



Do now:

What do you think the inside of the earth is made up of?

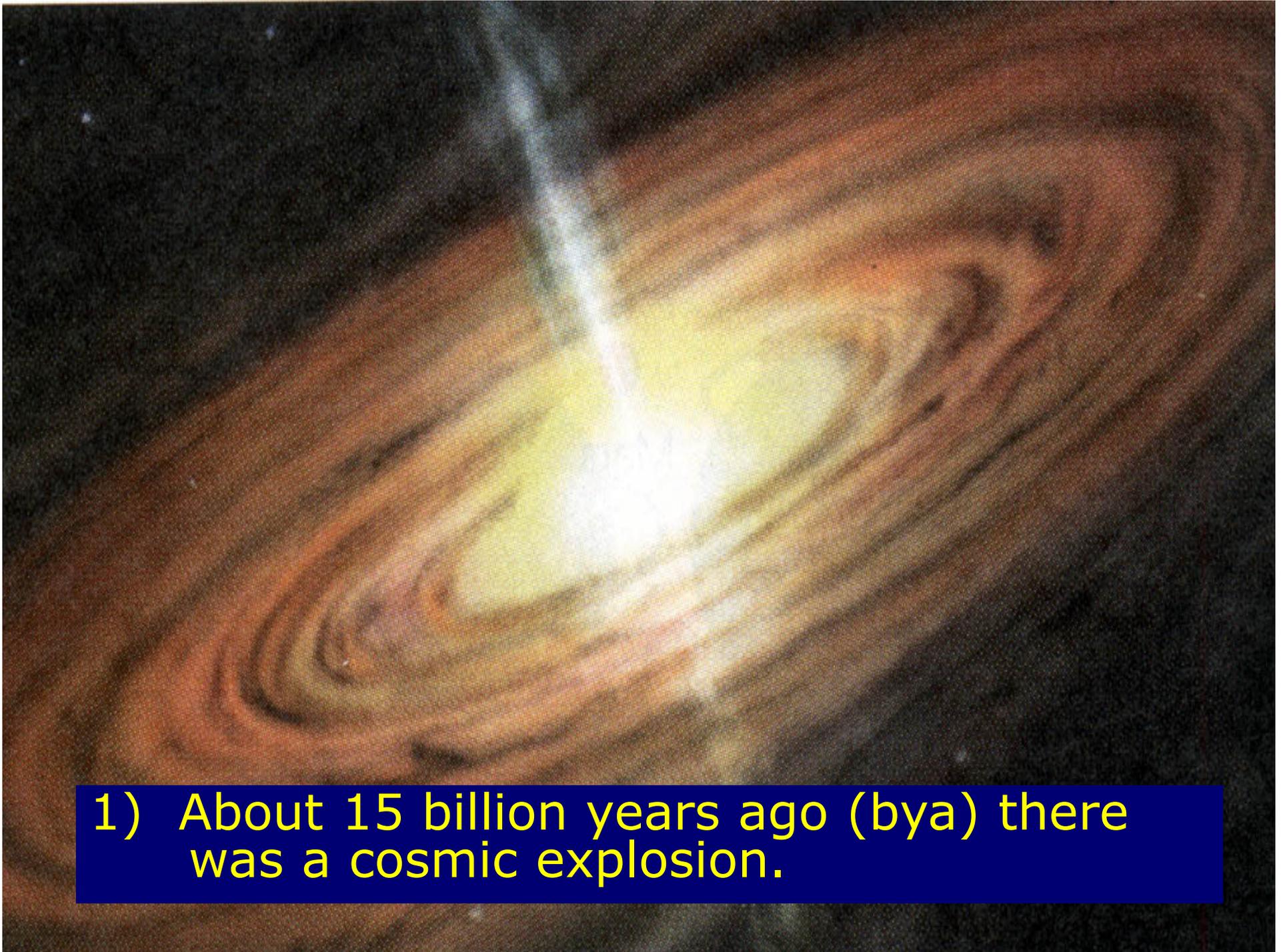
Why?

Unit 1

Measuring the Earth



I. How did the earth form?



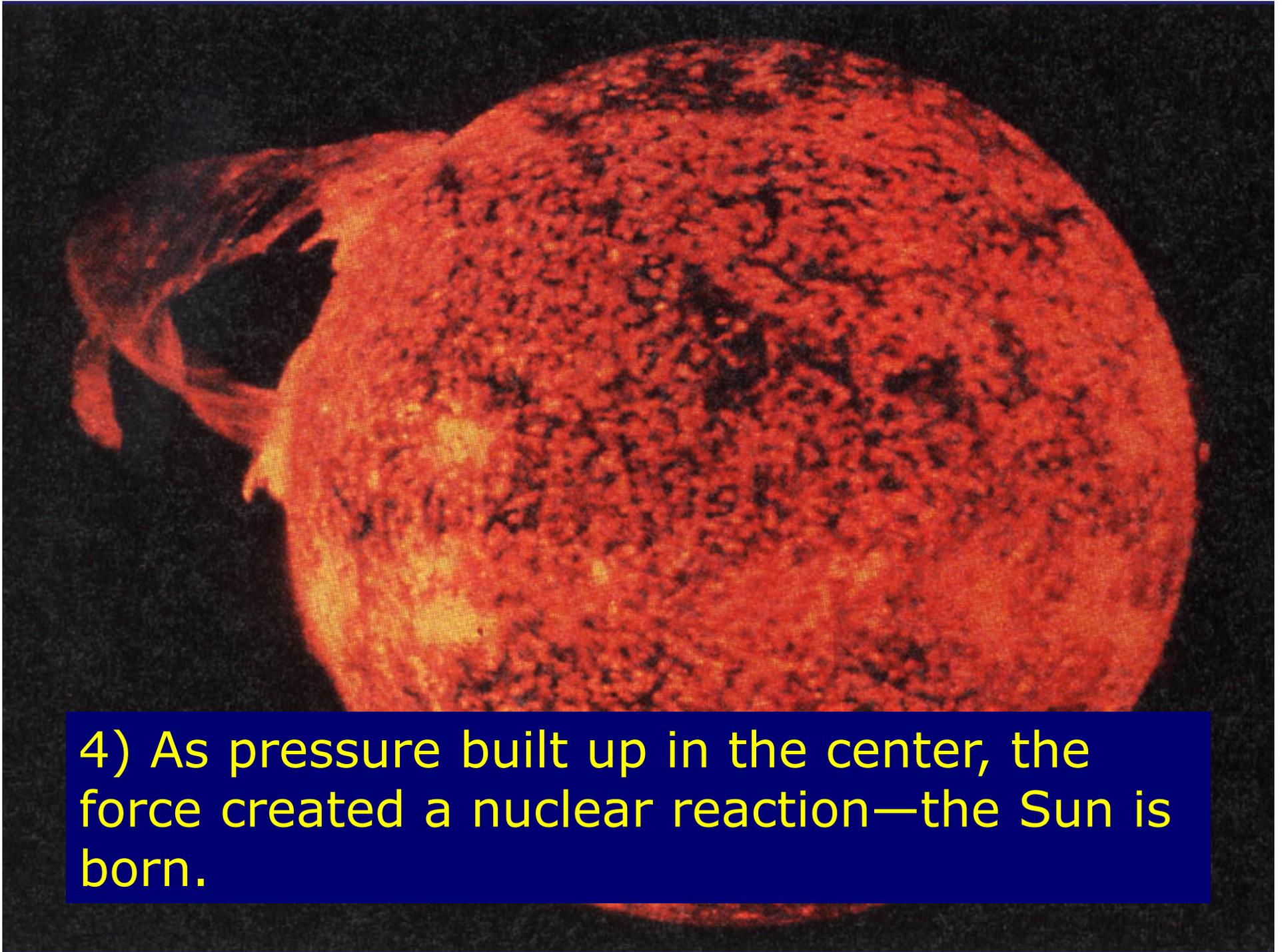
1) About 15 billion years ago (bya) there was a cosmic explosion.



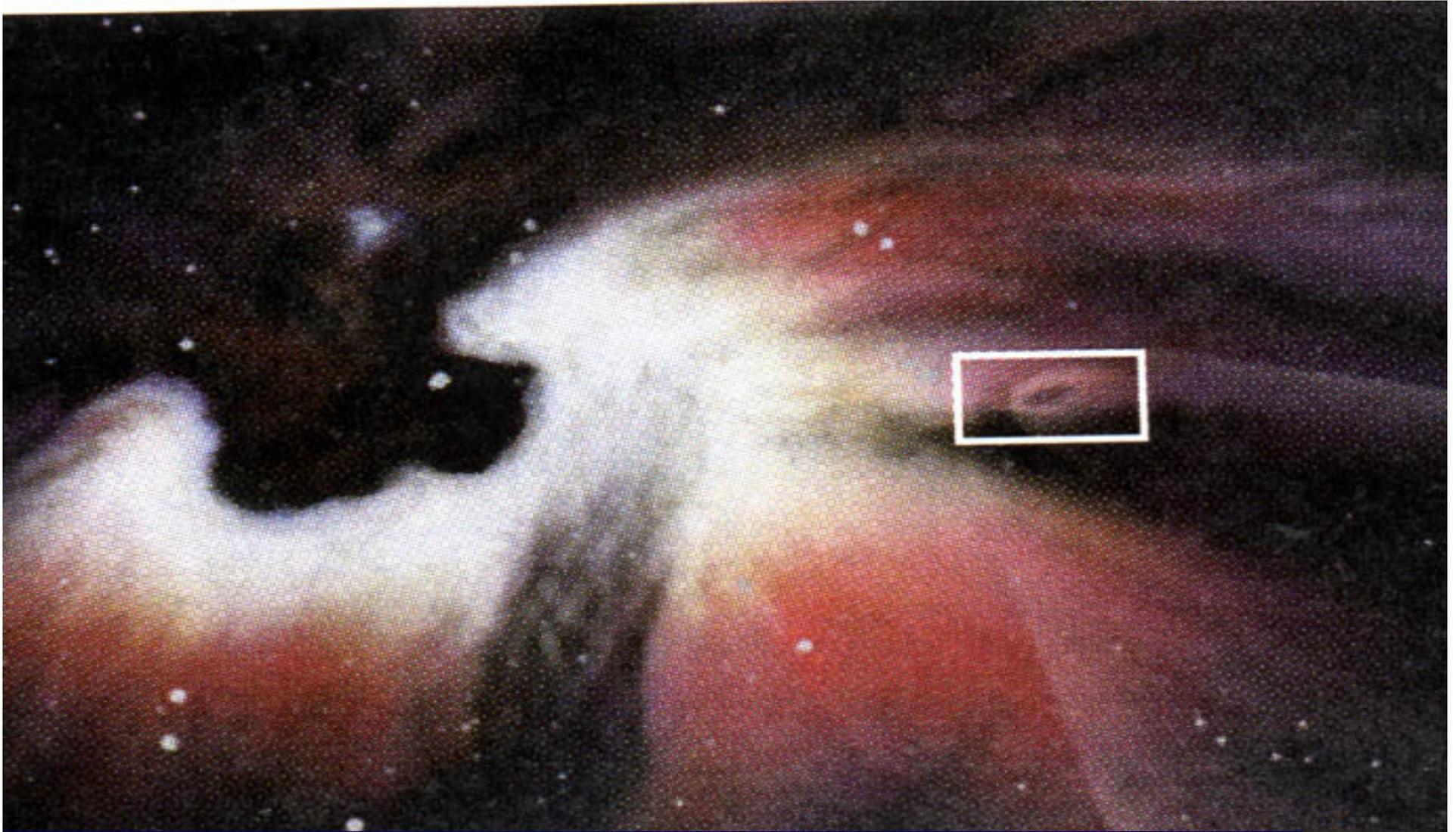
2) About 5 bya, some dust from the explosion begins swirling around in a cloud.



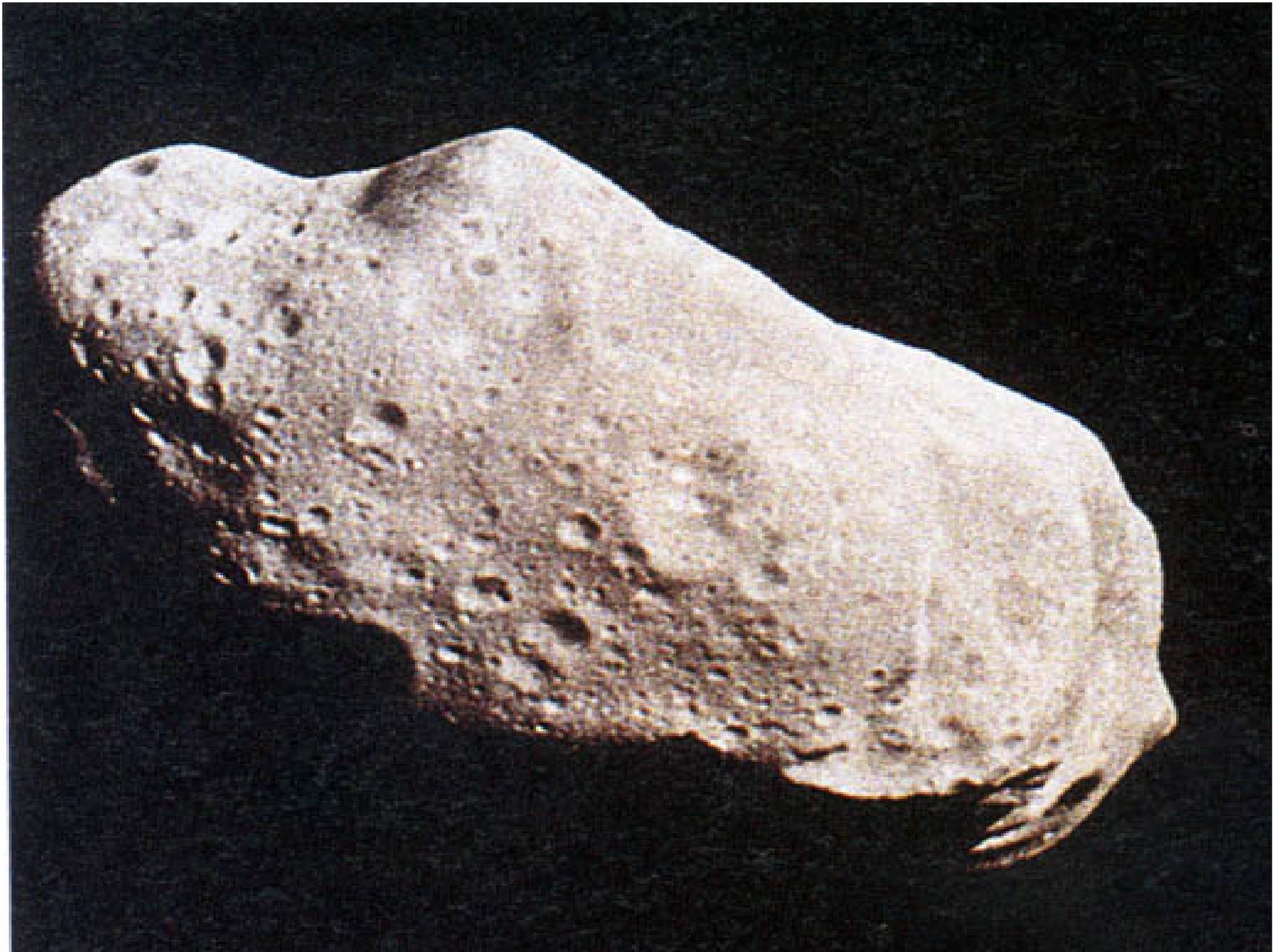
3) The cloud spun faster. Dust moved toward the center.

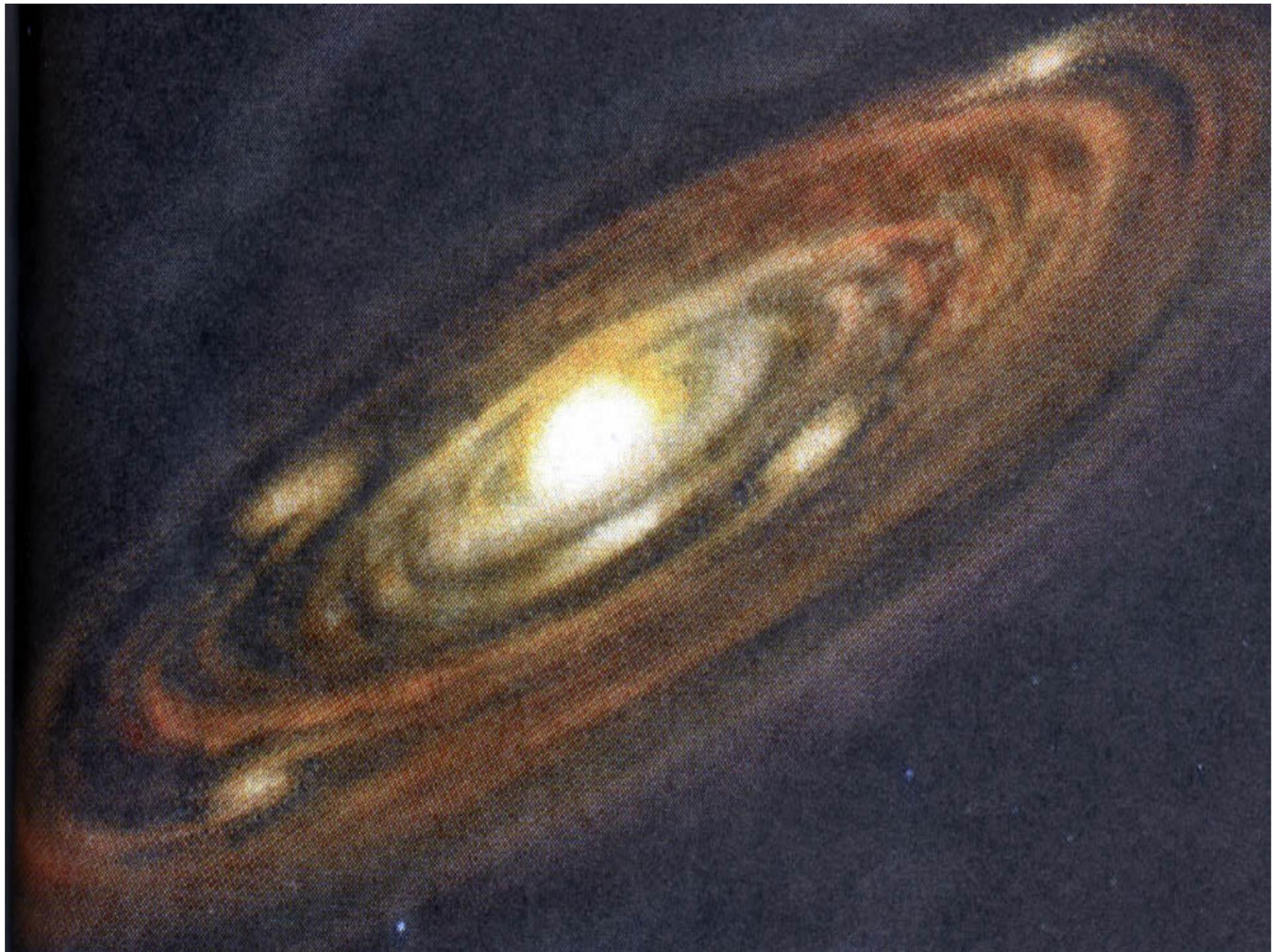


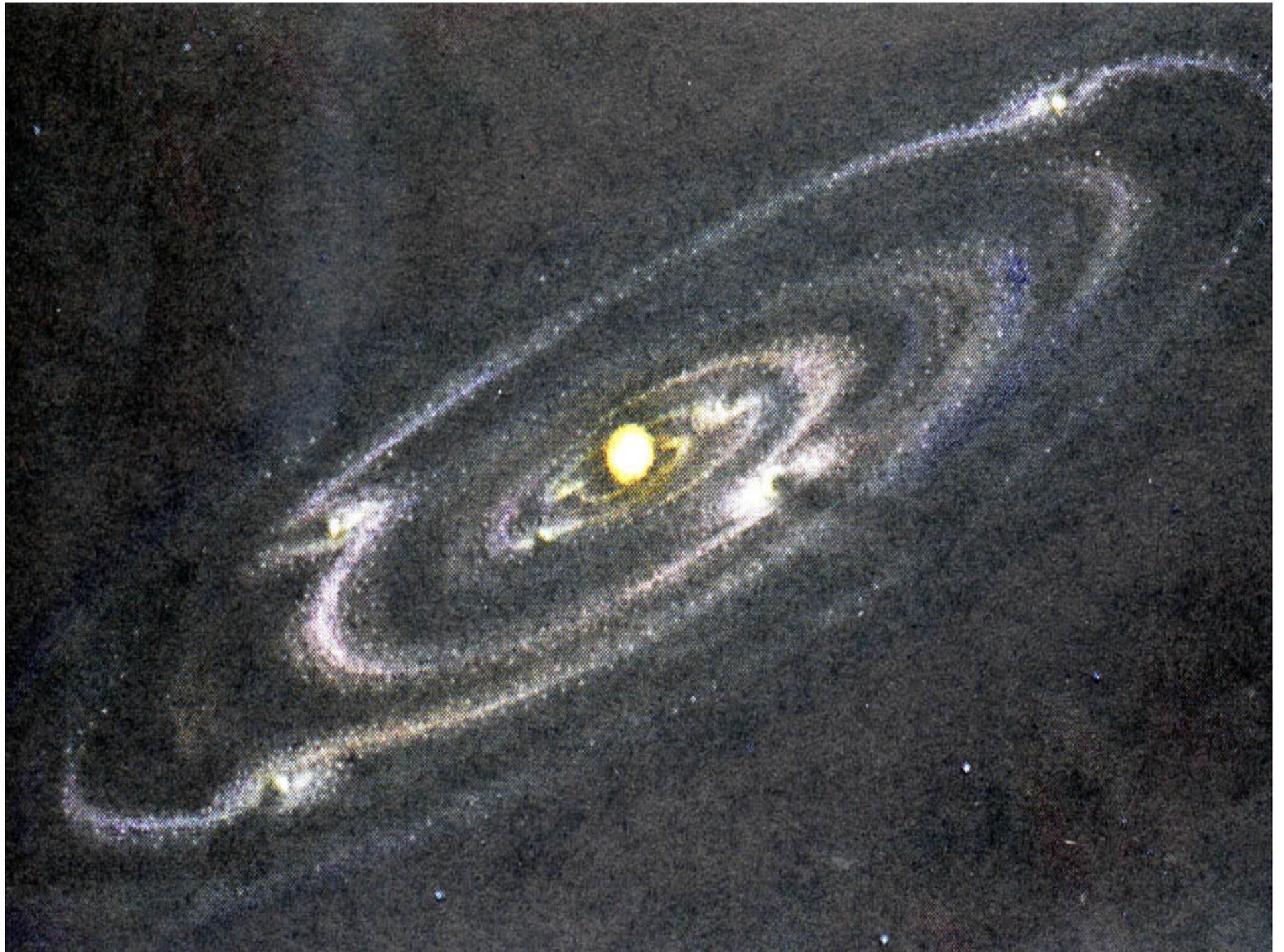
4) As pressure built up in the center, the force created a nuclear reaction—the Sun is born.



5) Remaining dust in the cloud began to stick together in chunks of rock called protoplanets.









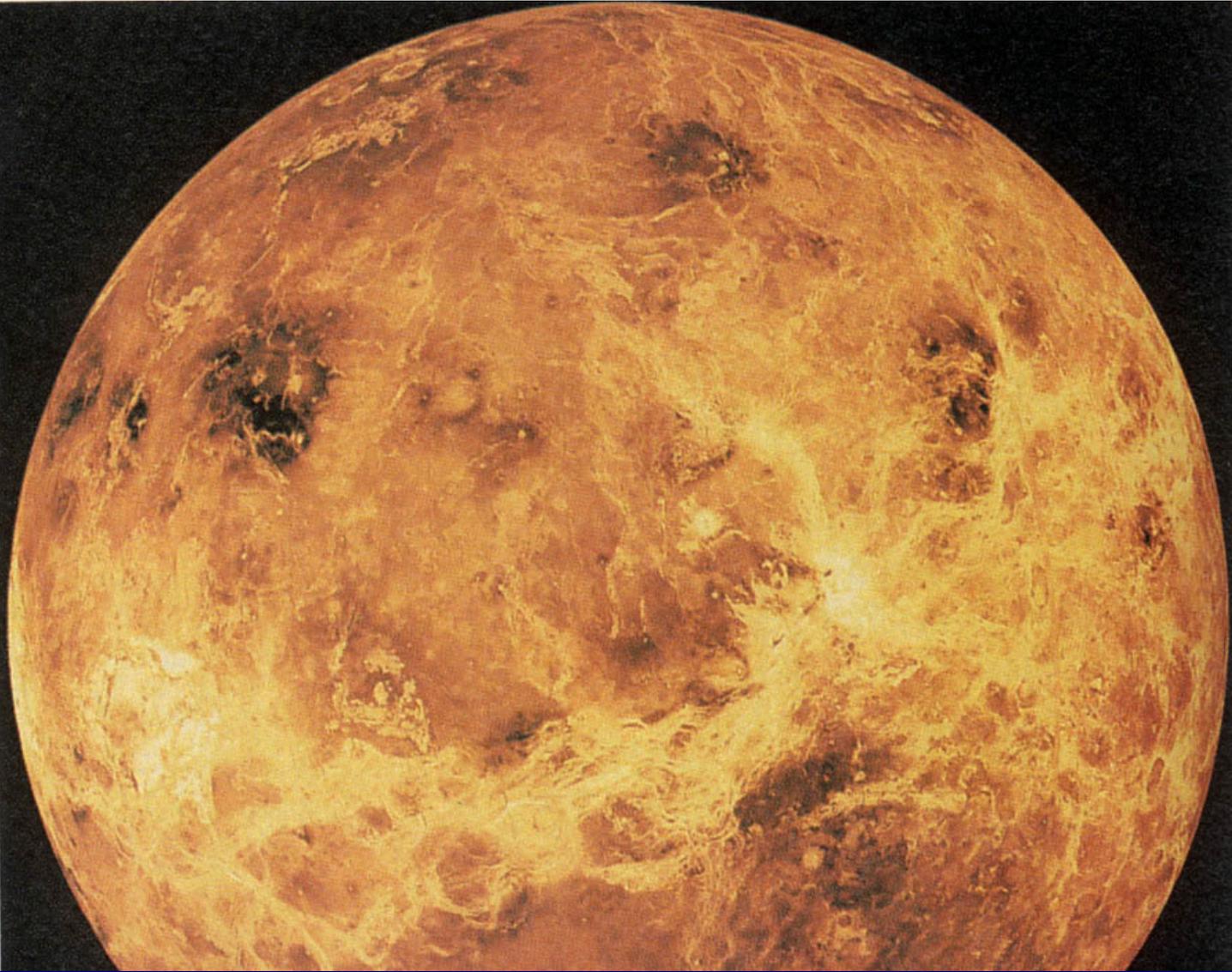
6) Eventually, they became planets.



early
earth



How did the oceans form?



1) The Earth was molten when it first formed.



2) Steam is released from volcanos



3) Steam eventually cooled and condensed into water

How did the atmosphere form?



Outgassing – gas is released from oceans and volcanoes

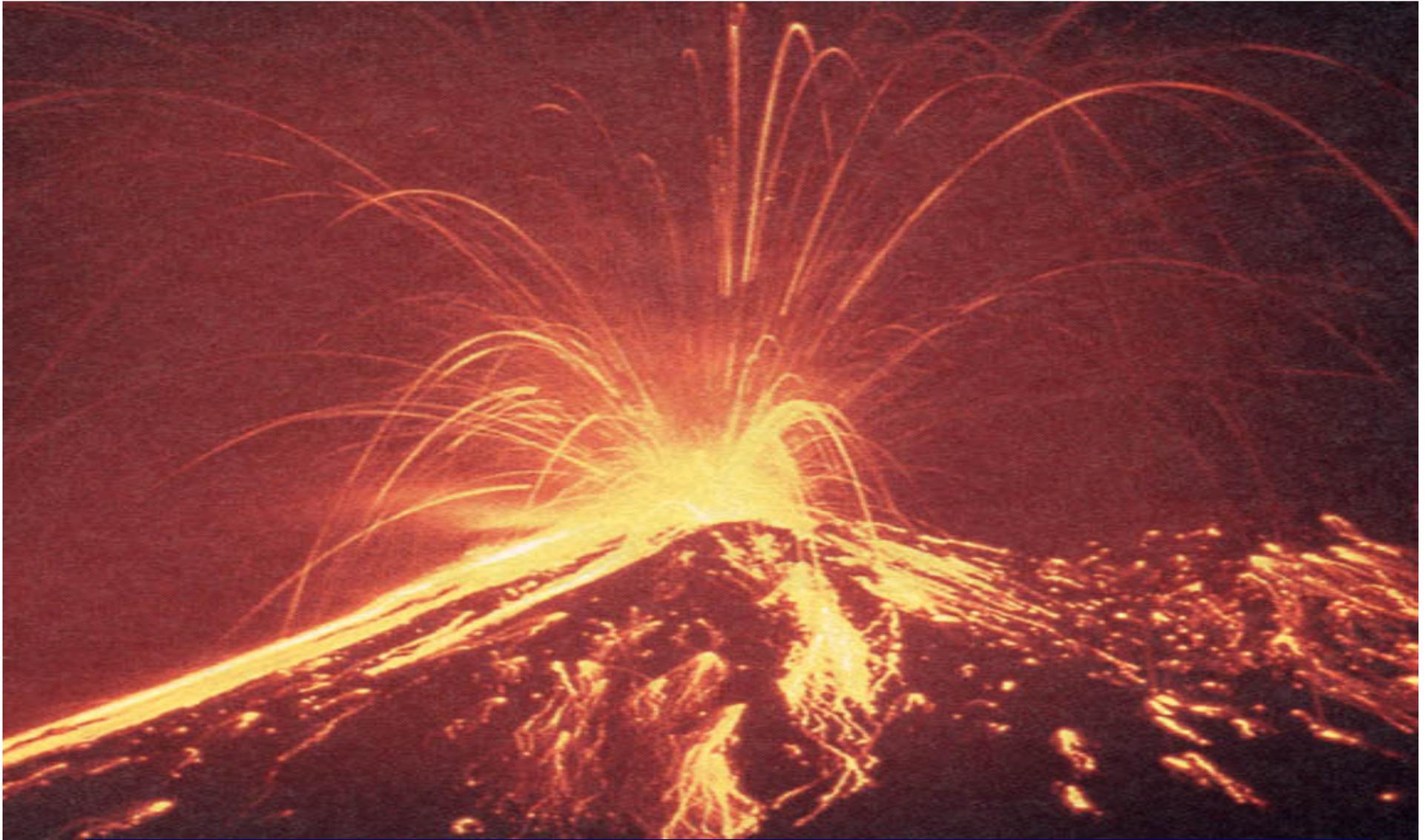
Earth's early
atmosphere

-carbon dioxide
-ammonia

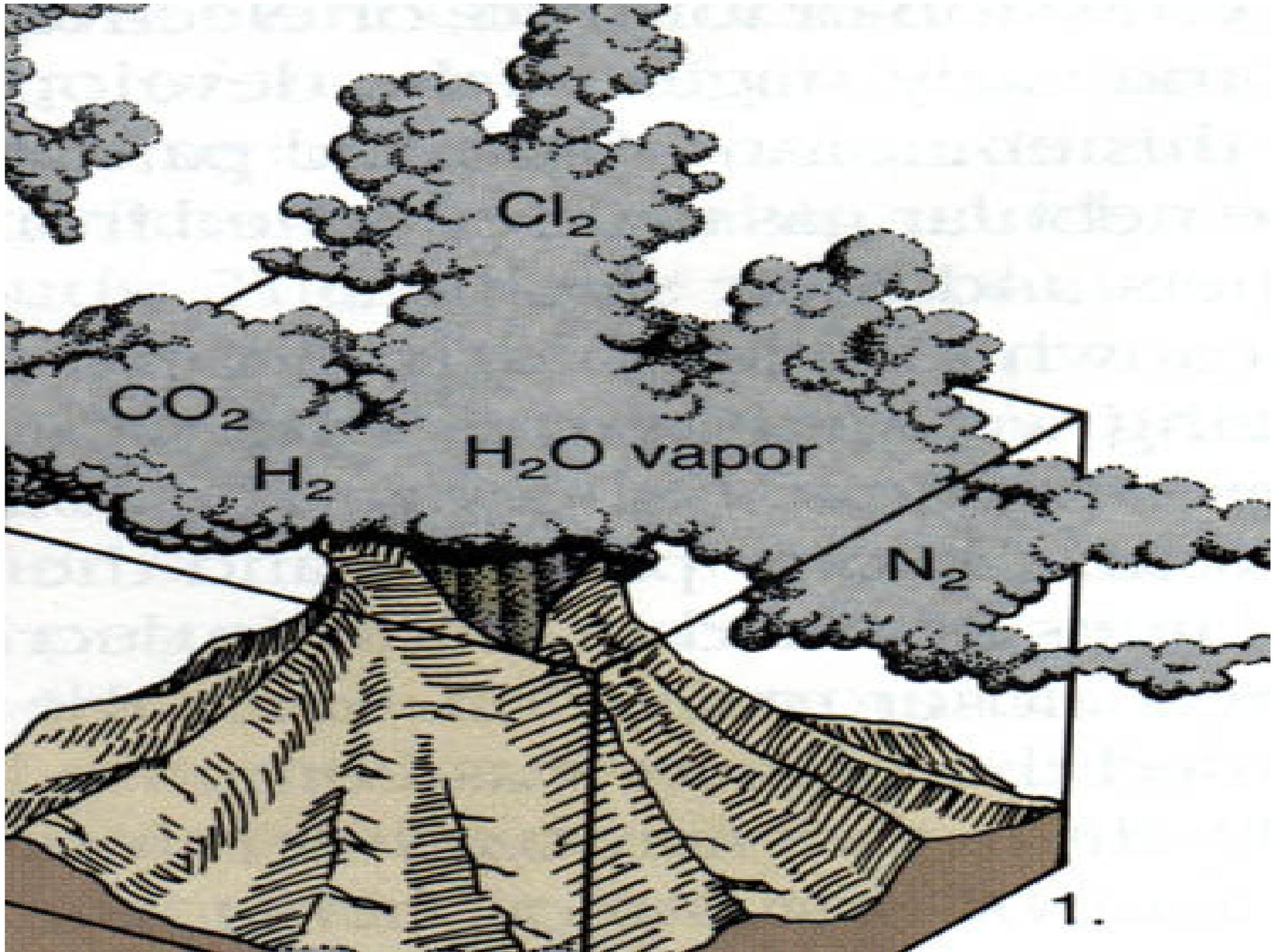
Earth's current
atmosphere

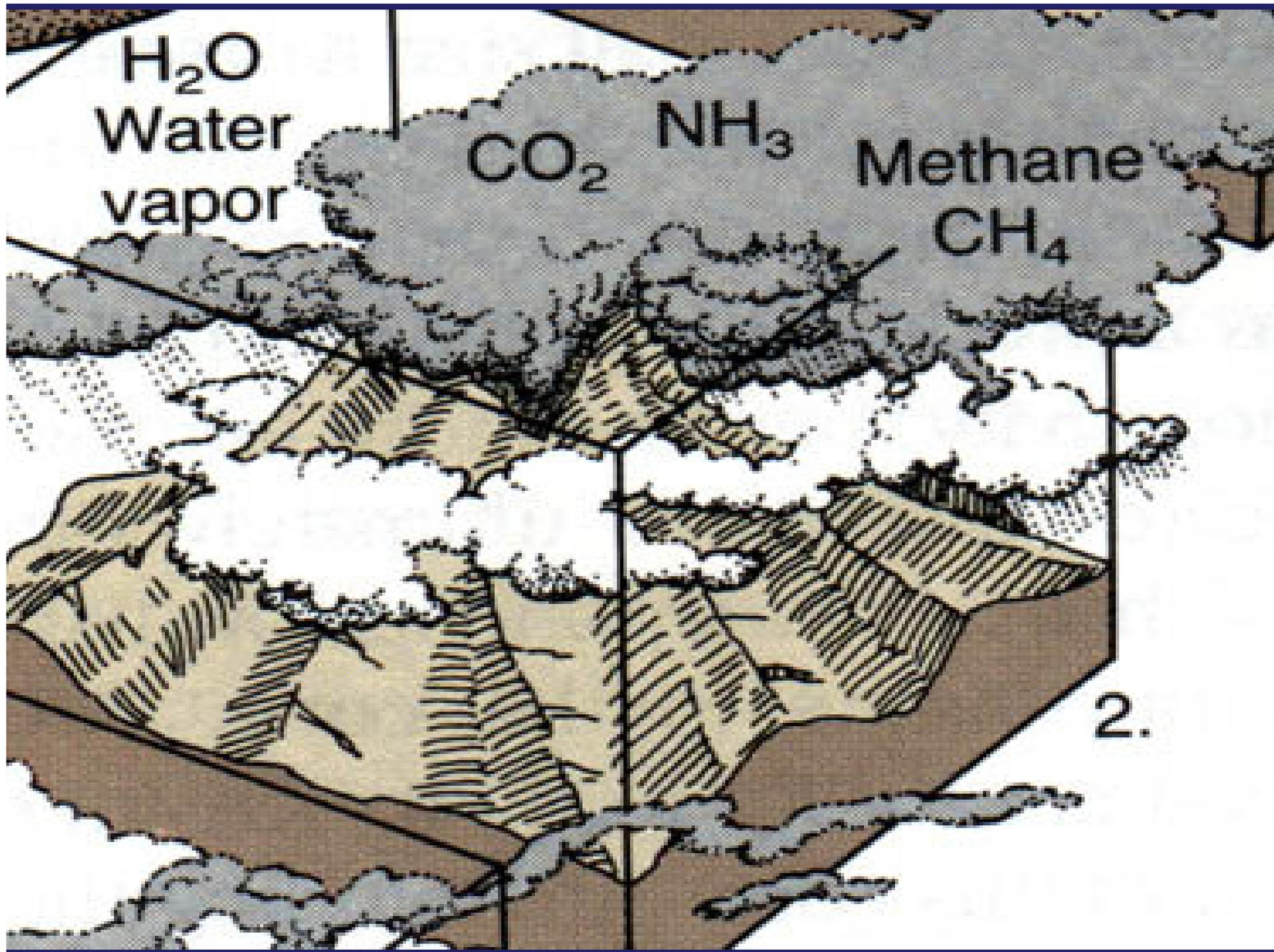
-nitrogen
-oxygen

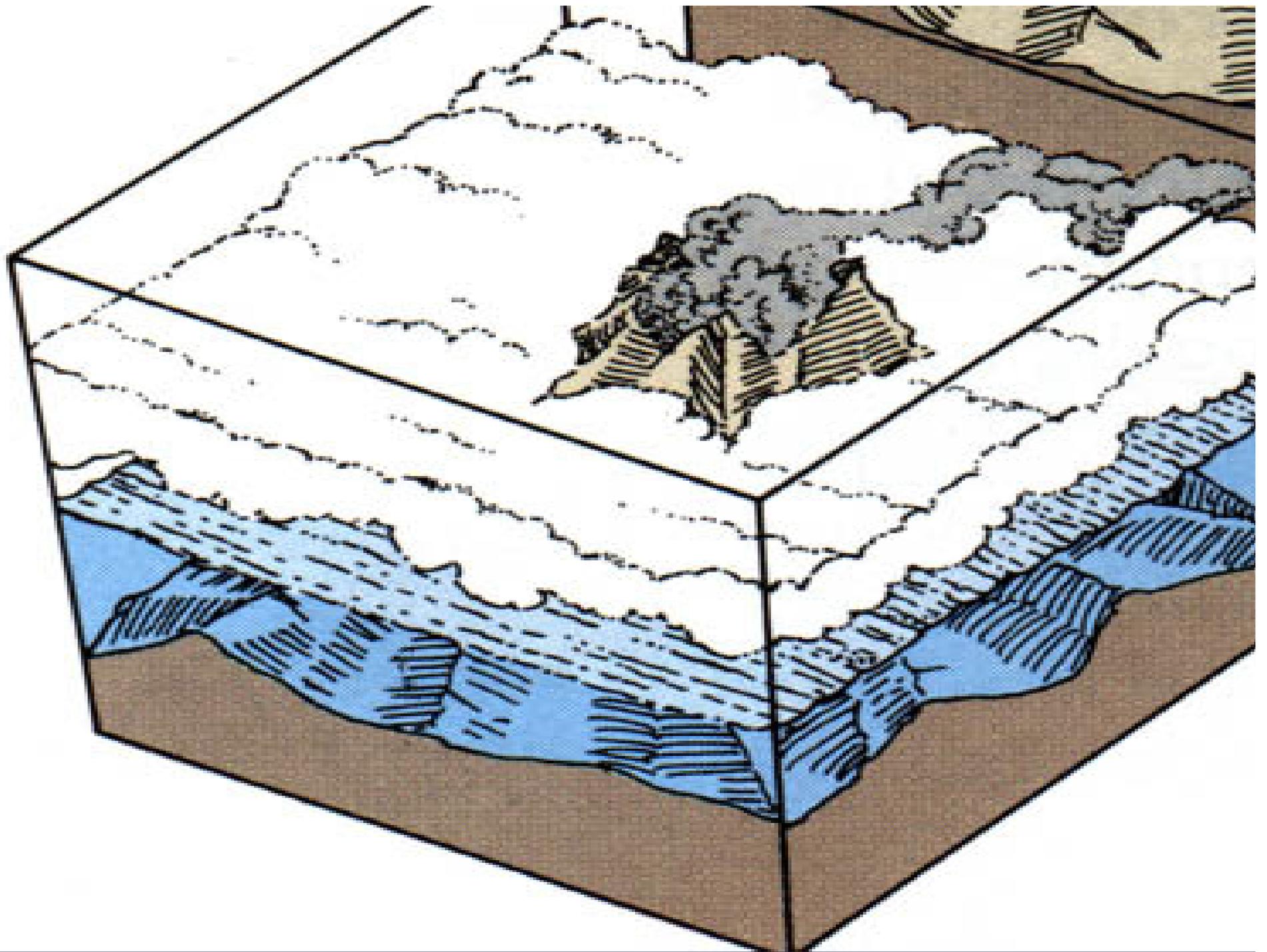
How did life form?



1) The secret ingredients of life: methane, ammonia, nitrogen, carbon dioxide, and water + a large energy source







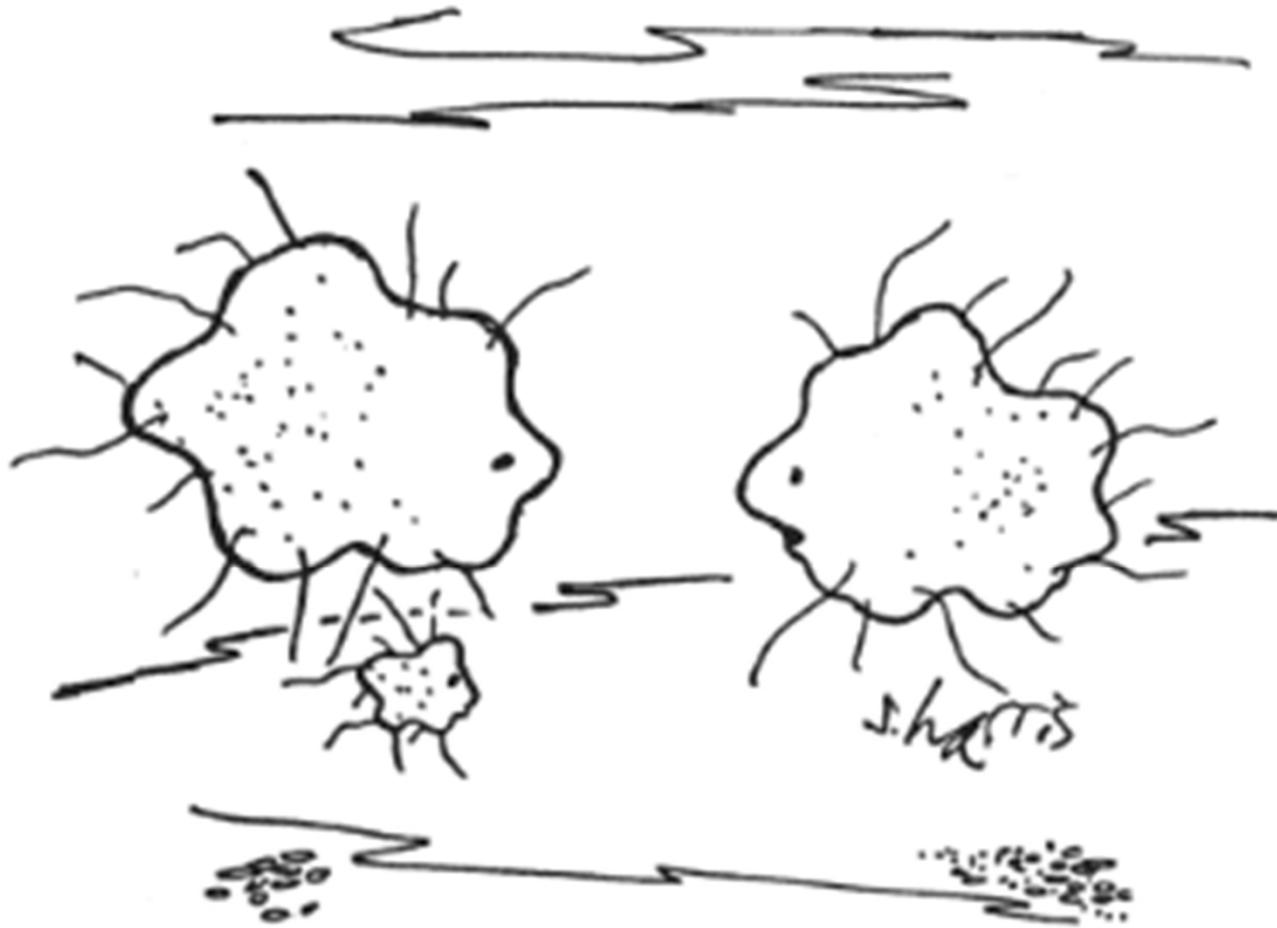
What was the energy source?



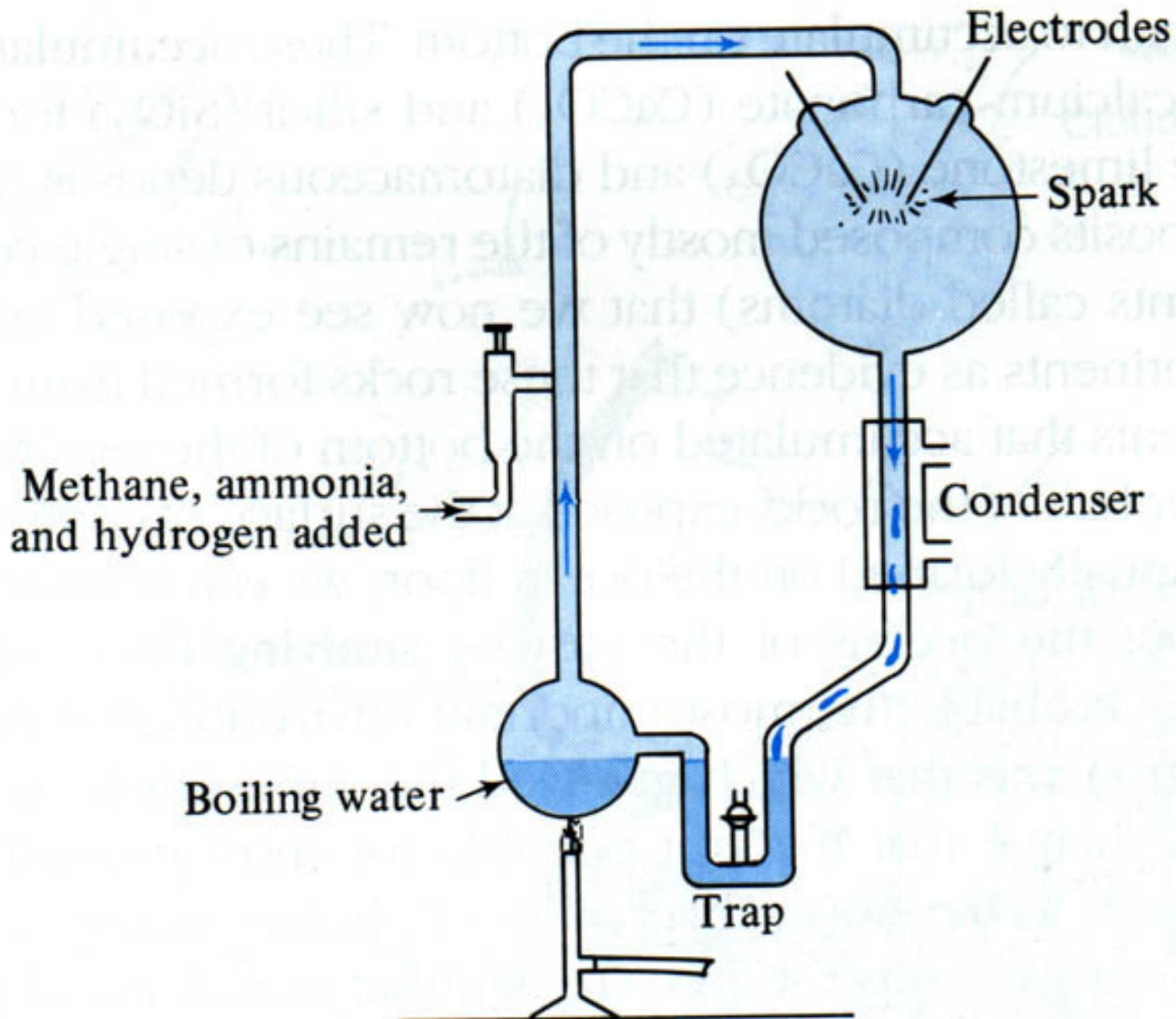
Lightning!



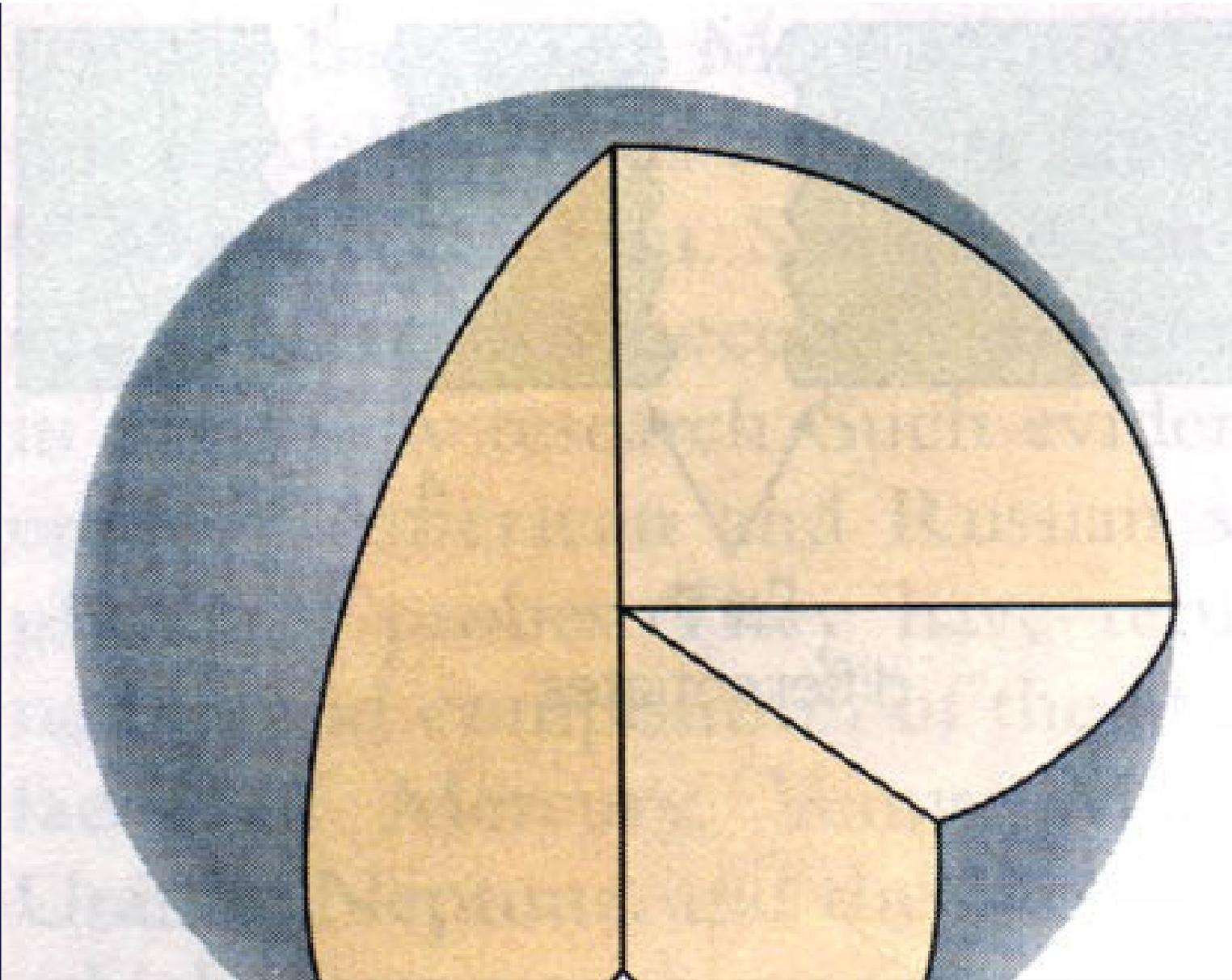




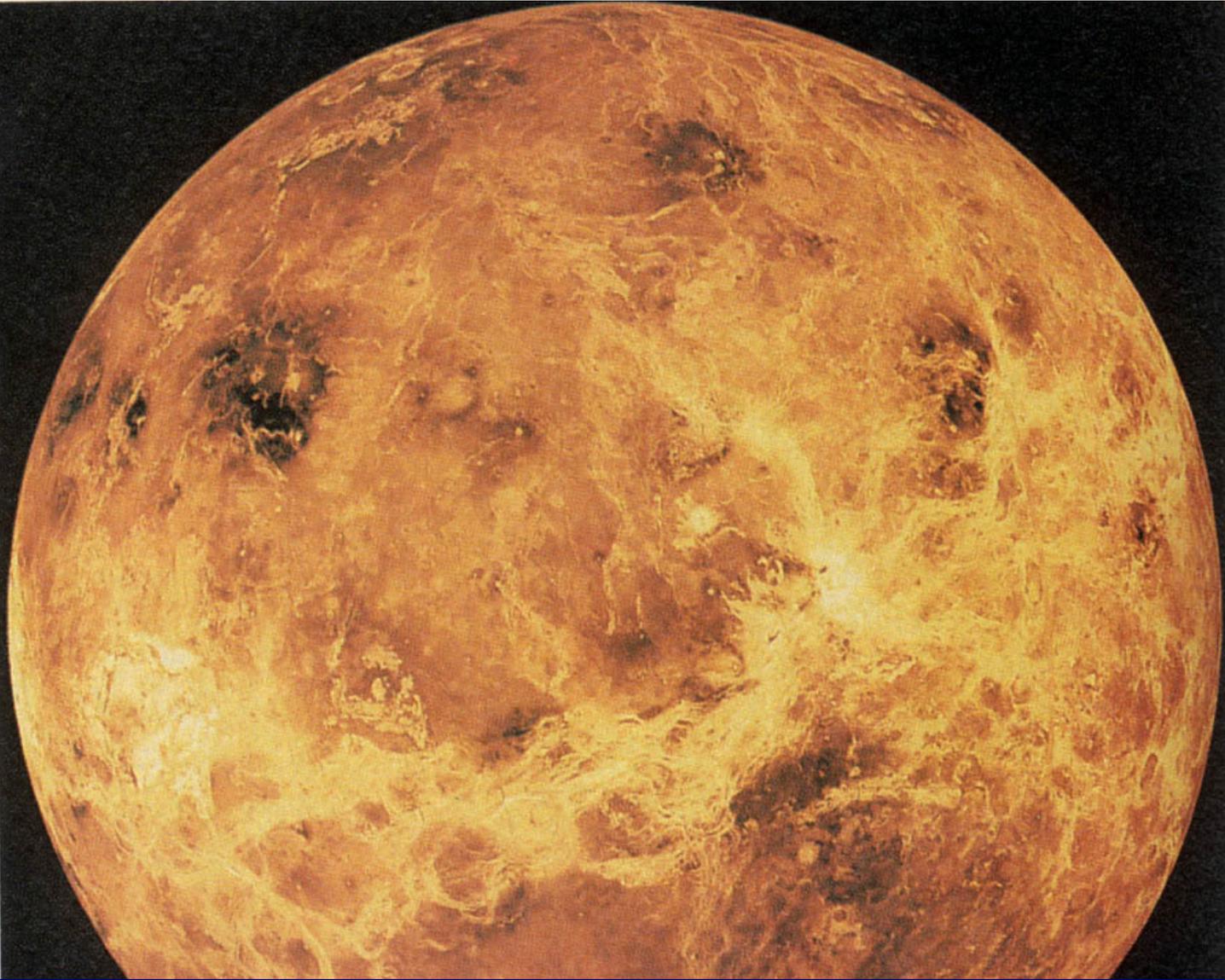
"He looks just like you.
But he looks just like me, too."



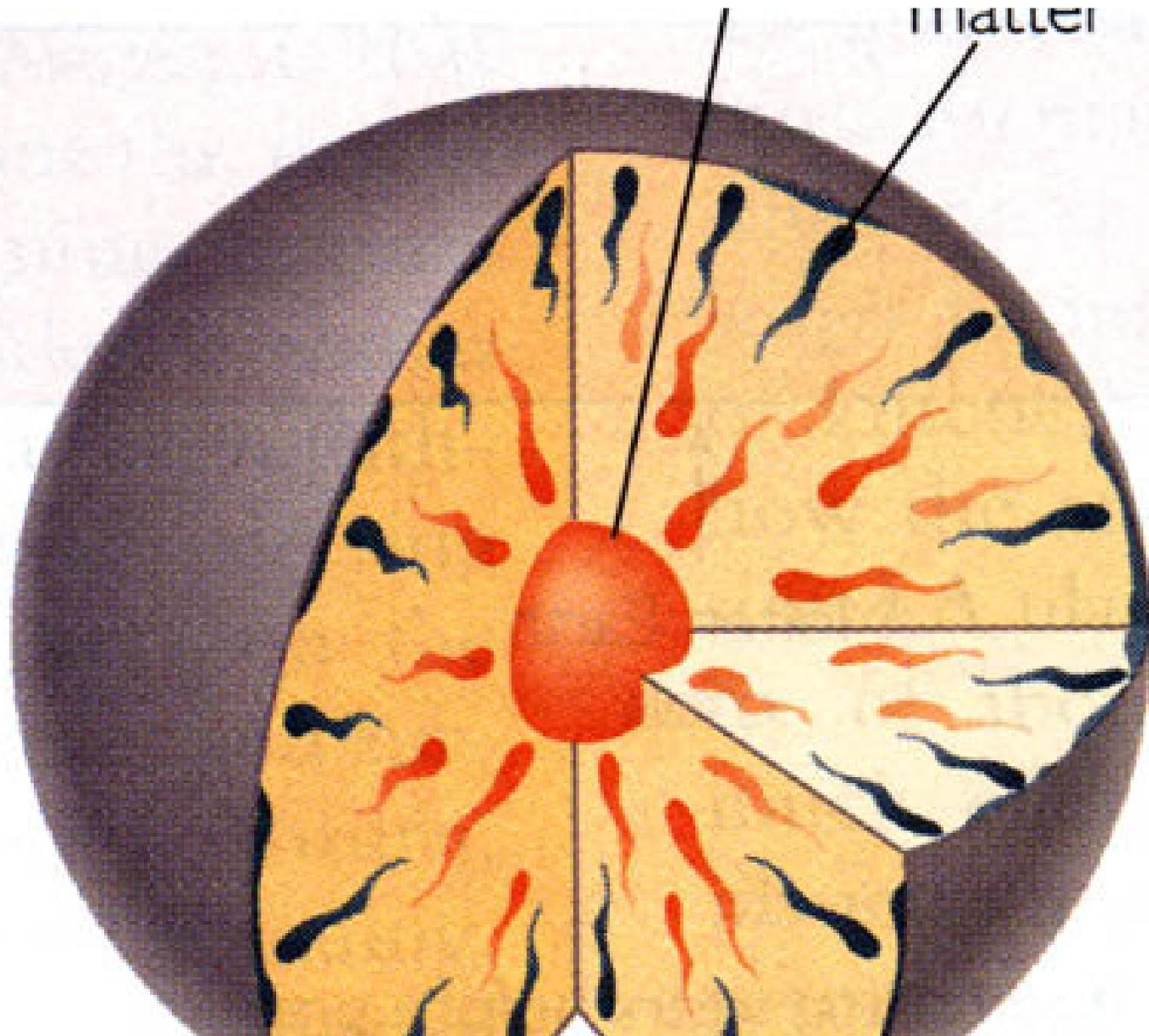
How did rocks form?



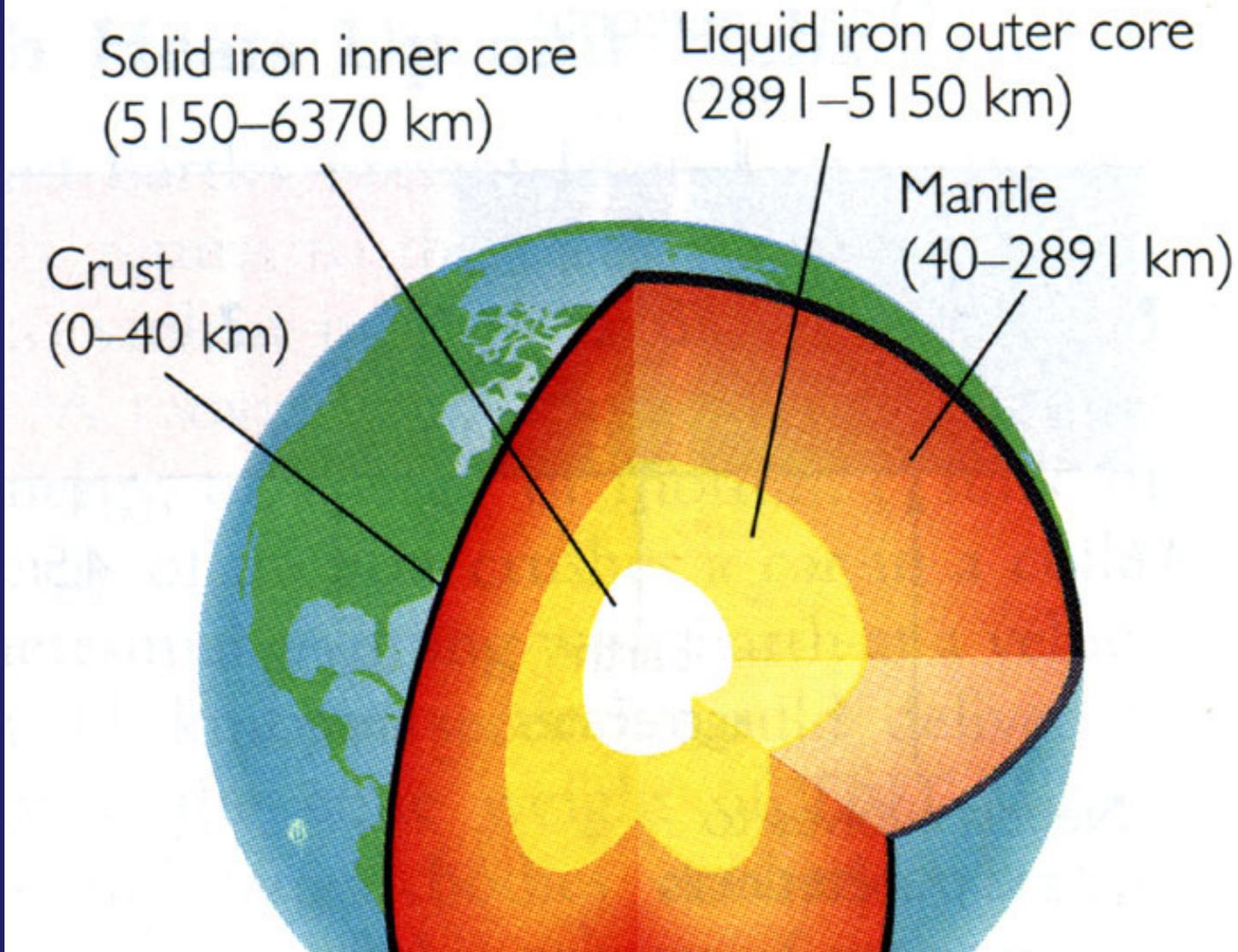
1) As molten lava cooled, it hardened into rock



2) Molten lava slowly cooled

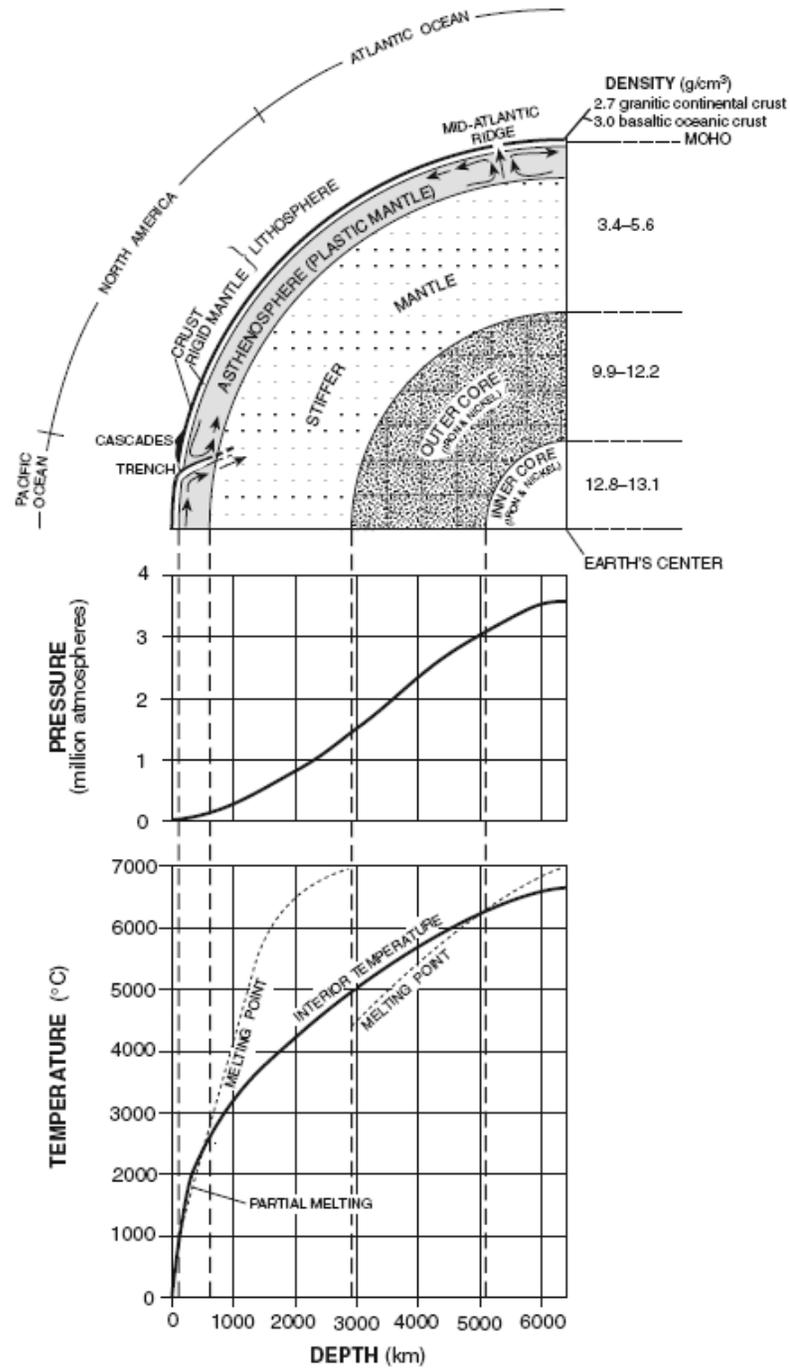


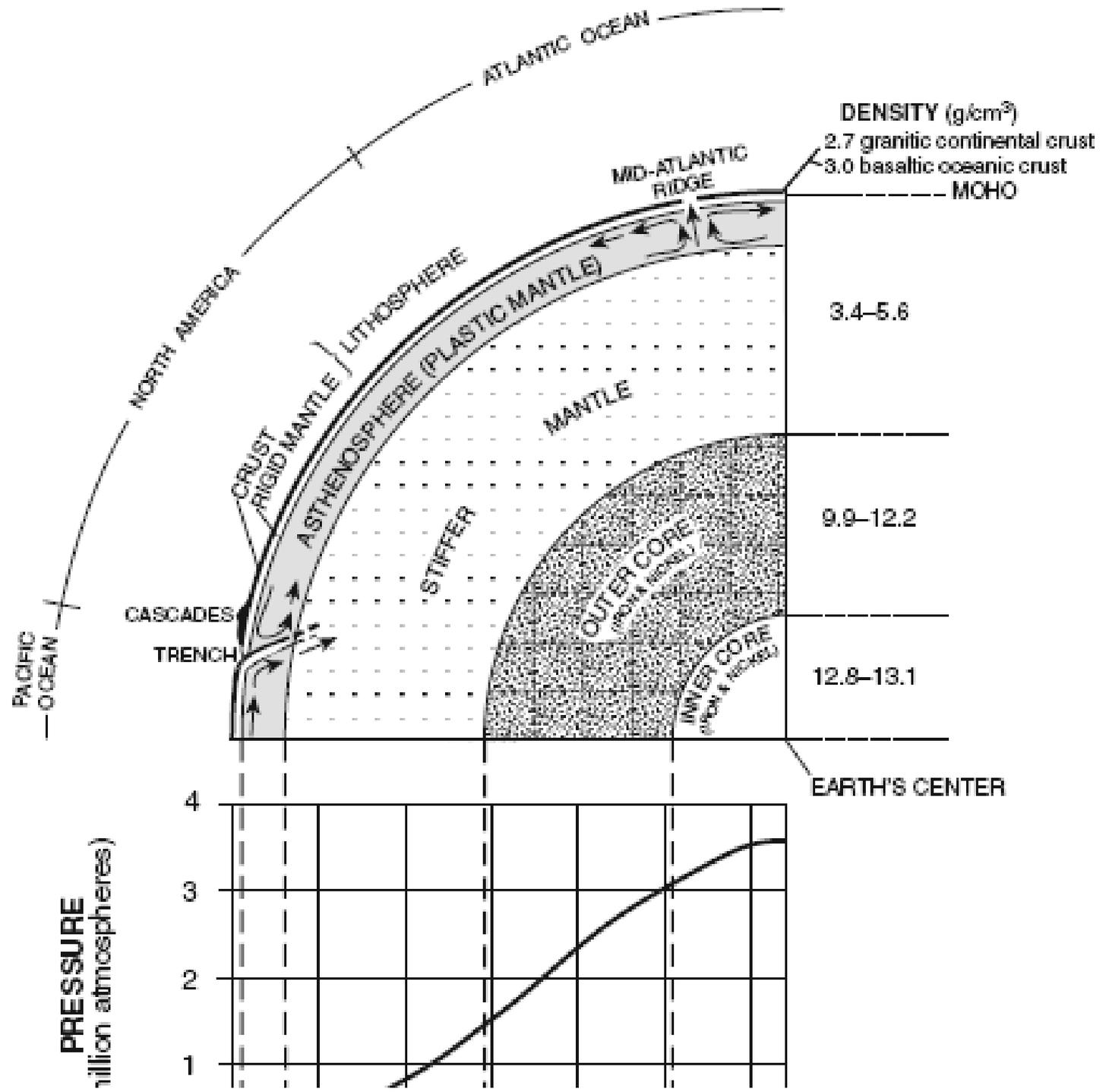
3) The heavier lava rocks sank toward the center of the earth



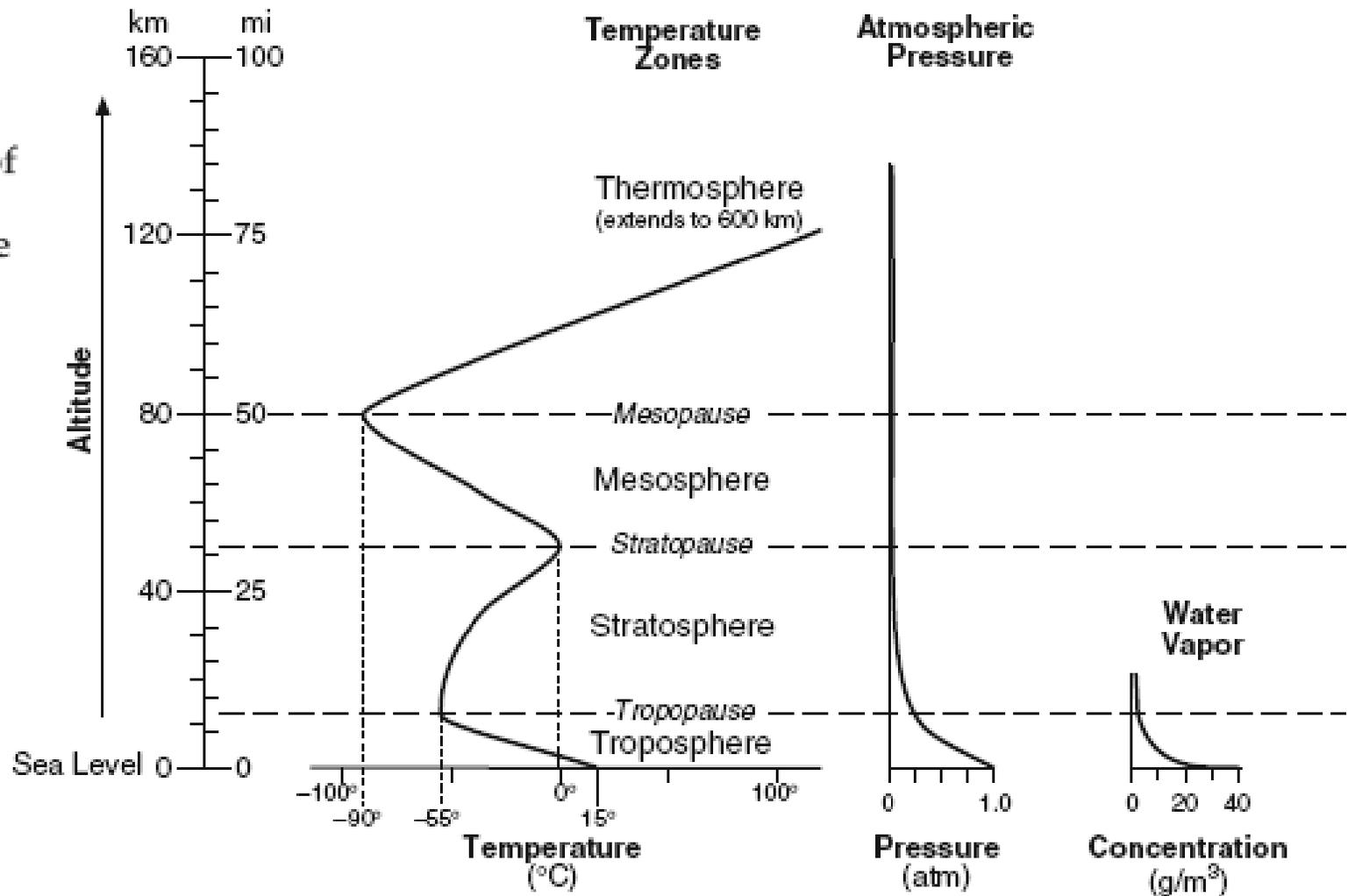
4) This caused the earth to have layers with the most dense layer in the center

Inferred Properties of Earth's Interior





Selected Properties of Earth's Atmosphere



The earth's shape



How do we know the earth is a sphere?

1) Pictures from space

2) Lunar eclipse-the earth's shadow on the moon is round



How do we know the earth is a sphere?

3) As a ship sails away from you, the bottom disappears before the top of the sail



How do we know the earth is a sphere?

- 3) As a ship sails away from you, the bottom disappears before the top of the sail
- 4) The altitude of Polaris (the North Star) increases as you move northward



© 2006 Jerry Lodriguss / AstroPix.com



Big Dipper

Little Dipper

Polaris

© 2003 Jerry Lodriguss

Start animation



How do we know the earth is a sphere?

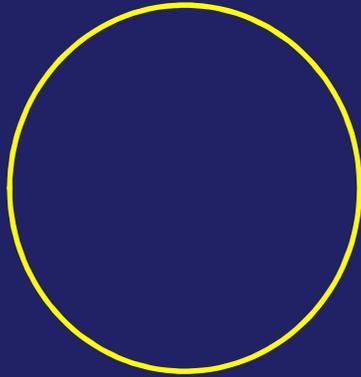
5) The earth is not actually a perfect sphere. It is very slightly wider at the equator. This shape is called an oblate spheroid.

6) Earth's circumference:

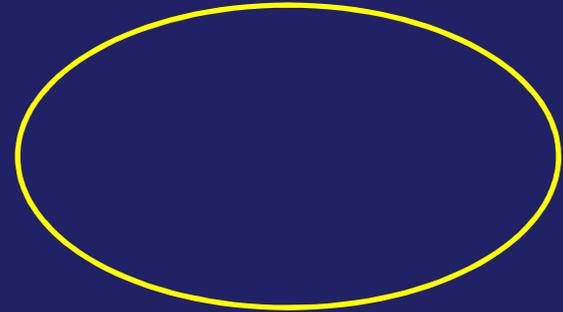
Equator:	40,076 miles
Poles:	40,008 miles

Which diagram most accurately shows the cross-sectional shape of the Earth drawn to scale?

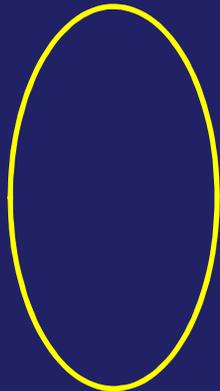
(1)



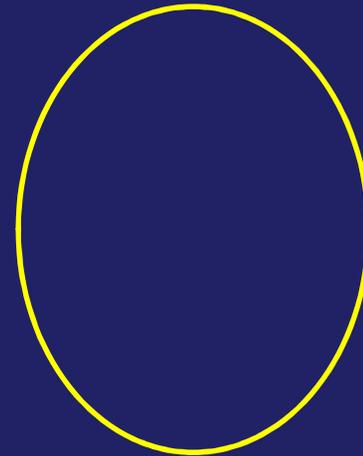
(2)



(3)



(4)



II. The outer parts of the earth



1) Lithosphere

-the Earth's crust

-thin shell of rock covering the whole earth



2) Hydrosphere

- layer of water which rests on the lithosphere
- covers 70% of the Earth's surface



Atmosphere -

-shell of gasses that surrounds the Earth

-layered into zones (troposphere, stratosphere, mesosphere, thermosphere)



Biosphere -

- zone of earth where life is found
- consists of parts of the other three layers
- also known as ecosphere



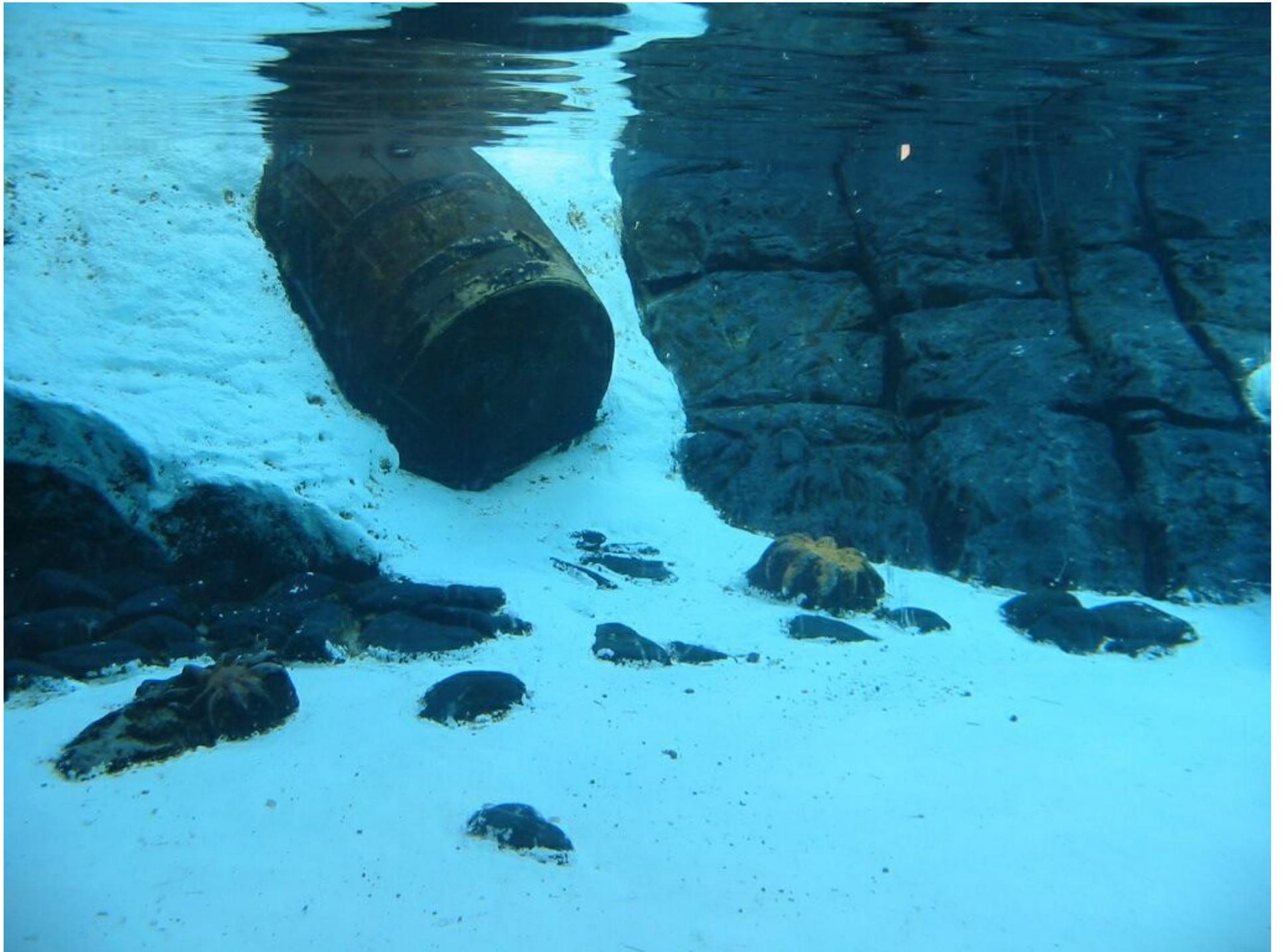
Can you guess which layer(s) it is?







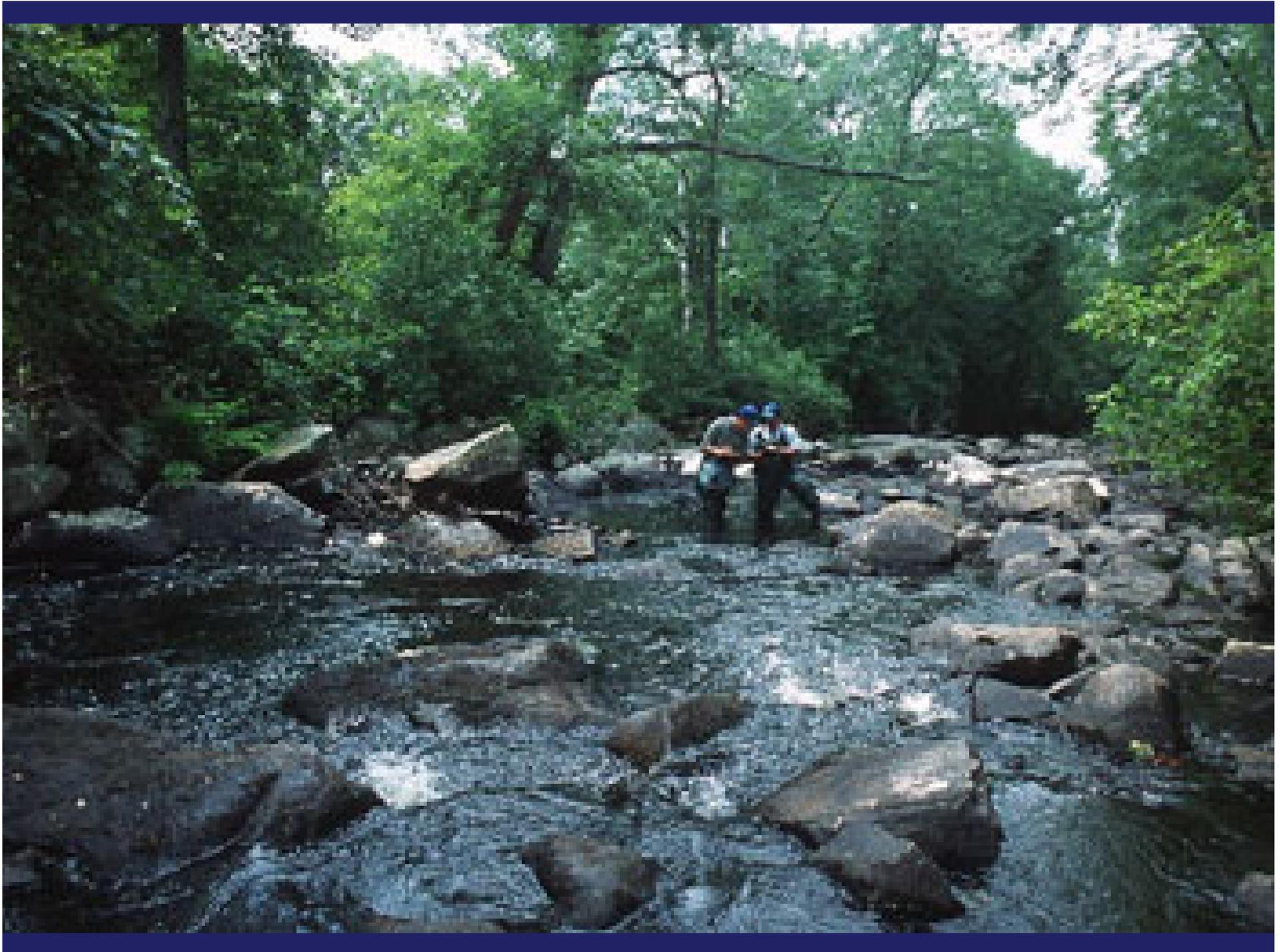


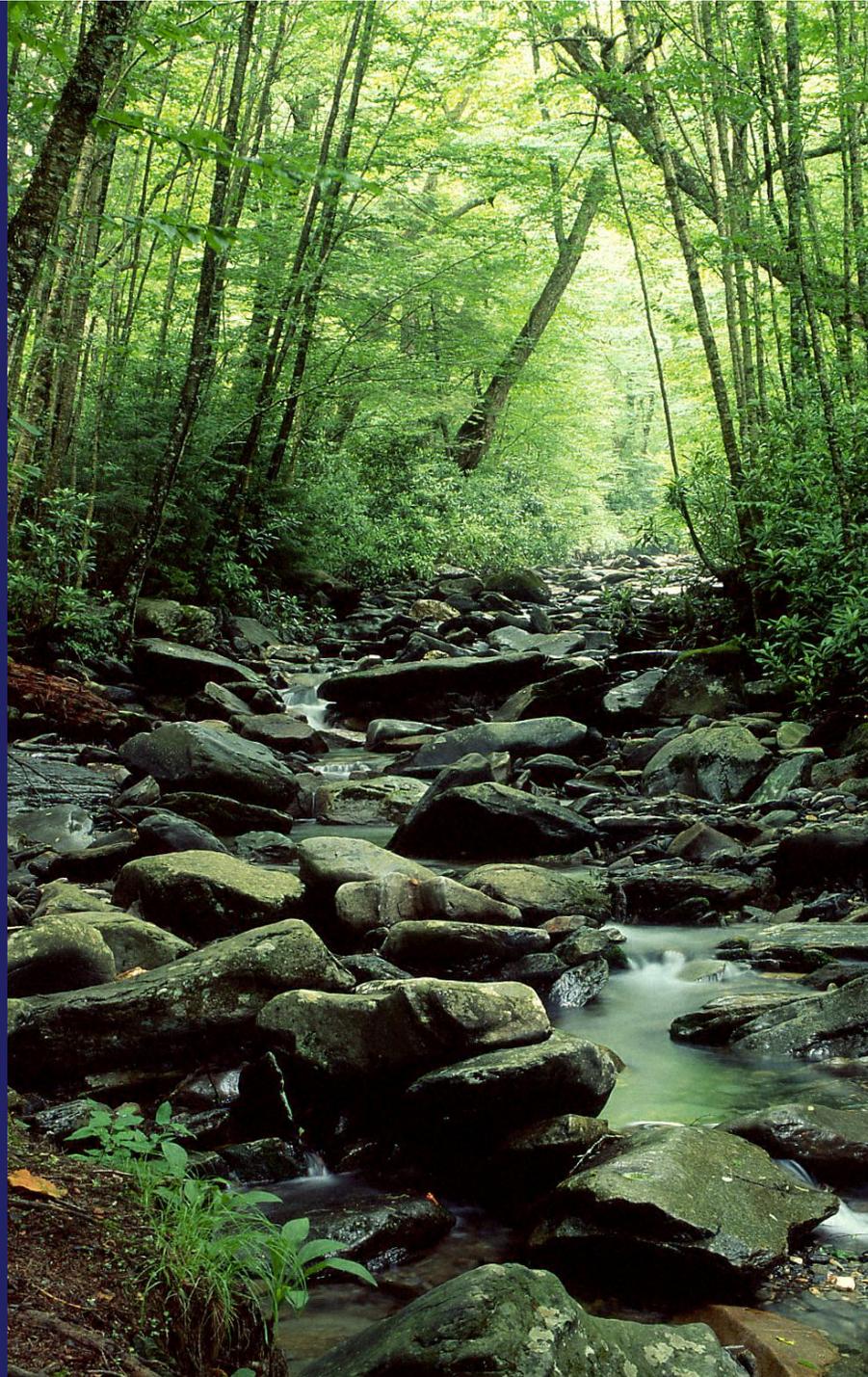












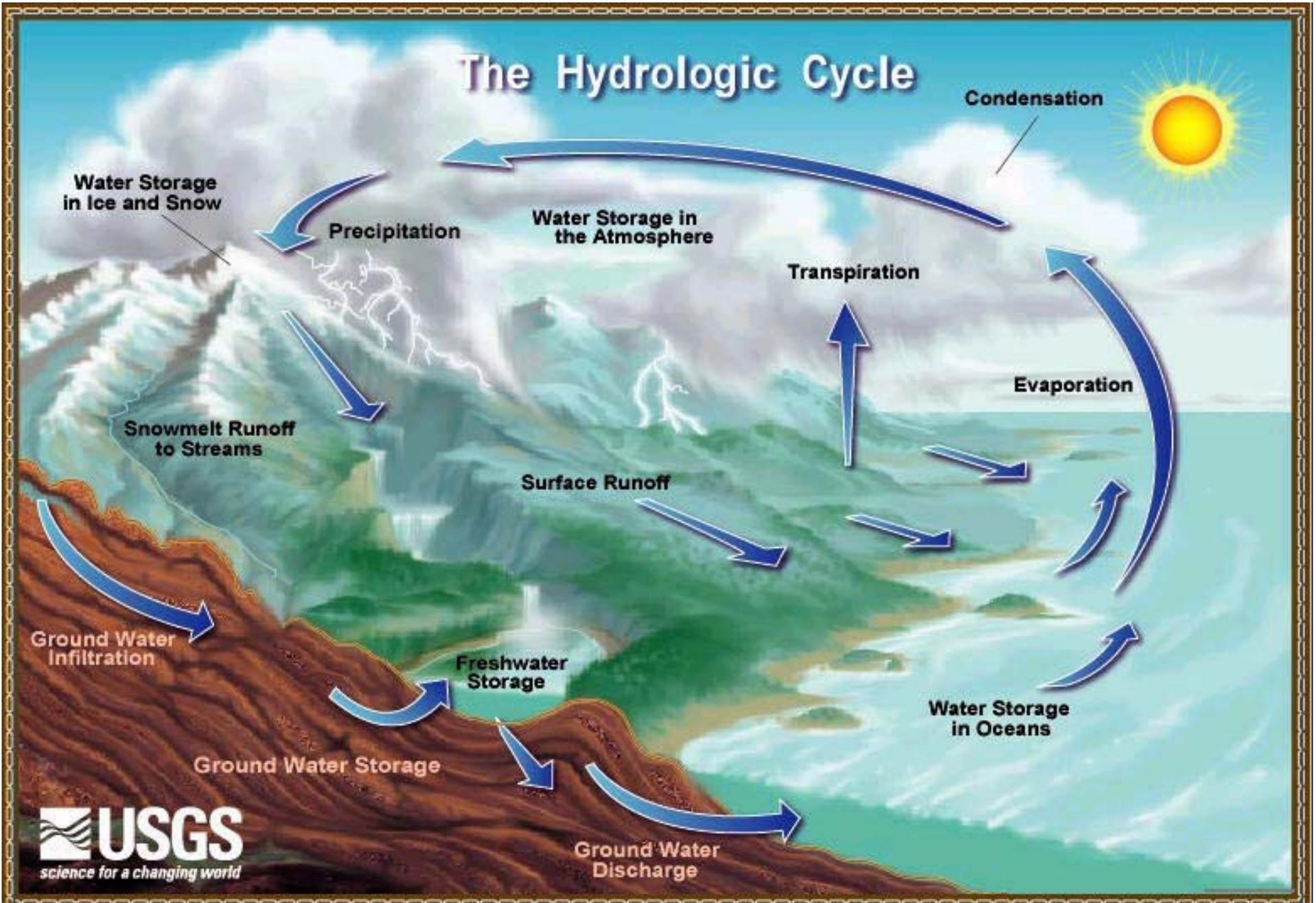


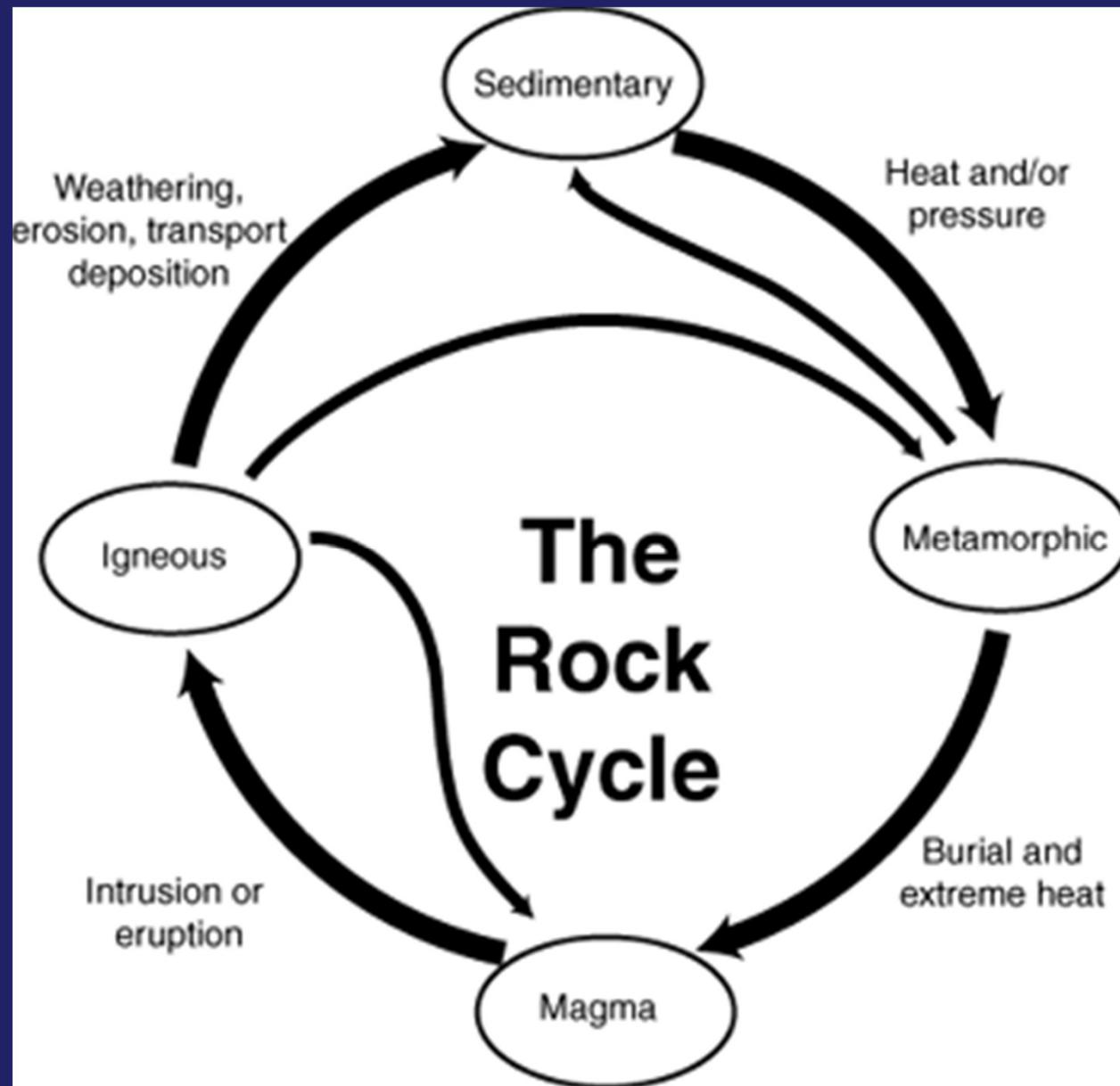
Where isn't the biosphere?

Cycles of the earth:

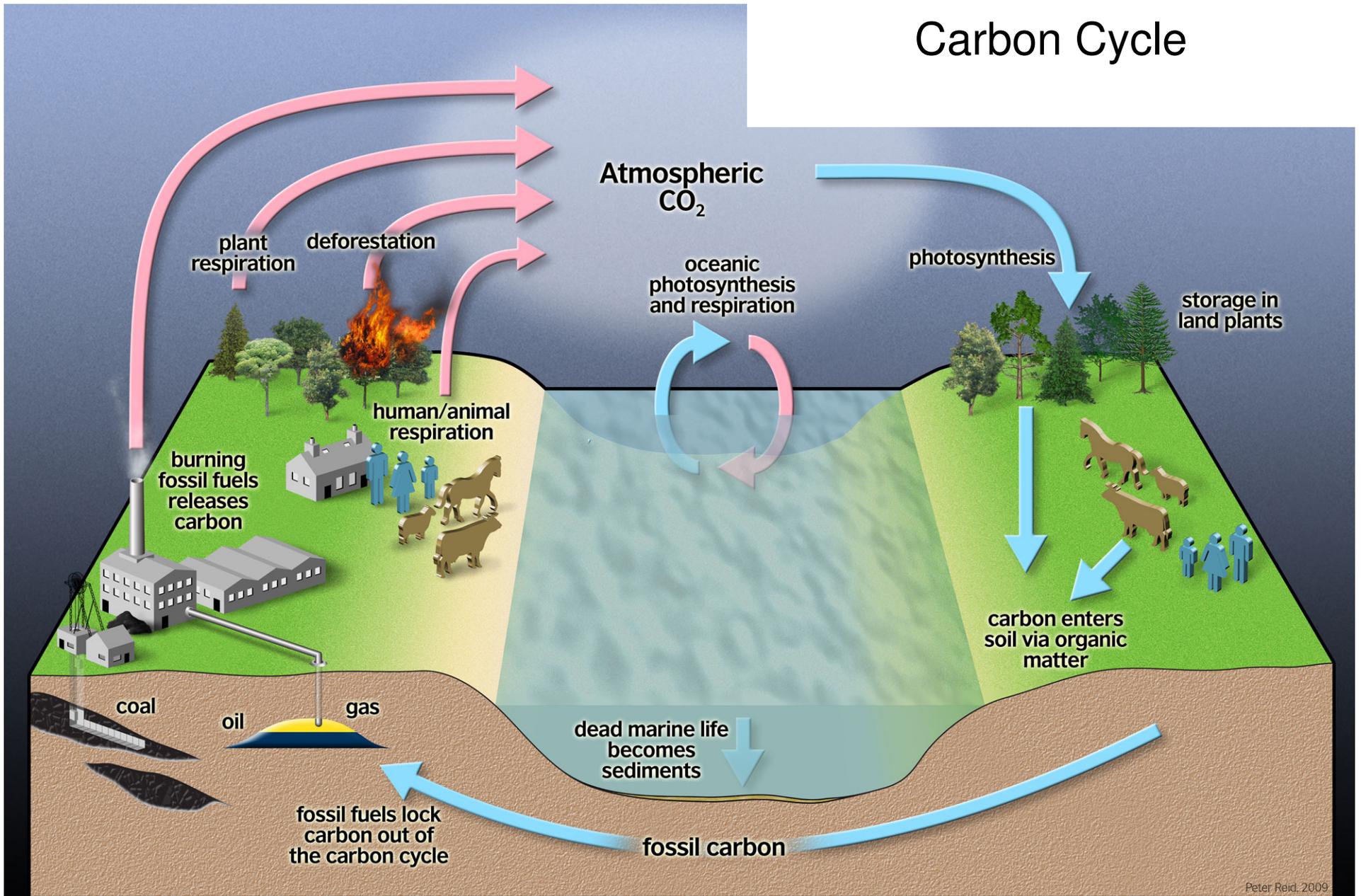
- 1) Water cycle
- 2) Rock cycle
- 3) Carbon cycle

The Hydrologic Cycle



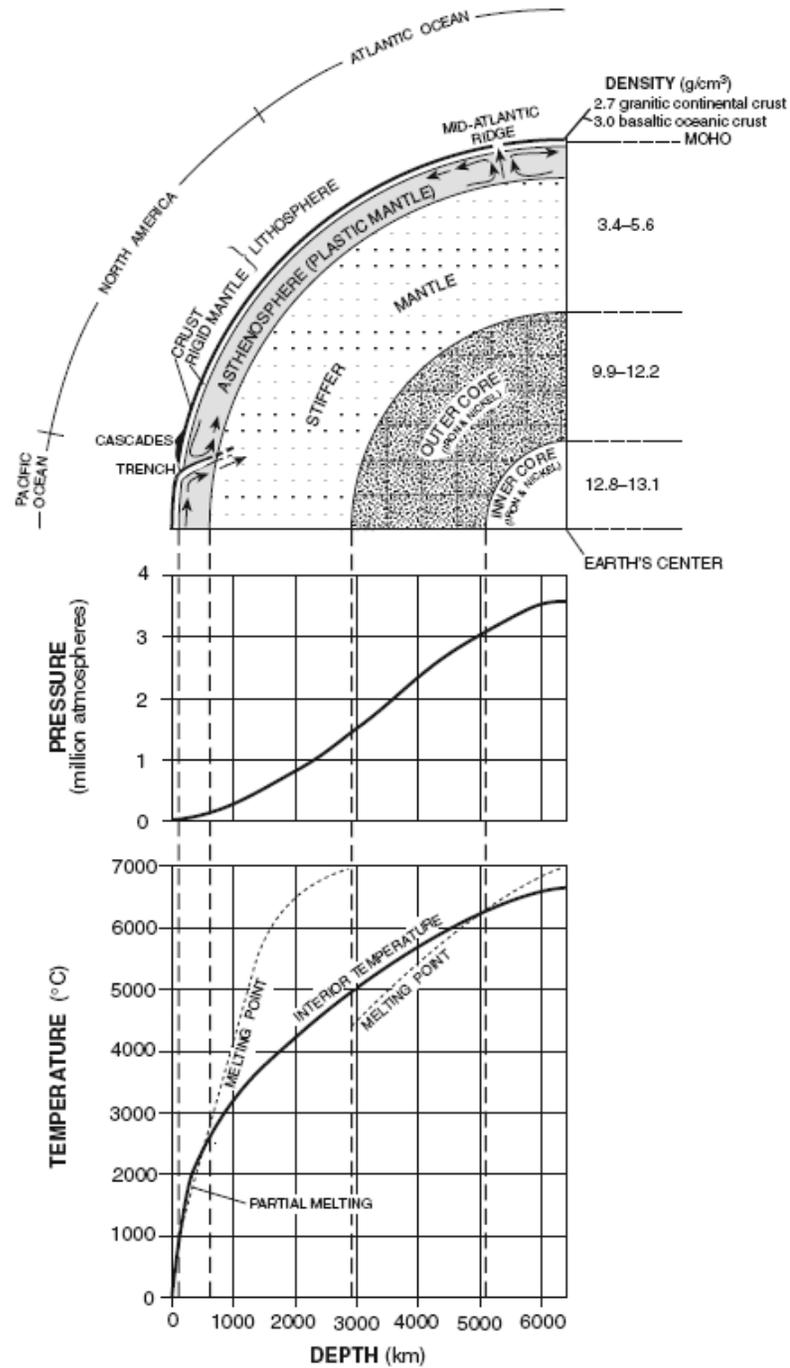


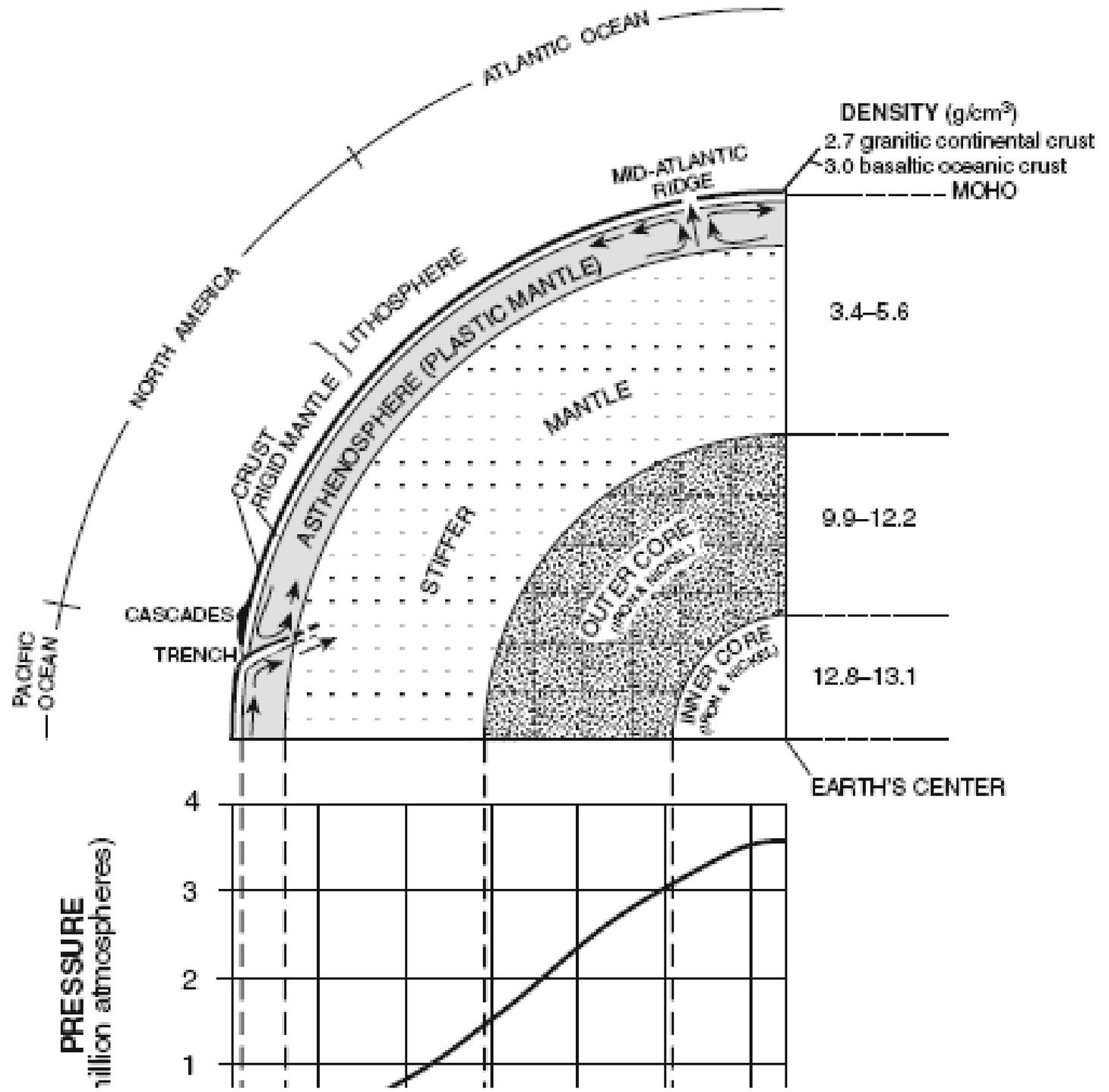
Carbon Cycle



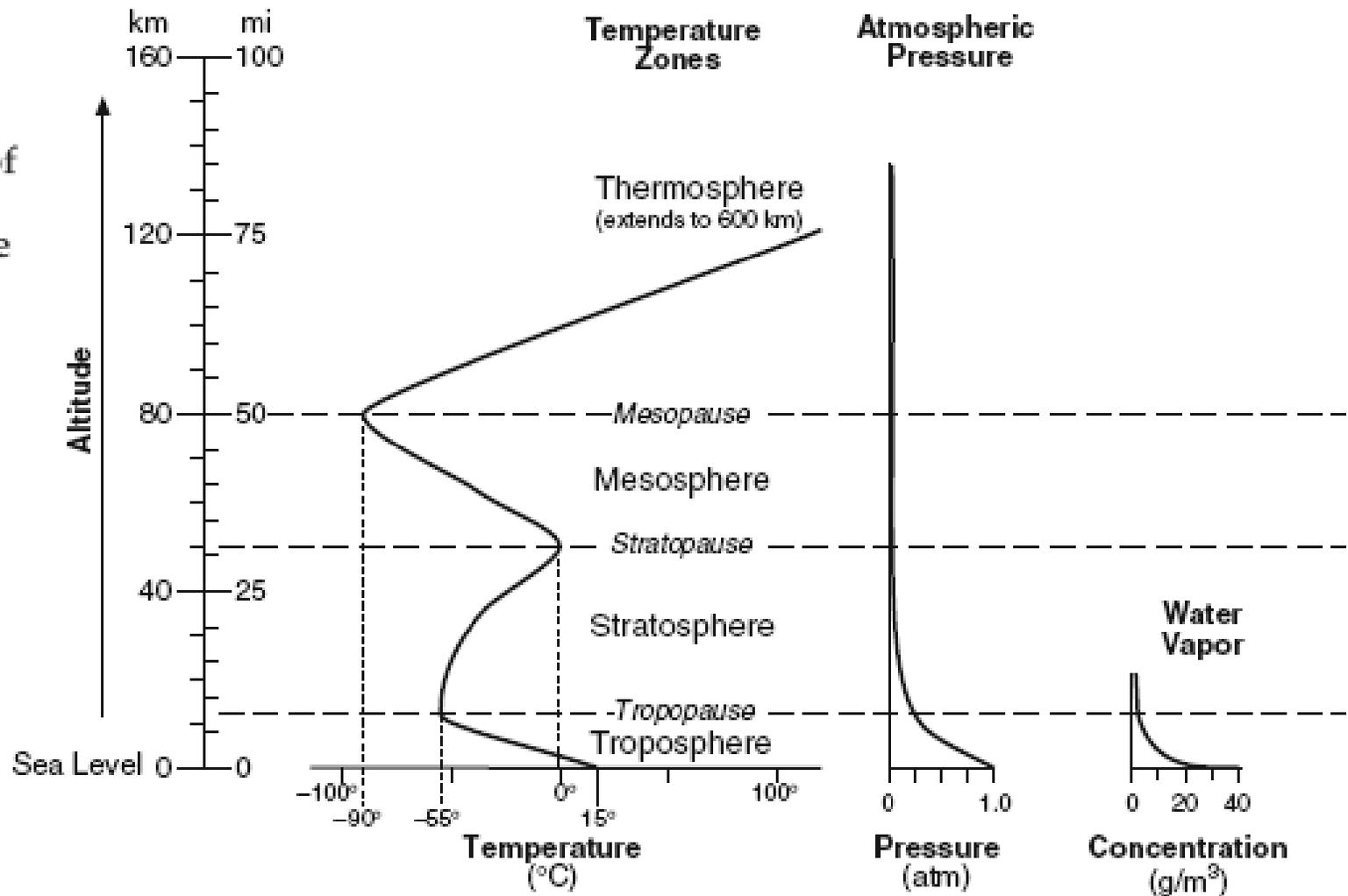


Inferred Properties of Earth's Interior





Selected Properties of Earth's Atmosphere



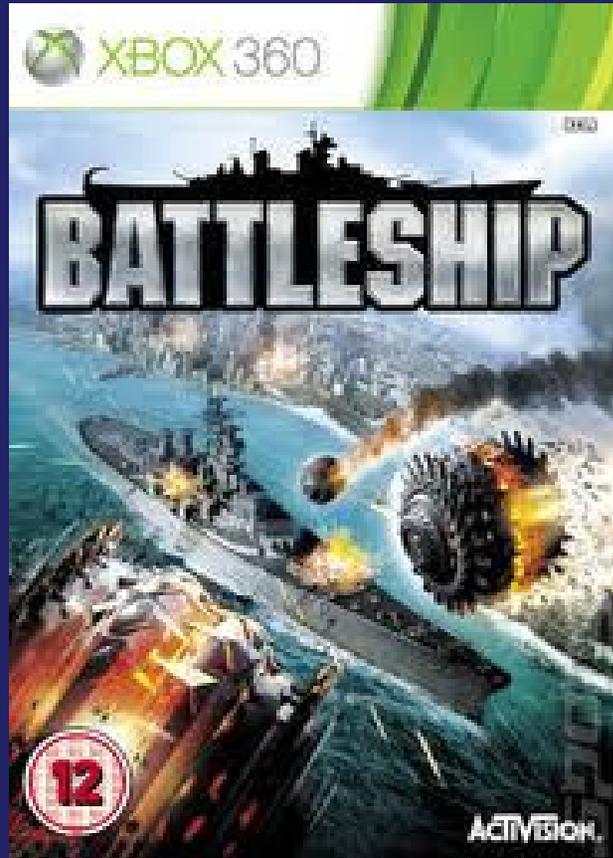
III. Longitude and Latitude

XBOX 360

BATTLESHIP

12

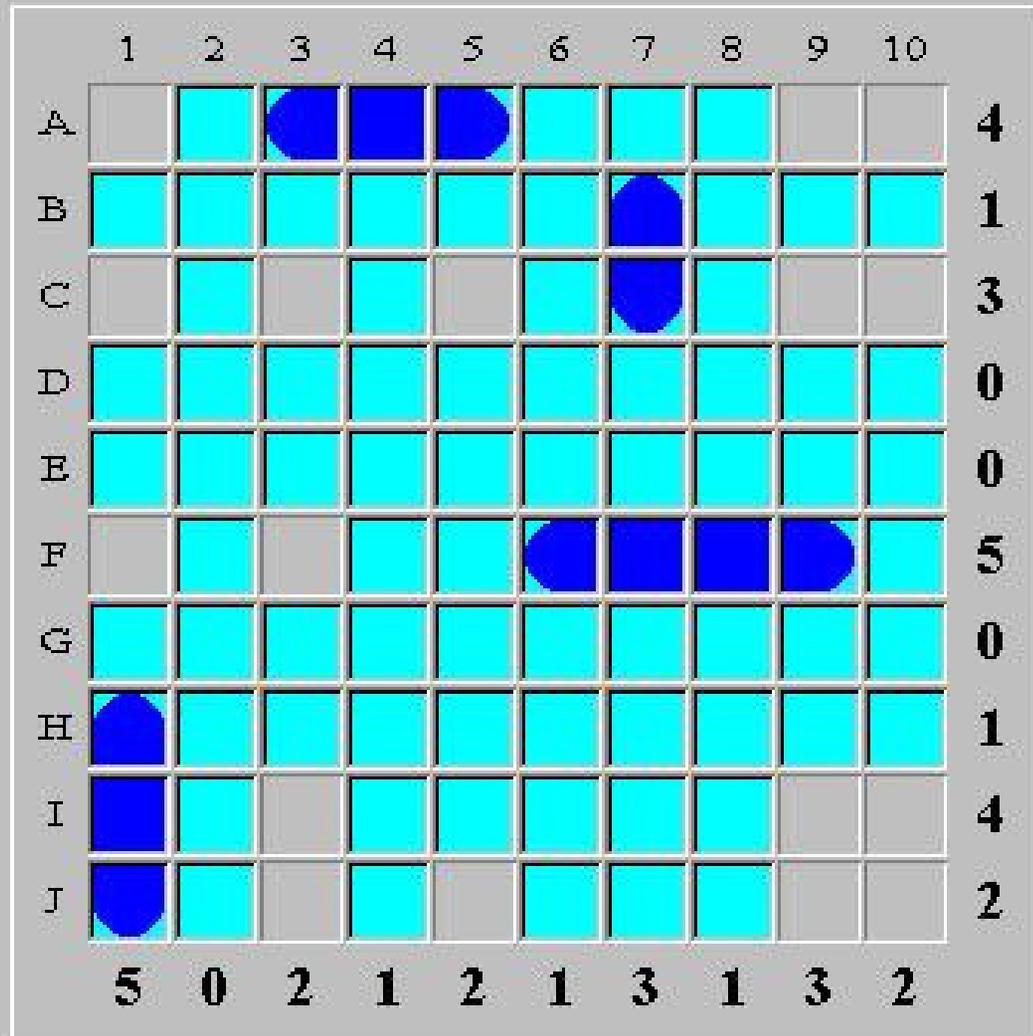
ACTIVISION



Fathom It! (Easy) Board #5



Game Options Board Guess Help

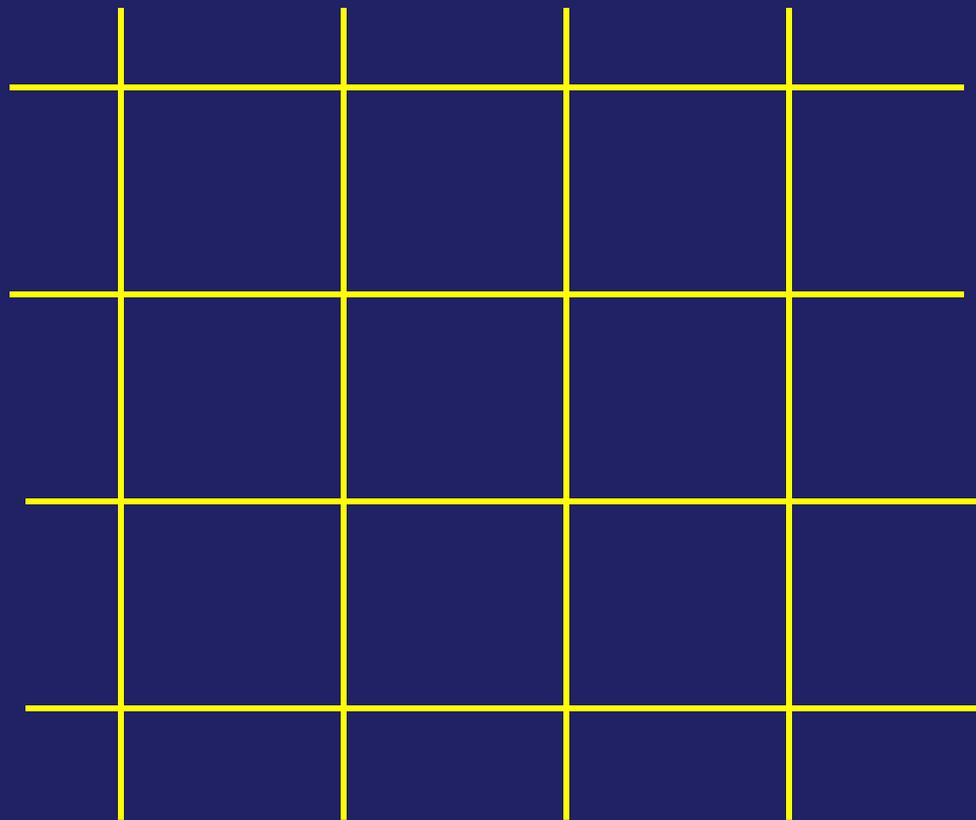


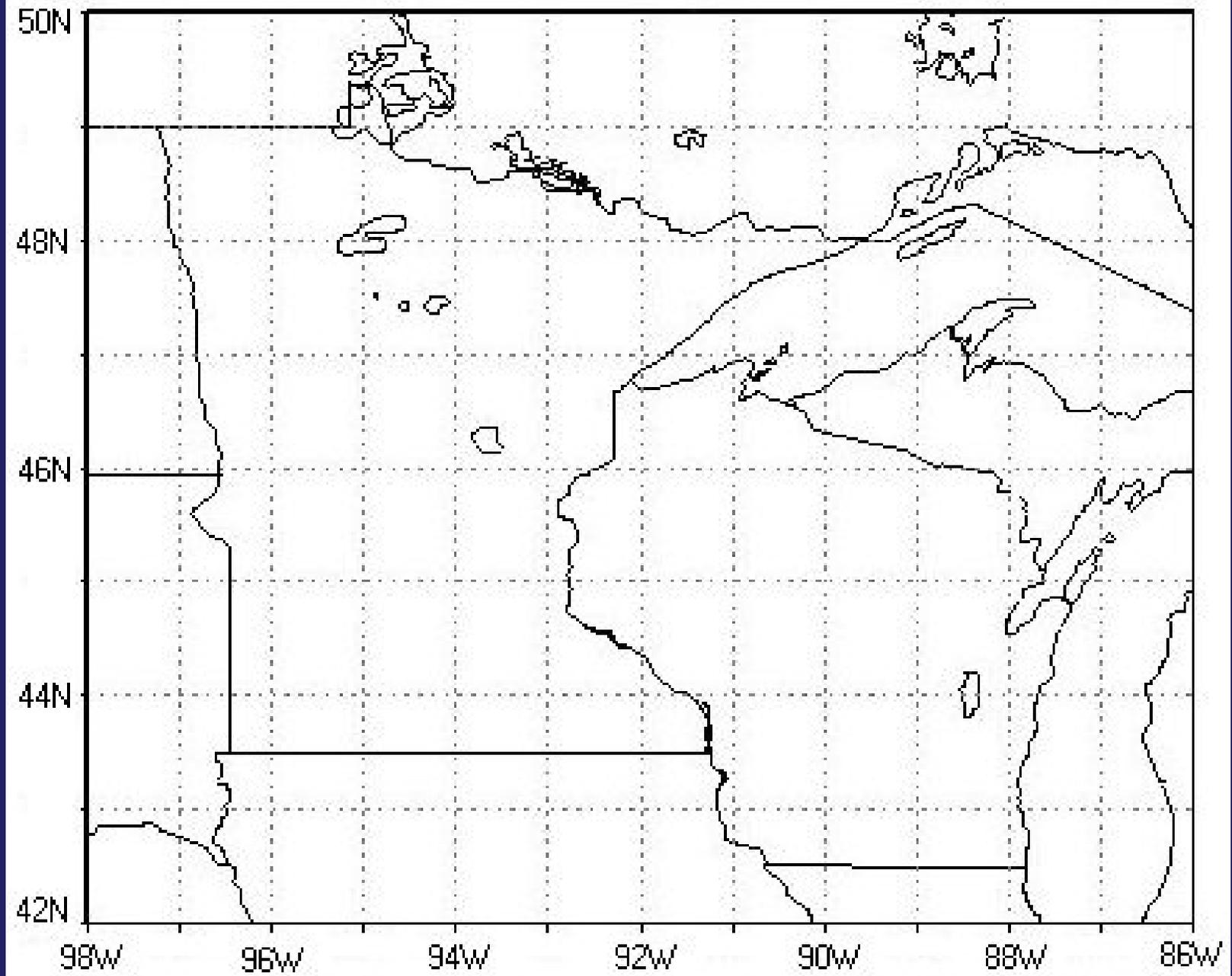
Battleship 
Cruiser 
Destroyer 
Submarine 

 Undo Guesses
 Finalize Guesses
 Start Solver

153

11 18





- 1) Every spot on Earth has its own coordinates.

- 2) Main reference lines:
 - latitude = equator (0° lat)
 - longitude = prime meridian (0° long)

Latitude

North

(+)

90 90

60 60

30 30

Equator

0

30 30

60 60

90 90

South

(-)

Longitude

180

150

150

120

120

90

90

West
(-)

60

60

30

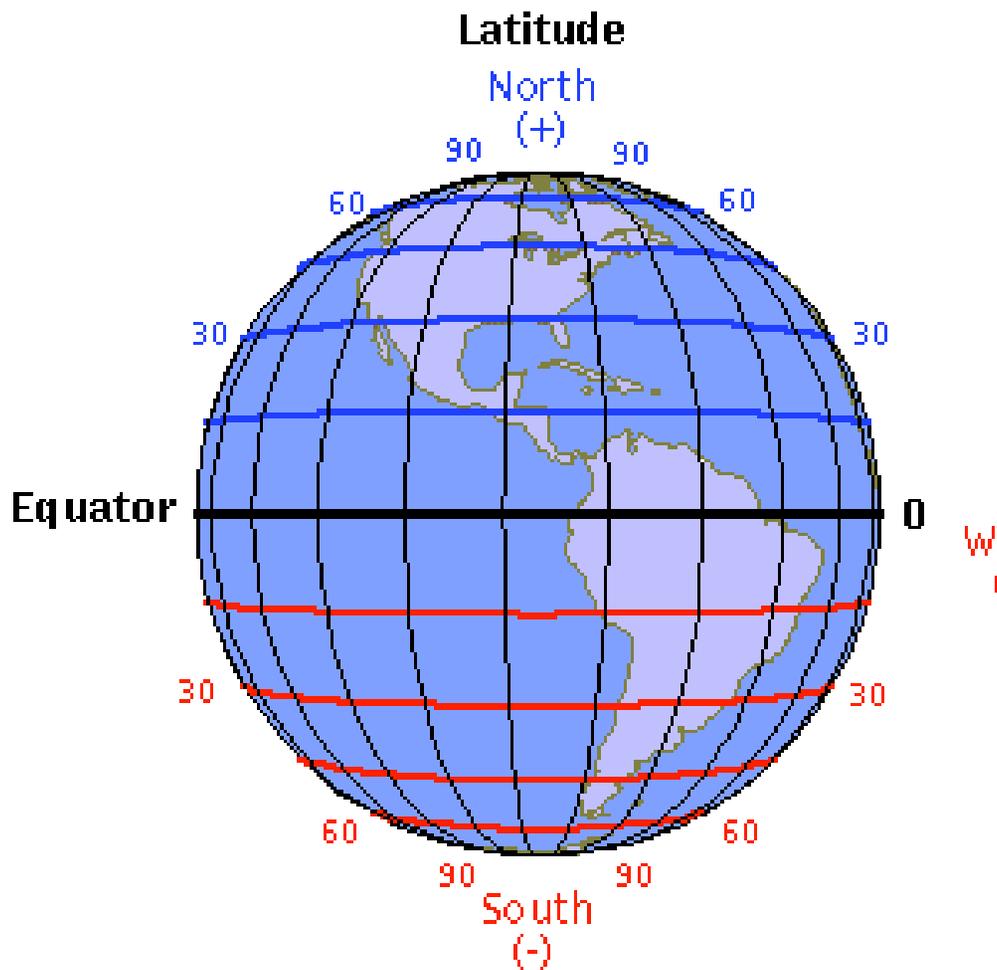
30

0

Prime
meridian

East
(+)

Microsoft Illustration



Microsoft Illustration

3) latitude lines:

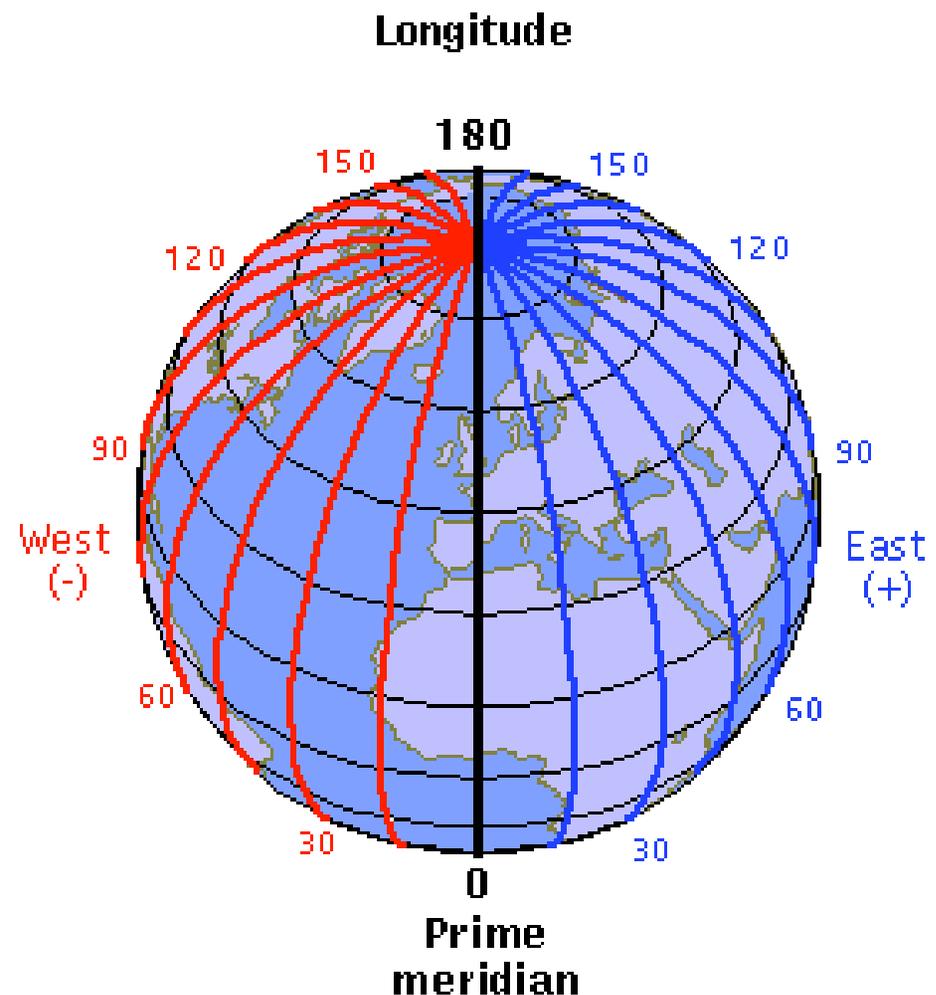
- measure north or south (like a ladder)
- maximum of 90° (at poles)
- lines are parallel
- ****same altitude as the north star****

Start animation



4. longitude lines:

- measure east or west
- have a maximum of 180° (at international date line)
- lines connect at the poles
- based on the movement of the Sun

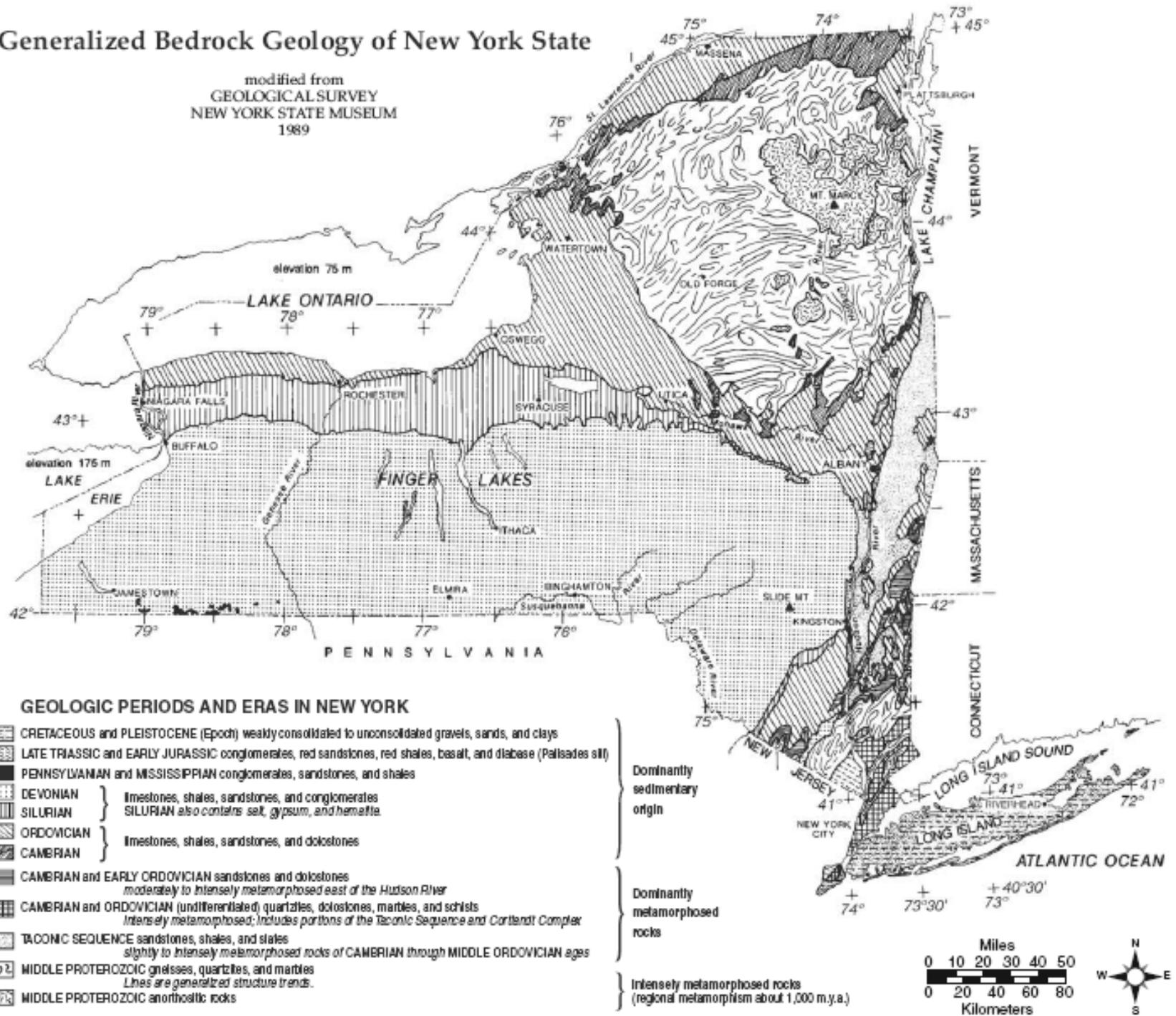


Find Your Longitude

- <http://www.pbs.org/wgbh/nova/longitude/find.html>

Generalized Bedrock Geology of New York State

modified from
GEOLOGICAL SURVEY
NEW YORK STATE MUSEUM
1989



5) Each degree is divided into 60 minutes.

IV. Time Zones

Question: How many degrees does the Sun appear to move per hour?

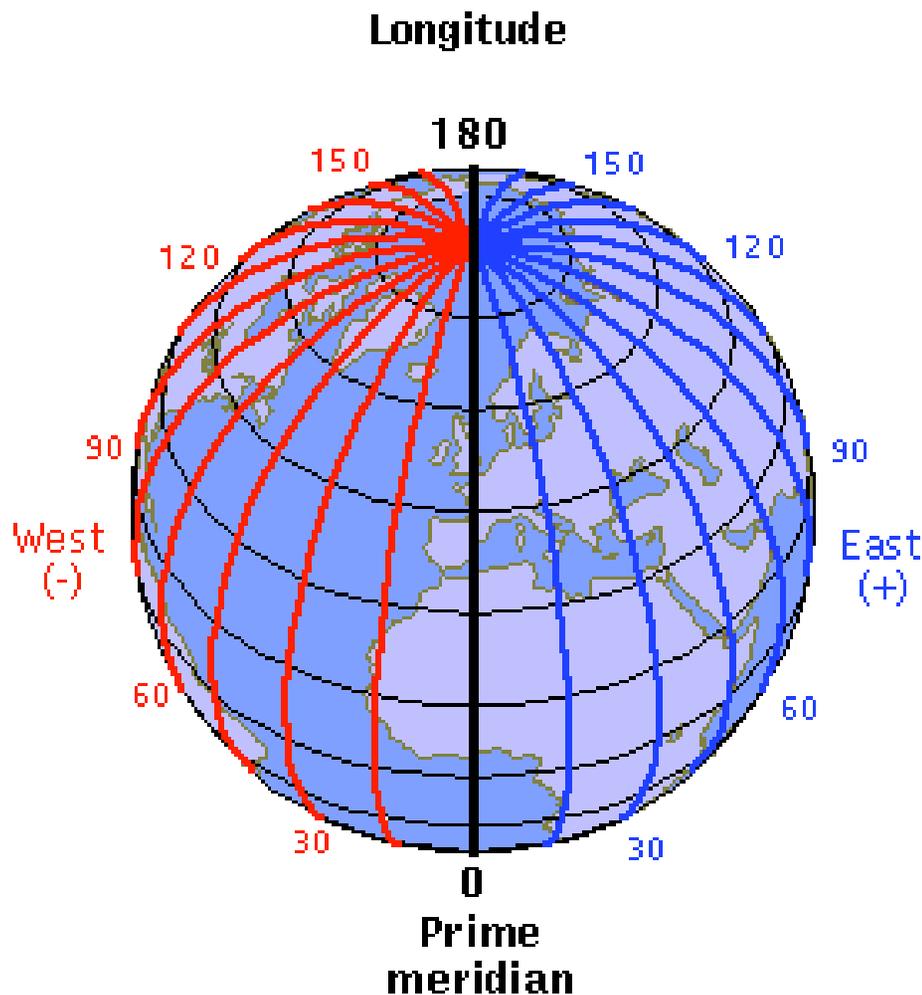


Earth sphere = 360°
Hours in a day = 24

$$360/24 = ?$$

15° per hour

12 Noon on the Prime Meridian (Greenwich)



-If the location time is earlier than Greenwich, the longitude is west

-if the location time is later than Greenwich, the longitude is east.

-If the location time is earlier than Greenwich, the longitude is west

-if the location time is later than Greenwich, the longitude is east.

Do Now:

It is 5 hours earlier in Harrison, N.Y. than it is in Greenwich (0° longitude).
What is Harrison's longitude?

5 hours x 15° per hour =
75° West Longitude

-If the location time is earlier than Greenwich, the longitude is west

-if the location time is later than Greenwich, the longitude is east.

Do Now:

Los Angeles is 8 hours earlier than Greenwich (0° longitude).
What is LA's longitude?

8 hours x 15° per hour =
120° West Longitude

-If the location time is earlier than Greenwich, the longitude is west

-if the location time is later than Greenwich, the longitude is east.

Do Now:

It is 9 hours later in Tokyo than it is in Greenwich (0° longitude). What is Tokyo's longitude?

9 hours x 15° per hour =
135° East Longitude

-If the location time is earlier than Greenwich, the longitude is west

-if the location time is later than Greenwich, the longitude is east.

Do Now:

The altitude of Polaris is $41^{\circ} 32'$ in Harrison. What is Harrison's latitude?

$41^{\circ} 32' \text{ N}$

Unit 1a Review

Know for test:

- formation of earth and atmosphere
- shape of the earth (how do we know?)
- Polaris
- spheres (lithosphere, hydrosphere, etc.)
- longitude & latitude
- time zones
- reference tables pages 1, 3, 10, 14

Review Questions:

Page 25

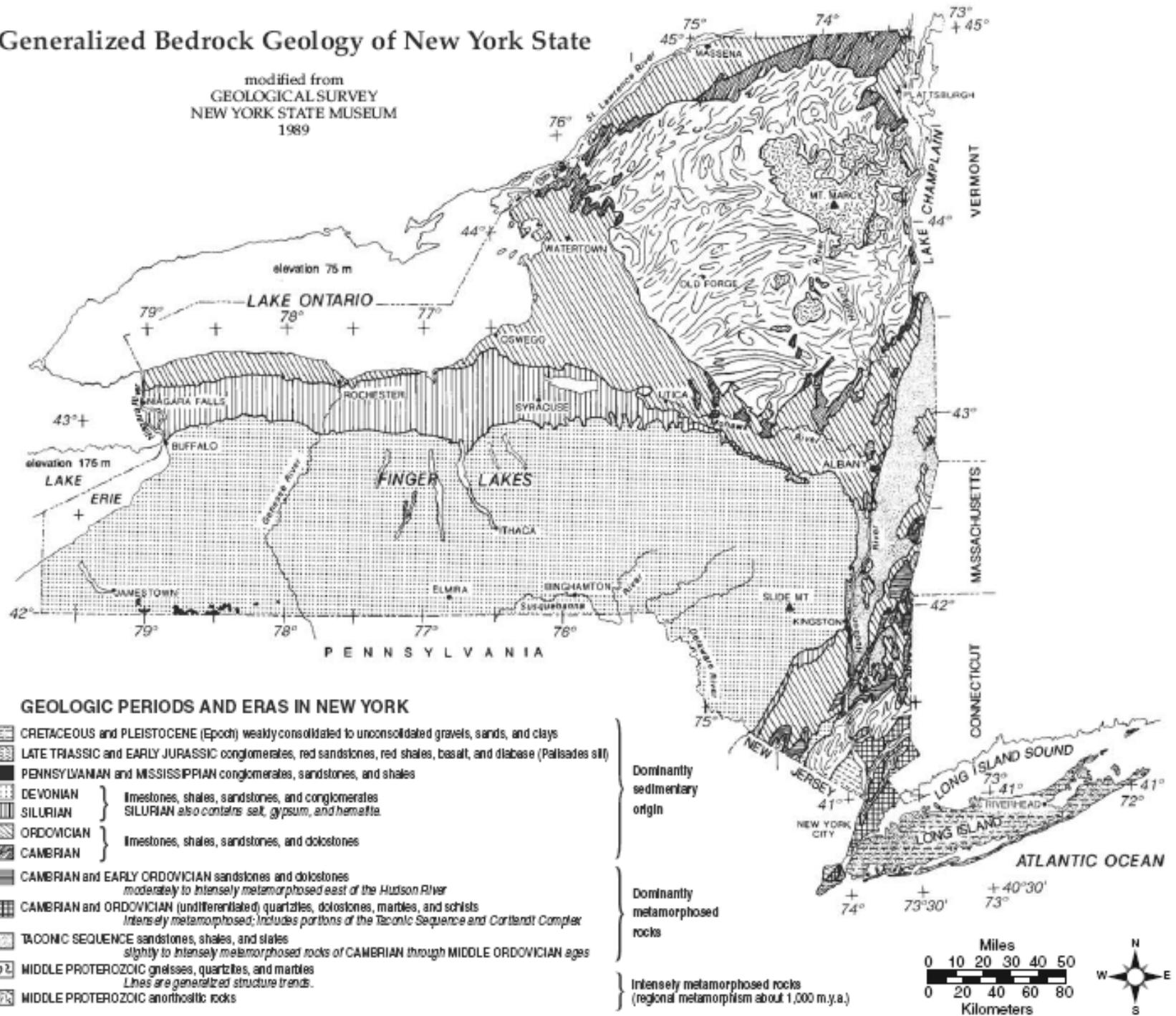
#1, 6-9, 11-18

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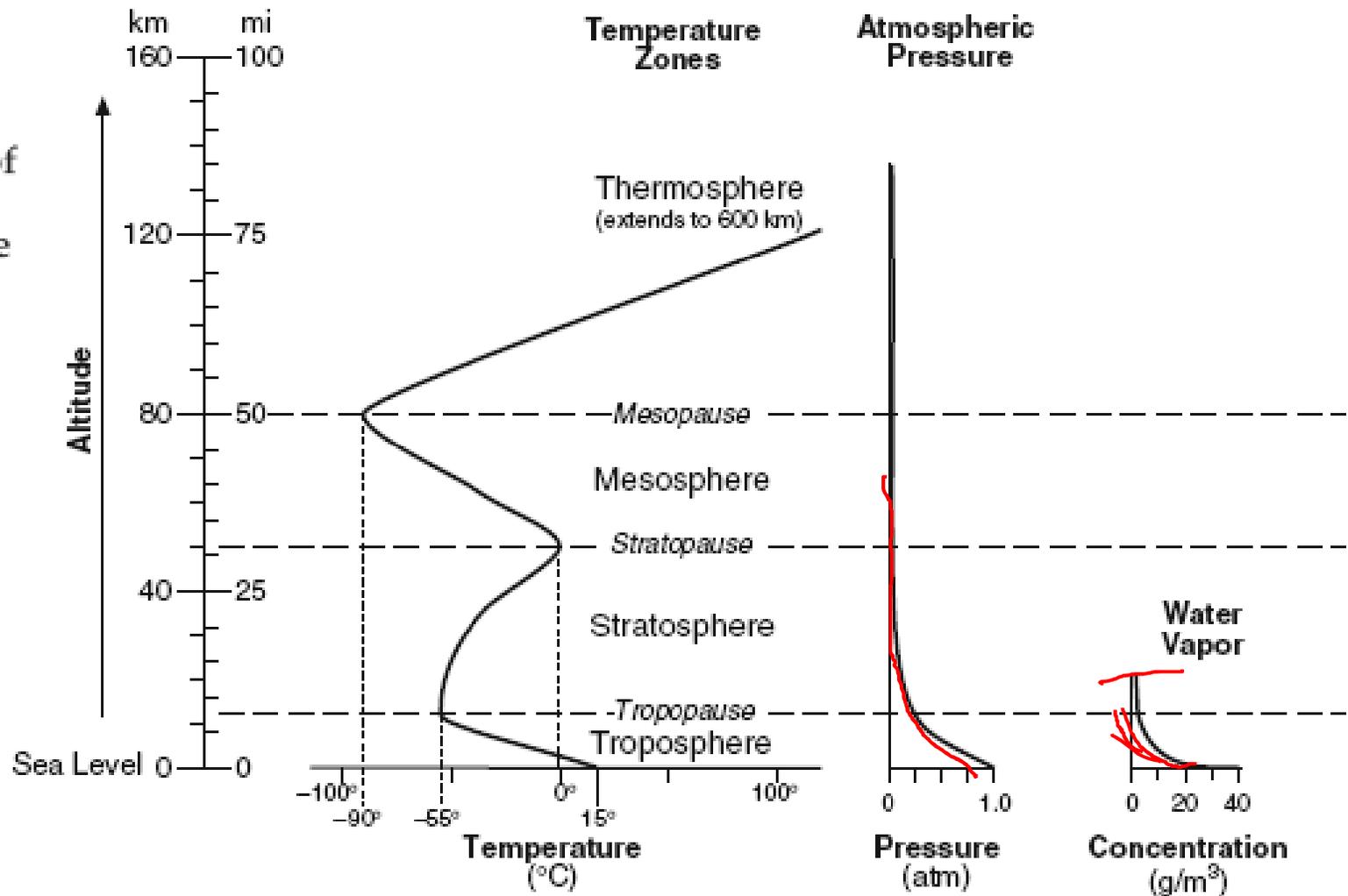
#6-9

Generalized Bedrock Geology of New York State

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GEOLOGICAL SURVEY
NEW YORK STATE MUSEUM
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Selected Properties of Earth's Atmosphere



Inferred Properties of Earth's Interior

