth interesting. Seasons are also critically important for the distribution of solar energy on the planet and make life on Earth possible. Some places on the planet experience very little differences between the seasons, while in others, seasonal change is obvious. Not every place on the planet experiences the seasons at the same time. North of the Equator, summer is from June to September. South of the Equator, summer is from December to March.

During what months is it summertime where you live? What is the hottest month of the year where you live?

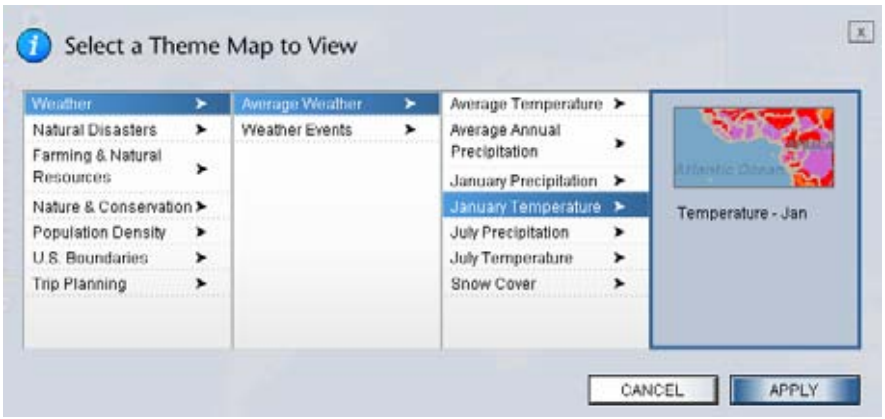
During what months is it wintertime where you live? What is the coldest month of the year where you live?

Africa is a continent where the Equator runs through the middle. So, when is it summertime in Africa? What if you could explore Africa and find out? With National Geographic's MapMachine, you can!

Your Mission: Explore Africa's climate in the summer and in the winter. Be an investigative geographer and report on the seasonal changes across Africa.

1. **Access the National Geographic MapMachine** to begin your voyage! http://plasma.nationalgeographic.com/mapmachine/

Select "More Theme Maps" and select Weather→ Average Weather→ January Temperature, as follows:



Make certain that the legend in the lower right of the map is turned on.

What colors mean that the weather is hot in January?

What colors mean that the weather is cold in January?

What patterns do you notice on the world map?

Is the average temperature hot or cold where you live in January?

Is it hotter or colder in Africa in January than where you live? Why?

Select "Change Map Theme" below the map and change the map to show July temperature.

What patterns do you notice on the world map?

Is the average temperature hot or cold where you live in July?

Is it hotter or colder in Africa in July than where you live?

Tip: If you would like to see two maps on your screen at the same time, open a new web browser. In one web browser, load a January temperature map, and in the other, load a July temperature map. Resize the windows and move them so that they are side by side.

2. **Average Temperature.** Change the Map Theme to be Average Temperature. **What is meant by the concept of "average temperature?" Where is the average temperature the warmest, on average, throughout the year?**

In your web browser, load a map from the National Geographic Xpeditions atlas. Enter "Africa" in the "Select Location" box. Notice that the Equator runs through Africa.

What effect does the equator have on the climate of Africa?

Think about how the Northern Hemisphere of the Earth is tilted toward the sun in January, while the Southern Hemisphere is tilted toward the sun in July.

Change back to make a map of Average January Temperature and then make a map of Average July temperature. **Where is it hottest in January? Where is it hottest in July? Why is northern Africa hotter in January, but southern Africa hotter in July?**

3. **The Sahara.** In your web browser, go back to the MapMachine. Enter "Africa" in the box, and select "Find A Place."

Is it hotter in Northern Africa in July, or near the Equator?

You'd expect it to be hotter near the Equator in July, but as you noticed, it is hotter in Northern Africa. Let's do more investigating to find out.

Change your map theme to Nature & Conservation → Vegetation→ Vegetation. You may have to zoom in to see the legend.

What vegetation exists in Northern Africa?

What vegetation exists in Central Africa along the equator?

Change the map theme to precipitation in January and then precipitation in July. **Does it rain more in Northern Africa or in Central Africa?**

Do tropical rainforests appear to grow where there is much precipitation, or do they grow where there is little vegetation?

Much of Northern Africa is occupied by the world's largest desert, the Sahara. **Why do you suppose the Sahara is even hotter than the tropical rainforest along the Equator?**

Change the map theme to population density. **Why do so few people live in the Sahara Desert?**

Change the map theme to Satellite. **What does the Sahara Desert look like from space? Why?**

4. **Seasonal Variation.** Change to a map of average temperature and zoom to Africa. Compare the average temperature in July to the average temperature in January. Compare these to the average annual temperature. **Where in Africa would you experience the greatest differences between summer and winter? Where would you experience the least difference? Why?**

In some places, particularly near the Equator, the main difference between summer and winter is not the temperature, but the amount of precipitation. Make maps of July precipitation and January precipitation. **In what parts of Africa would you find the main difference between summer and winter to be the amount of precipitation? During what month—January or July—would you experience the most rainfall in these places?**

5. **The Ocean Effect.** Change back to a map of average temperature and zoom to Namibia. Notice the difference in the temperature of the interior of Namibia versus that on the coast. The ocean heats up more slowly than the land surface, and cools down more slowly than the land surface. It therefore tends to have a moderating affect on the climate on land, keeping it warmer in the winter and cooler in the summer. **Why would the ocean have this type of effect on the land near it?**

Can you see any evidence of the effect of the ocean on the climate of Namibia?

Pan the map to fly up and down the coastlines around Africa. **Do you see the effect of the ocean in other parts of the continent?**

6. **Dig Deeper.** There are other things that have an effect on climate besides proximity to the Equator and proximity to the ocean.

Change the map theme to Physical, and zoom in on high mountains in Morocco, Tanzania, South Africa, and other countries. Make sure "Roads, Borders, & Places" is checked. **What effect do mountains have on the climate? Why?**

Change the map theme to average temperature. Then enter the names of some of Africa's largest cities in the "Find A Place" box. For example, enter "Johannesburg," "Cairo," "Lagos," and "Nairobi." **After zooming to each city, what city has the hottest average temperature? The coldest?**

Can you find a city with a hotter or colder temperature than these? What is this city?

Enter the names of some of Africa's countries in the "Find A Place" box. For example, compare Libya, Cameroon, and Zambia. **After zooming to each country, name the country that has the hottest average temperature of the ones you have selected.**

Name the country that has the coldest average temperature. Where are these countries in relation to the Equator, and to the Sahara Desert?

Switch the map theme to January precipitation. **What parts of Africa receive the most precipitation in January? Is there a relationship between precipitation pattern and temperature? Why or why not?**

Switch the map theme to Snow Cover Days to show the average number of days that snow covers the ground. **What is the relationship of the average temperature to the number of days that snow is on the ground? Why?**

Print your own giant wall map of Africa on:
http://plasma.nationalgeographic.com/pdf/africaphy.pdf

Go to Africa someday!
http://www.nationalgeographic.com/traveler/extras/planner/africa/index.html