

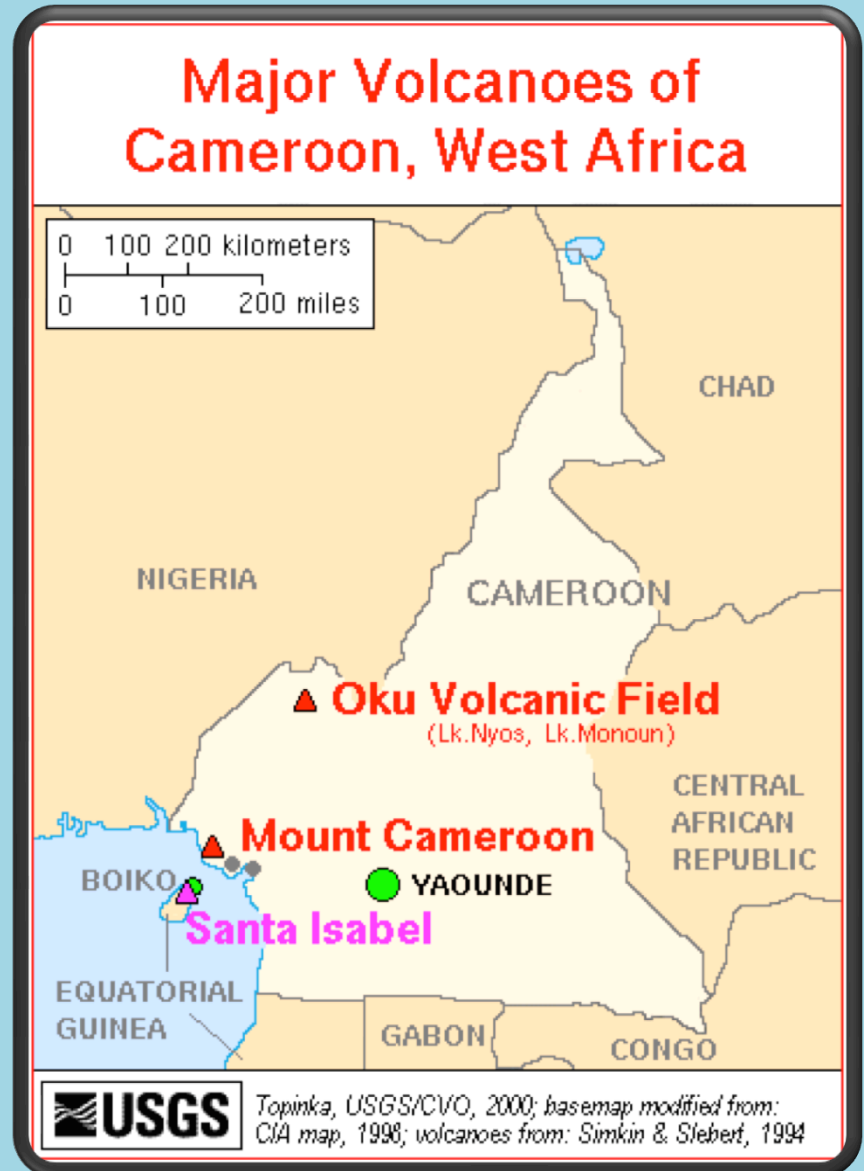
LAKE NYOS, CAMEROON

Mackensie Hotz

LOCATION

Lake Nyos lies near the northern boundary of the NE-trending Cameroon Volcanic Line, within the Oku Volcanic field.

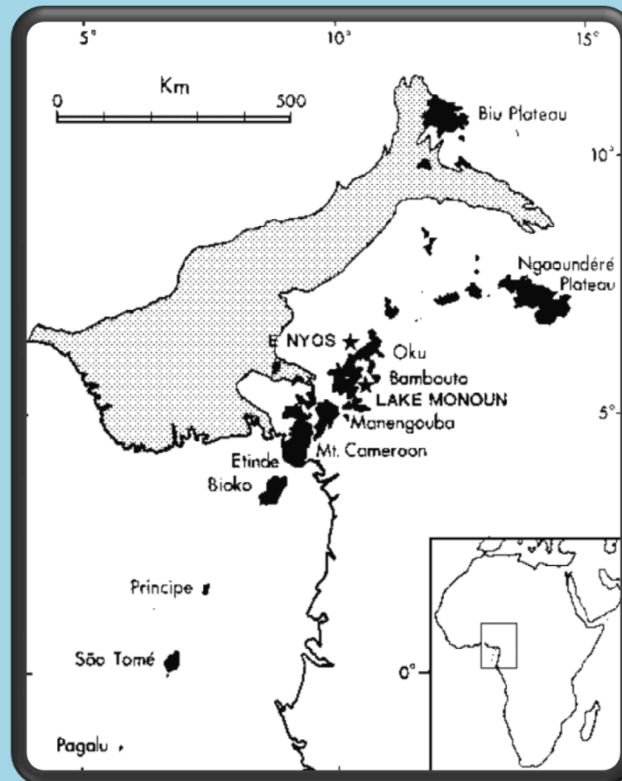
The Cameroon Line = a zone of crustal weakness and volcanism that extends south to the Mt. Cameroon stratovolcano.



GEOLOGIC HISTORY

The area has been volcanically active for millions of years.

~80 million years ago, West Africa experienced rifting, creating the Mbere Rift Valley.



Crustal extension has allowed magma to reach the surface along a line that runs through Cameroon.

FORMATION

Lake Nyos occupies a maar, which is an explosion crater created when a lava flow interacted violently with groundwater.

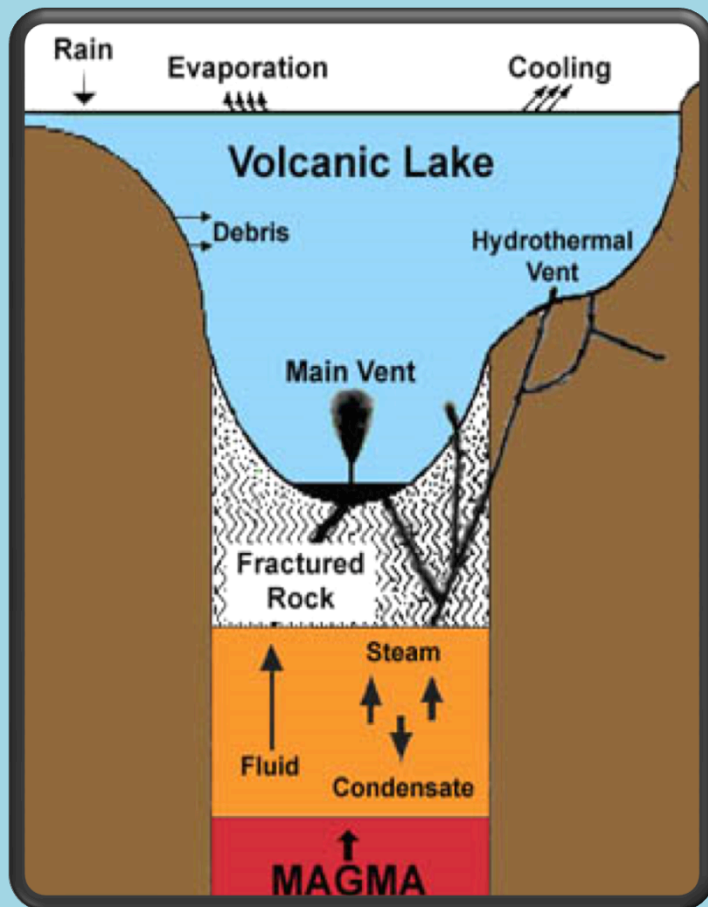
The maar was formed during a hydrovolcanic eruption that took place 400 years ago.



area = 1.5 km²
1400 m long
900 m wide
200 m deep

GEOLOGIC SETTING

A magma chamber exists beneath the lake.



50 miles directly beneath the lake volcanic magma emits CO_2 gas.

The gas travels up and seeps into the lake bed, saturating the bottom waters of Lake Nyos.

Most of the gas doesn't escape into the air due to the pressure exerted by the 200 meters of lake water that lie above the bottom layers where most of the CO_2 is dissolved.

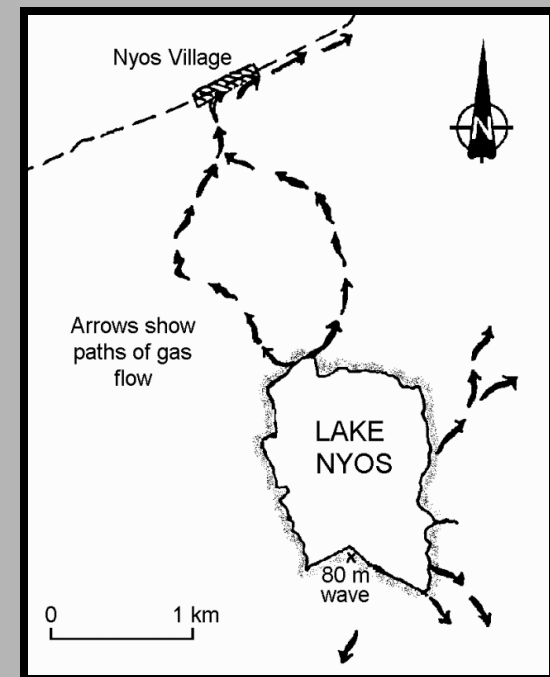
9:30 AM, AUGUST 12, 1986

A limnic eruption occurred, expelling a CO²-rich cloud from Lake Nyos, releasing approx. 1.6 million tons of noxious gas.

The CO² mass was ~50 meters thick and traveled at a rate of 20-50 km/hr.

It persisted for 23 kilometers in concentrated form.

Because CO² is 1.5 times more dense than air, the cloud hugged the ground as it descended into the surrounding valleys.





The human death toll was between 1,700 and 1,800 people, with thousands more animal deaths (mainly livestock).

The villages of Nyos, Kam, Cha, and Subum were most effected by the eruption.

The sole cause of death was asphyxiation.



THE CAUSE

It's unknown what mechanism triggered the sudden eruption.

Some suspect a landslide, others point to a small volcanic eruption, and a third possibility is the falling of rain.

There is little evidence to suggest a volcanic eruption was the cause.

1

There is evidence for the occurrence of a landslide.



2

The rapid accumulation of rainwater on one side of the lake could induce convection overturn.

Because the rainwater is cooler and more dense than the warm surface layers it sank, displacing the bottom layers.

This caused the bottom water to decompress and rise, causing the dissolved CO_2 to come out of solution and rapidly escape.

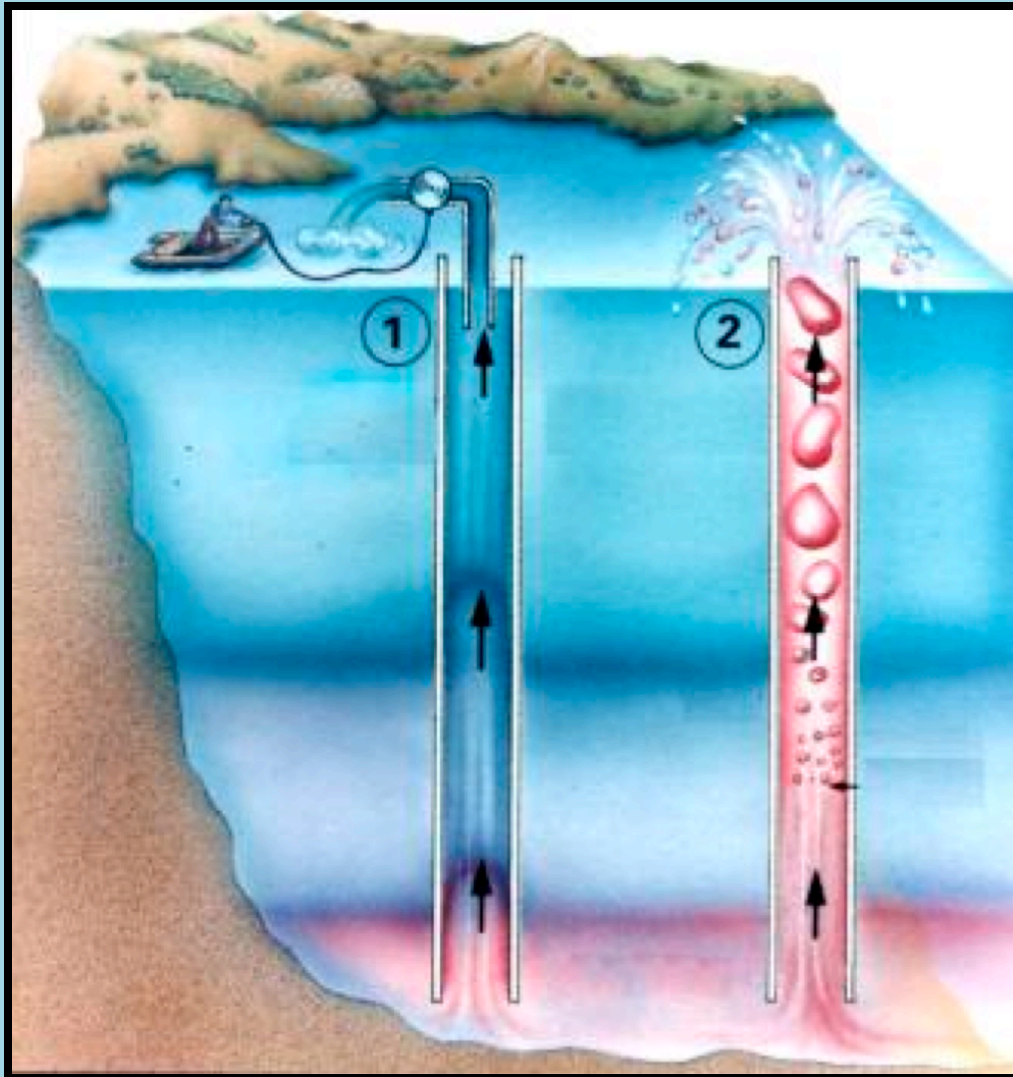
EFFECTS OF OUTGASSING

The normally blue waters turned a deep red due to iron-rich water from the bottom of the lake ascending and oxidizing at the surface.



The lake level dropped by nearly a meter, indicating the enormous volume of gas expelled.

DEGASSING LAKE NYOS



Degassing columns were installed at Lake Nyos to prevent a similar disaster.

A pump continually siphons bottom water heavily saturated in CO_2 to the surface.

This allows dissolved CO_2 to be slowly released as the water ascends.

RESOURCES

<http://www.hprcc.unl.edu/nebraska/Nyos.html>

http://www.geology.sdsu.edu/how_volcanoes_work/Nyos.html

http://en.wikipedia.org/wiki/Lake_nyos

http://vulcan.wr.usgs.gov/Glossary/Lakes/description_volcanic_lakes_gas_release.html

http://www.geo.arizona.edu/geo5xx/geos577/projects/kayzar/assets/images/degassing_lake_nyos.jpg

http://news.bbc.co.uk/1/1/shared/spl/hi/pop_ups/05/sci_nat_enl_1127817614/img/1.jpg

http://www.volcano.si.edu/volcanoes/region02/africa_w/oku/02oku02f.png