



NASA

with your host:



Lecture 6: Our Home

Coop


$$m = 6e24 \text{ kg}$$

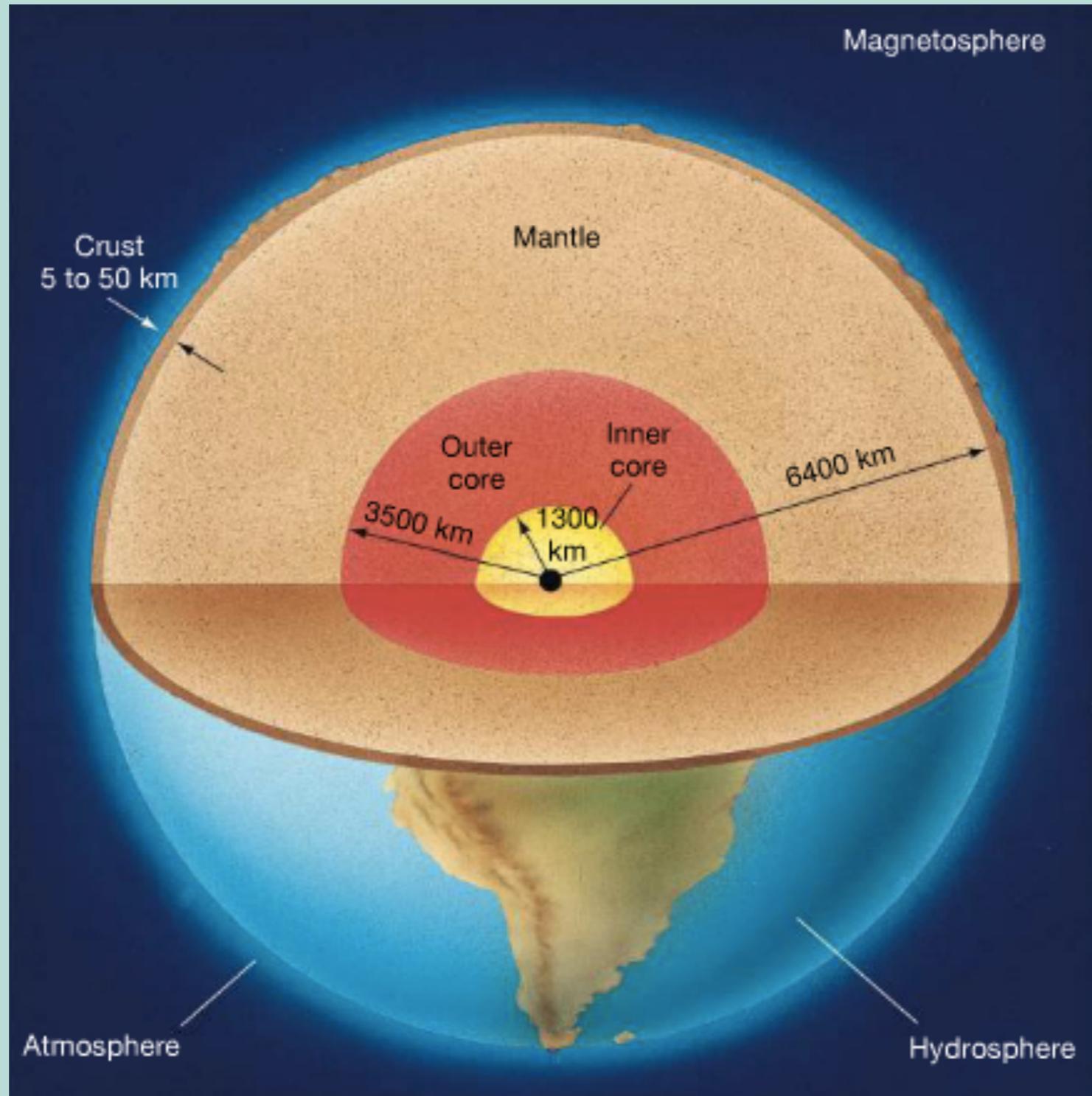
$$\begin{aligned} r &= 6.4e3 \text{ km} \\ &= 0.02 \text{ s} \end{aligned}$$

$$\begin{aligned} d_{\text{sun}} \\ = \end{aligned}$$

$$\begin{aligned} 1.5e8 \text{ km} \\ = \\ 8.3 \text{ minutes} \end{aligned}$$

1 moon.

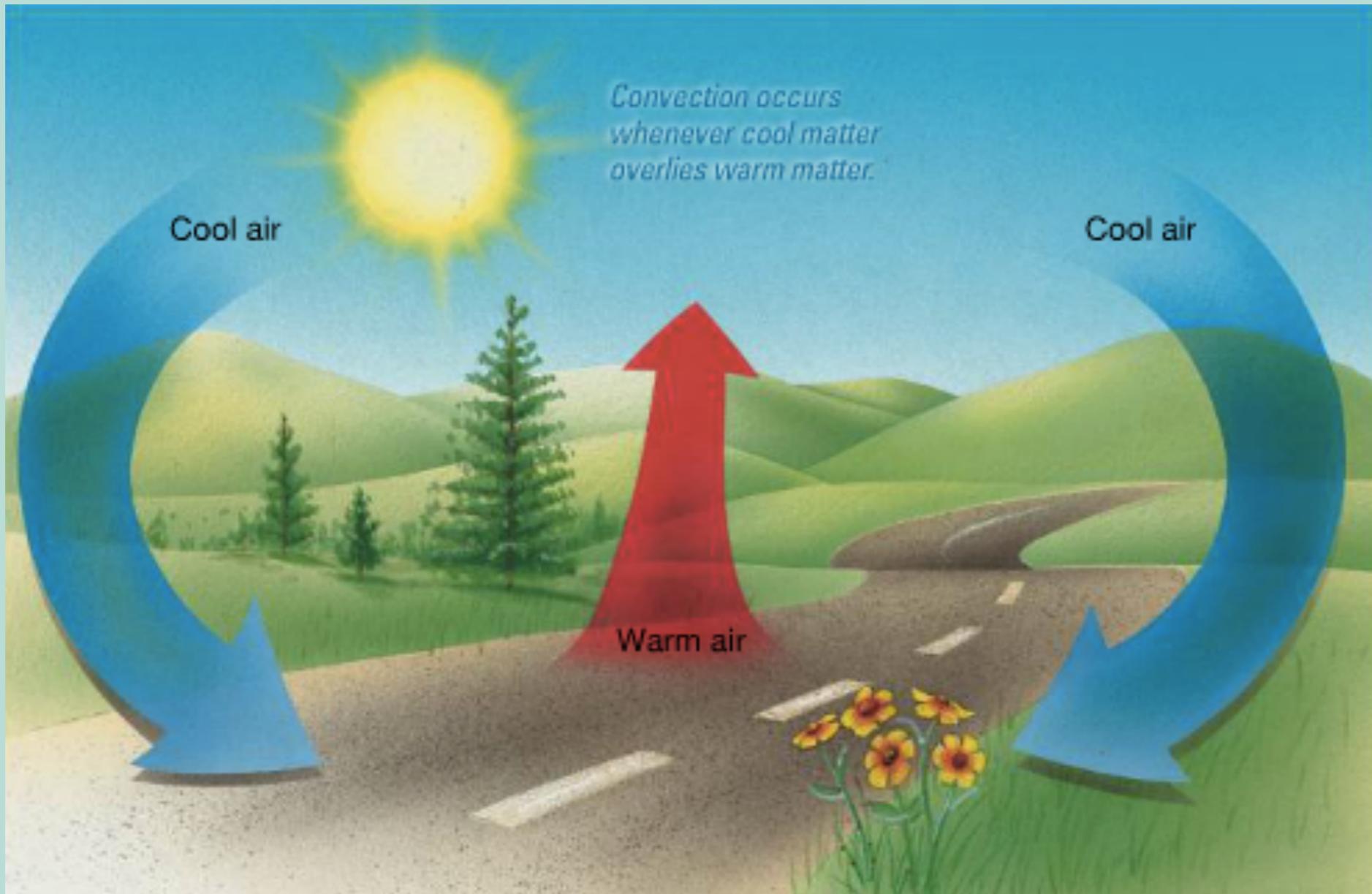
Chomp.



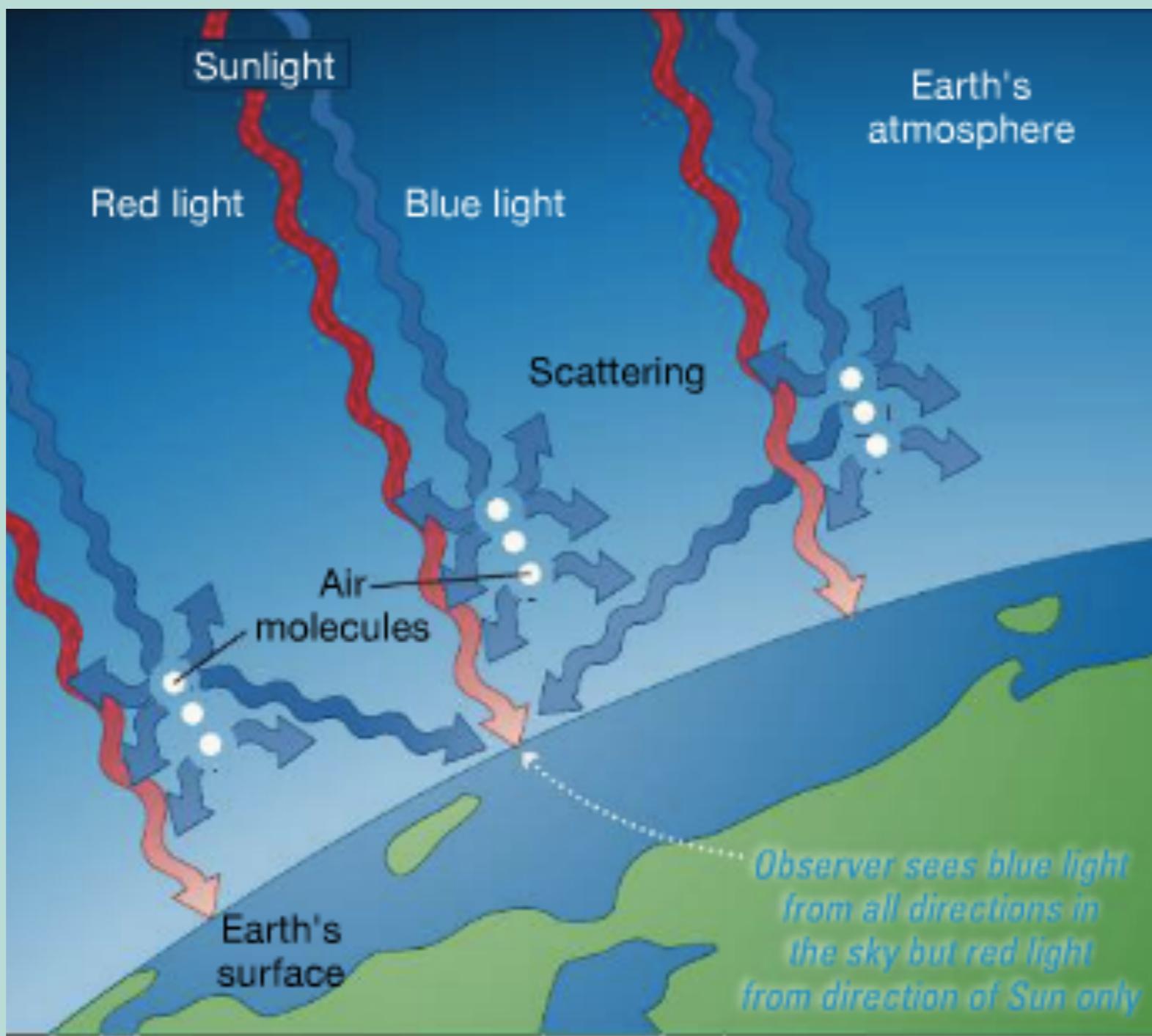
Atmosphere

Earth's Atmosphere	Percentage	GHG?
Nitrogen	78.08%	No
Oxygen	20.95%	No
Water	0 to 4%	Yes
Argon	0.93%	No
Carbon Dioxide	0.039%	Yes
Neon	0.0018%	No
Helium	0.0005%	No
Methane	0.00017%	Yes
Hydrogen	0.00005%	No
Nitrous Oxide	0.00003%	Yes
Ozone	0.000004%	Yes

Convection

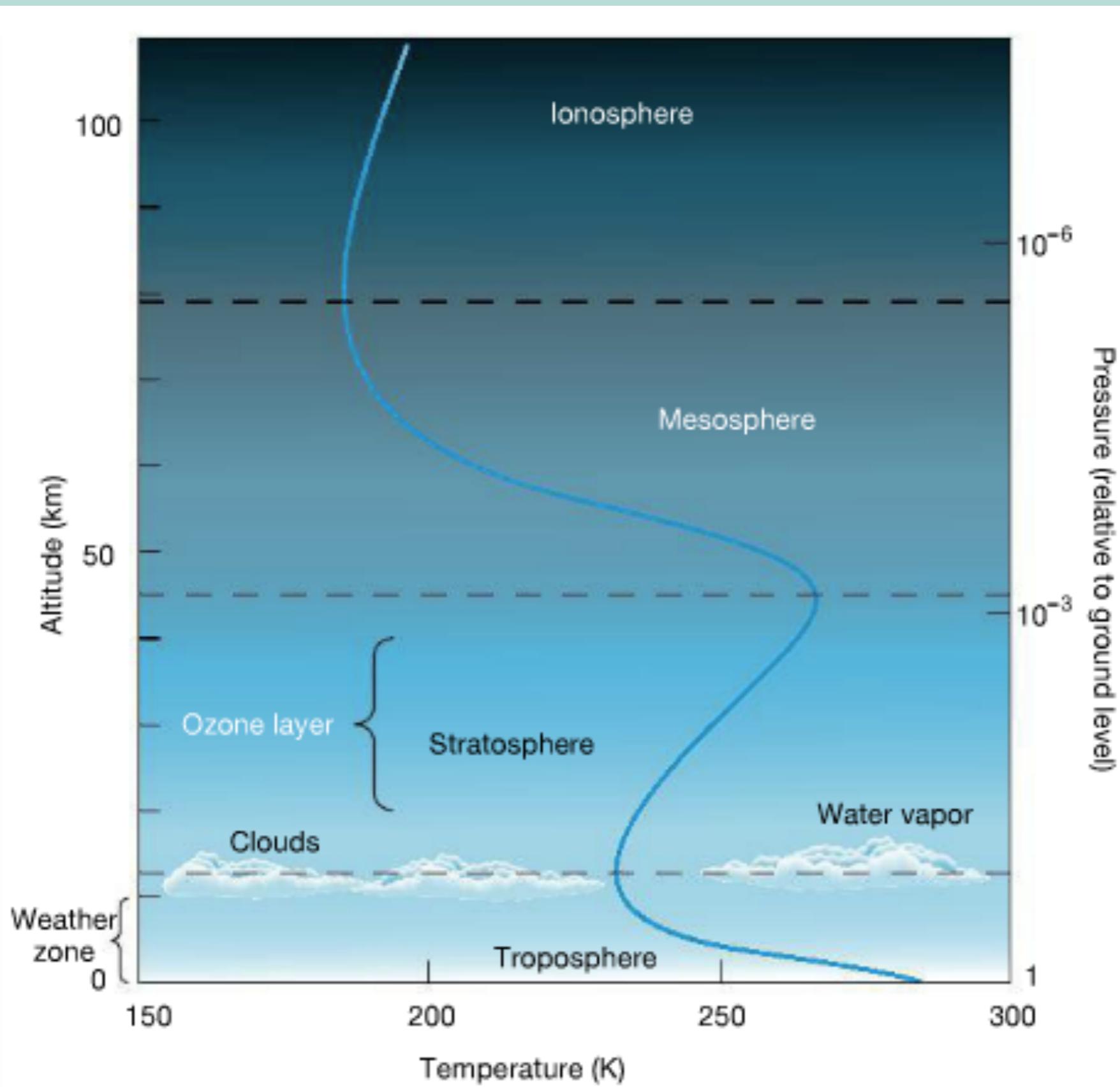


Why is the Sky Blue?

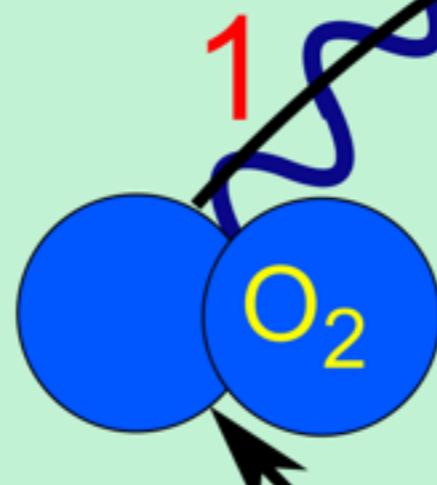




Atmosphere

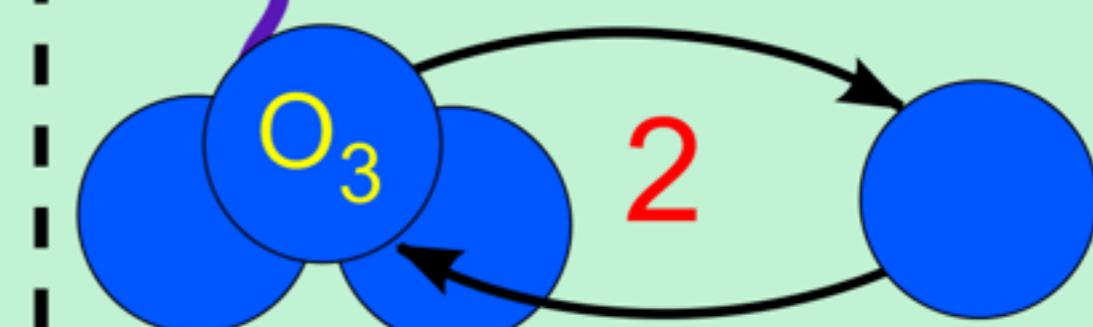


1. Oxygen molecules are photolyzed, yielding 2 oxygen atoms (SLOW)



SUN

2. Ozone and oxygen atoms are continuously being interconverted as solar UV breaks ozone and the oxygen atom reacts with another oxygen molecule (FAST)

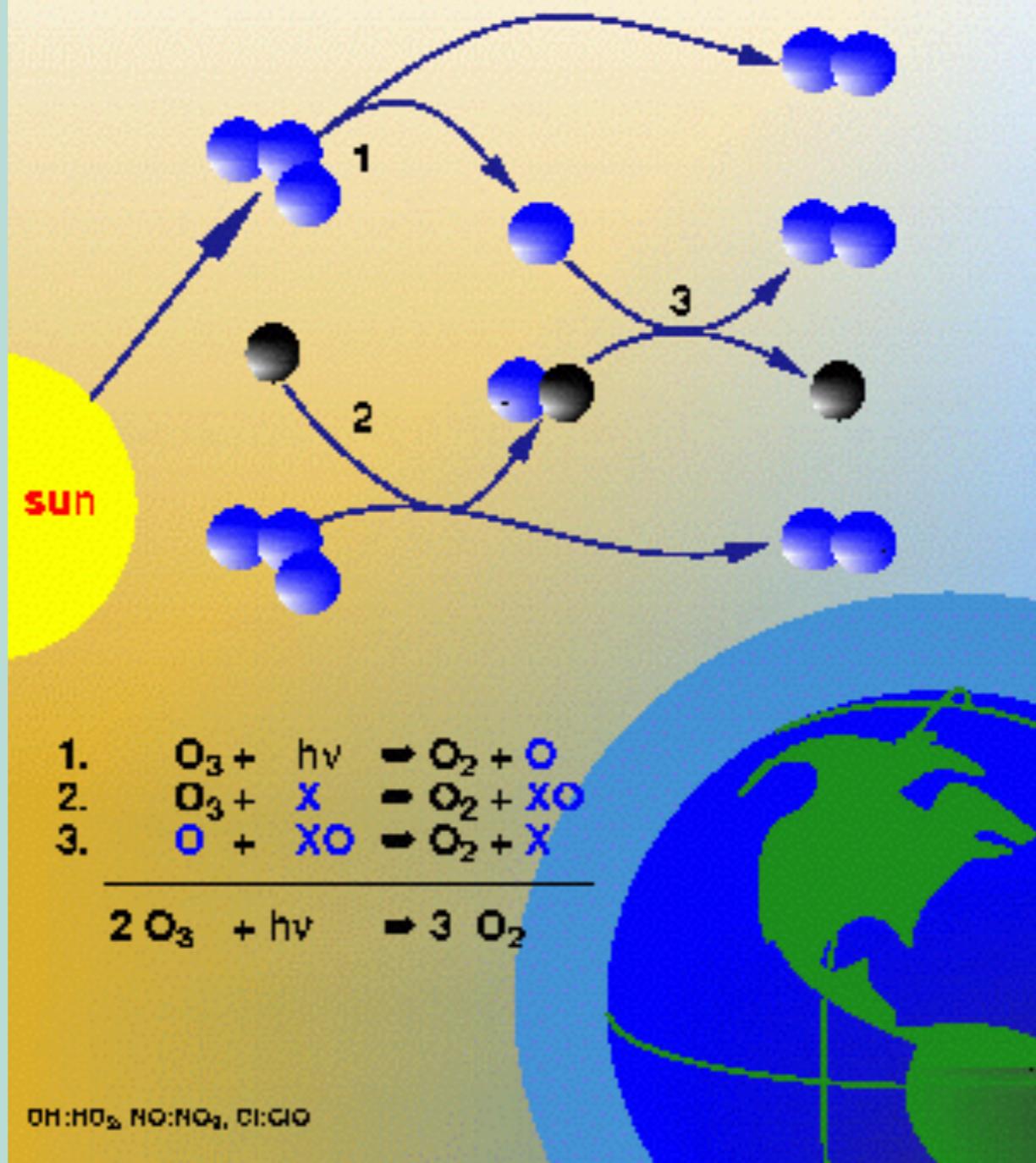


3. Ozone is lost by a reaction of the oxygen atom or the ozone molecule with each other, or some other trace gas such as chlorine (SLOW)

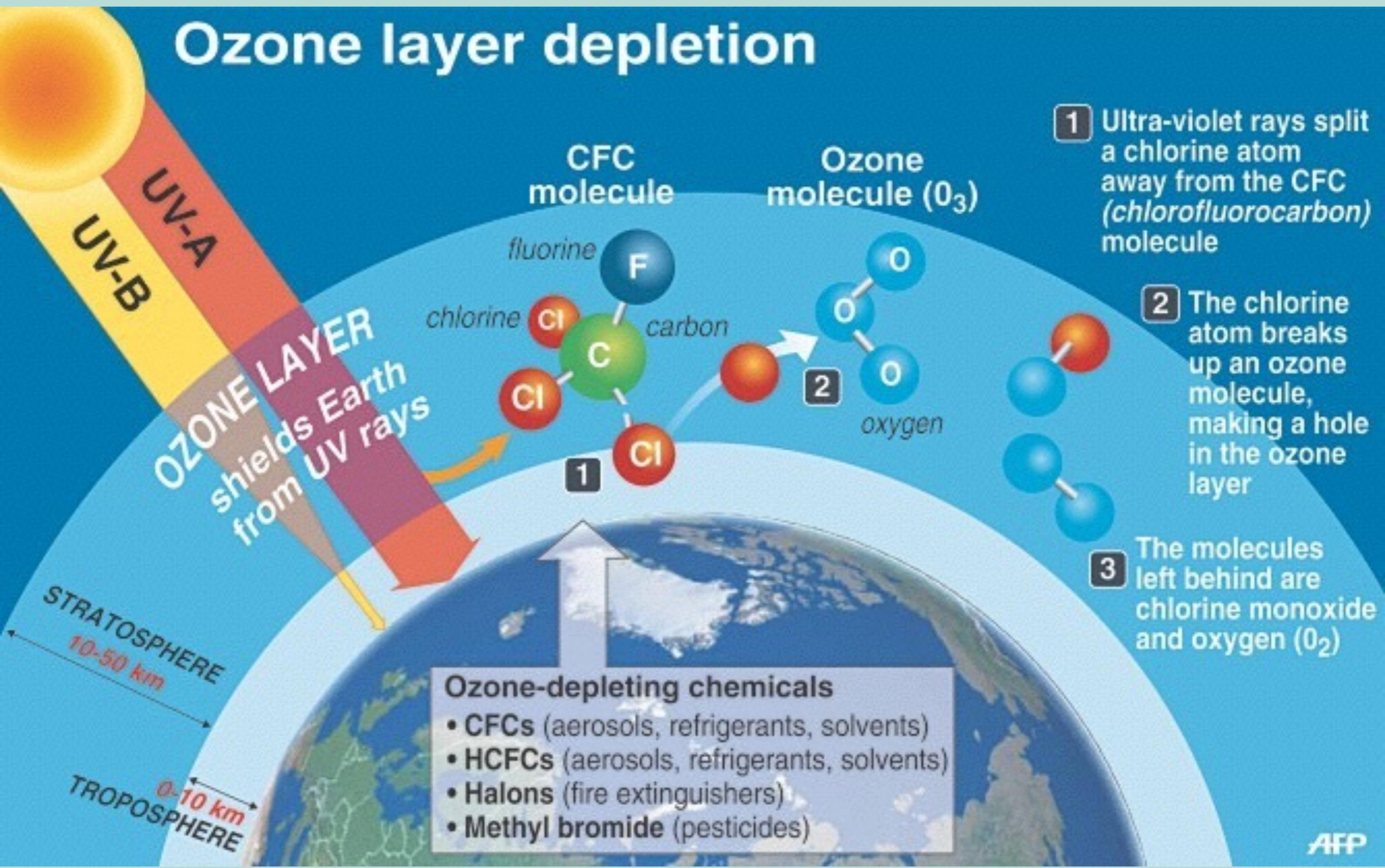
3

This interconversion process converts UV radiation into thermal energy, heating the stratosphere

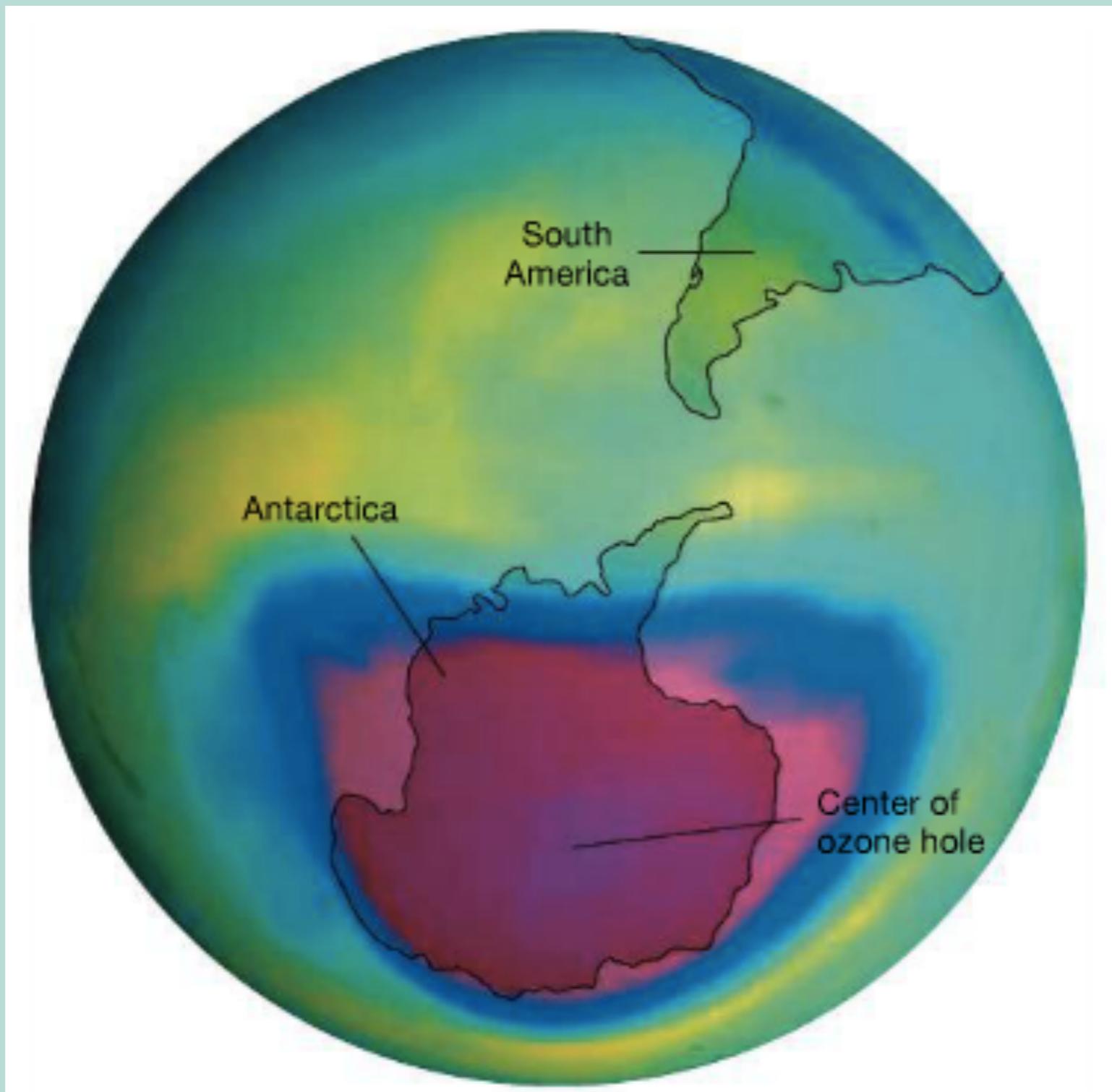
Catalytic Ozone Destruction

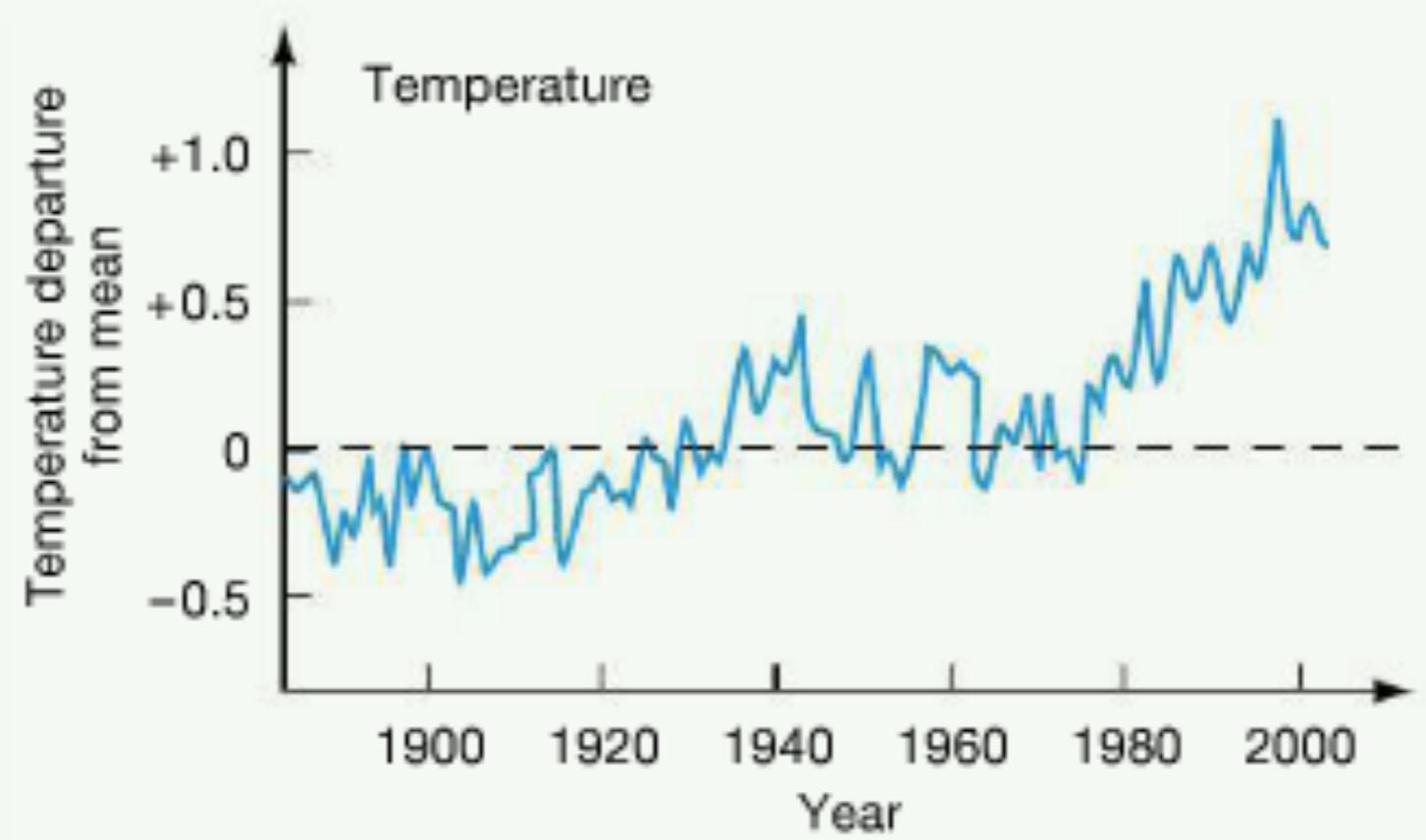
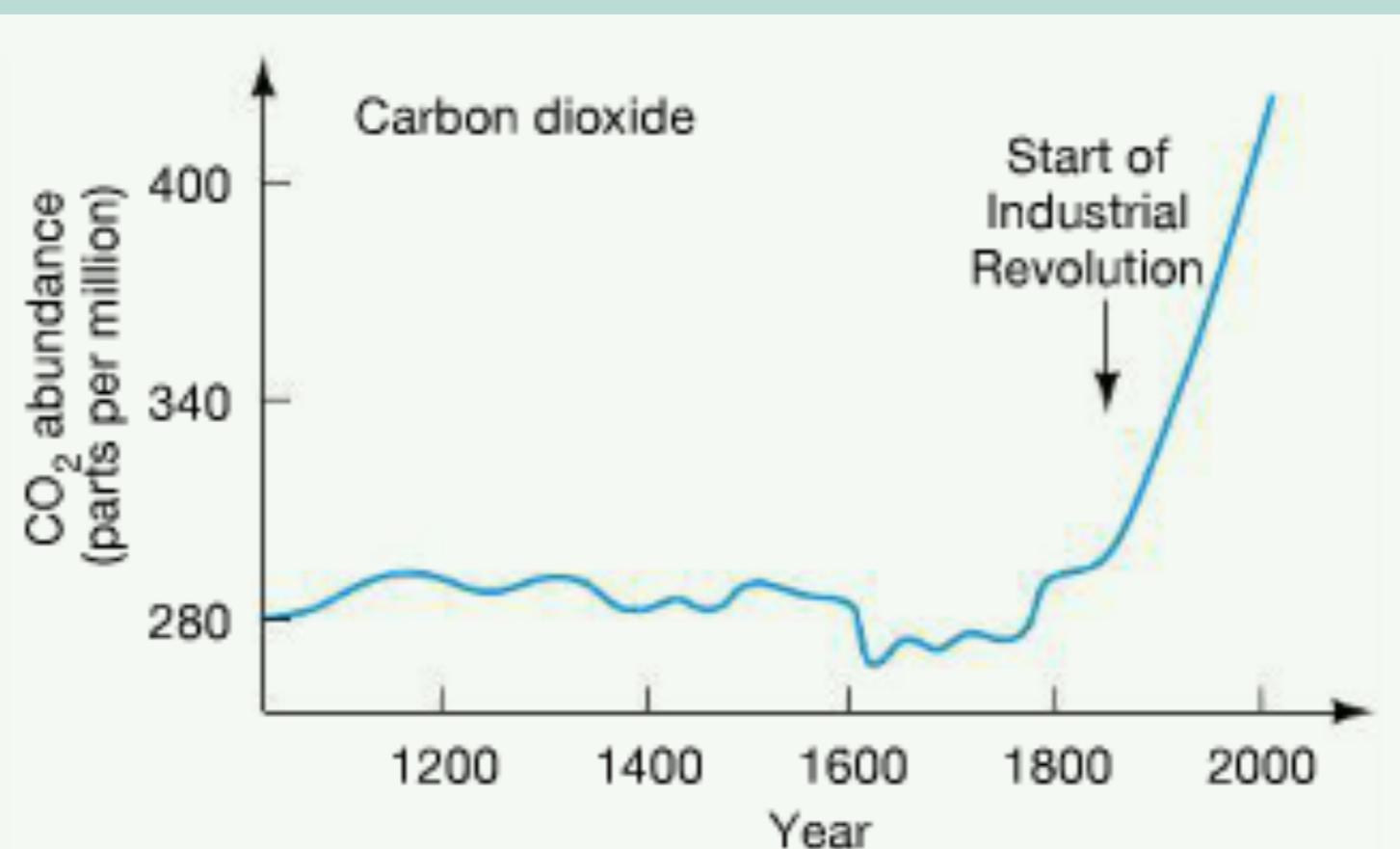


Ozone layer depletion

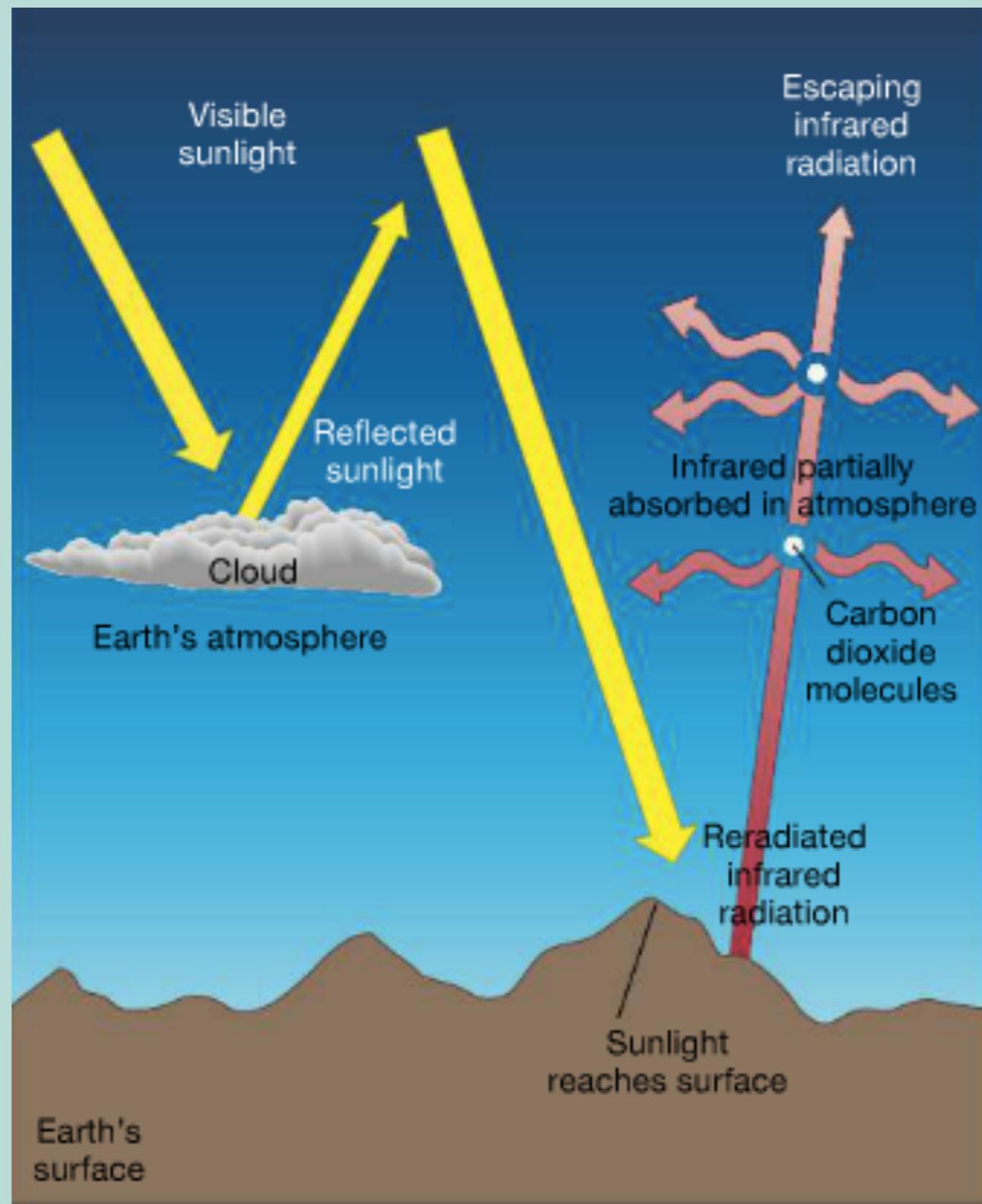


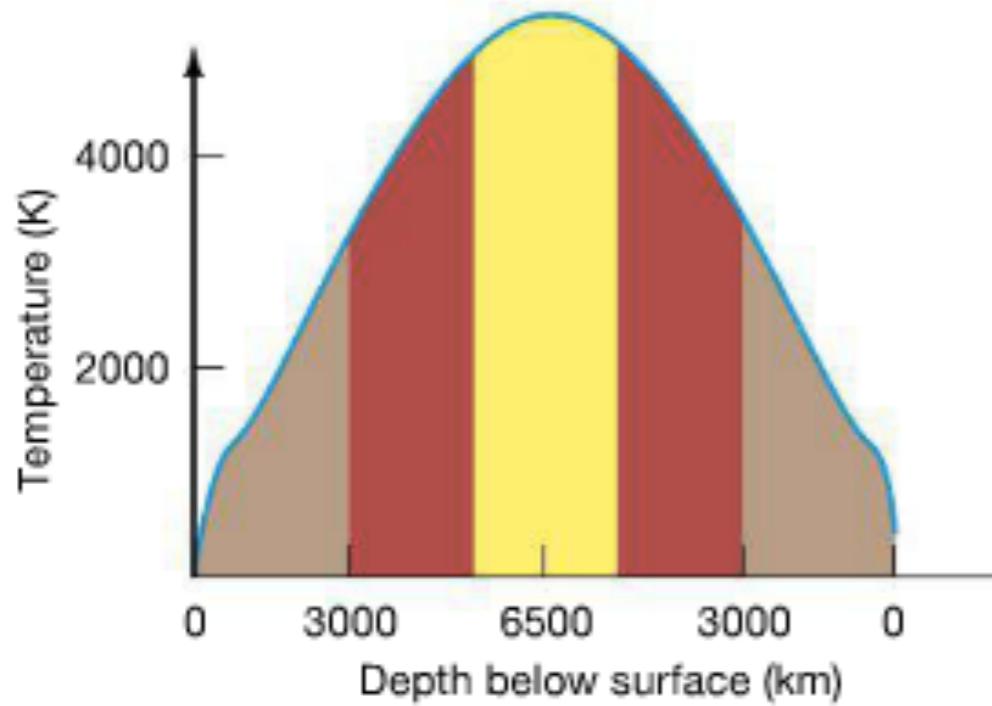
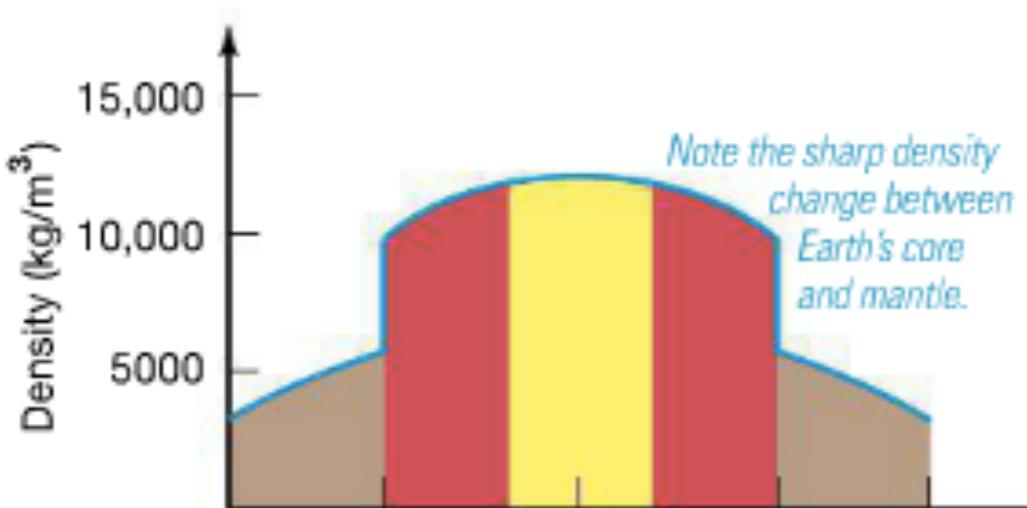
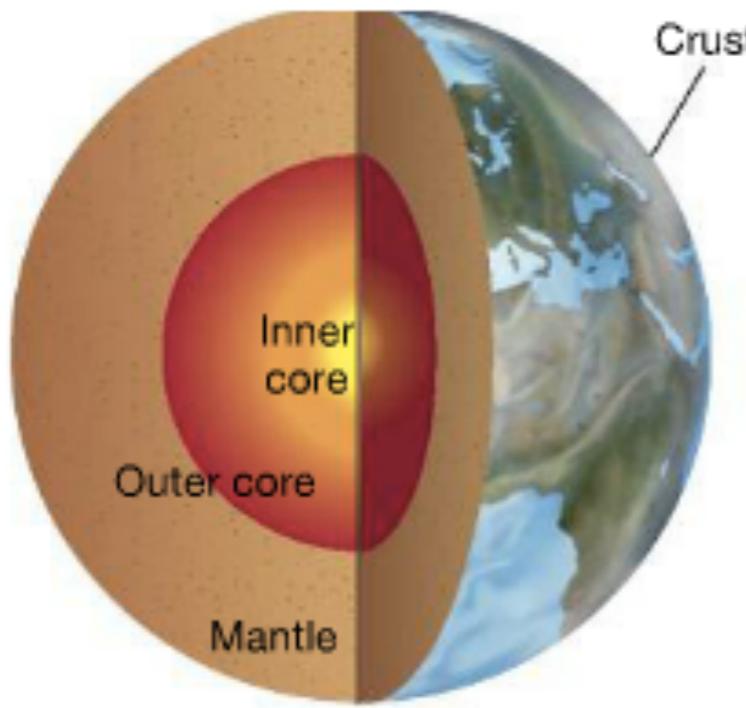
The Ozone Hole





Greenhouse gas blanket





Density of Water: 1000

Density of Granite: 2750

Density of Earth: 5500

Density of Iron: 8000

Density of Mercury: 13500

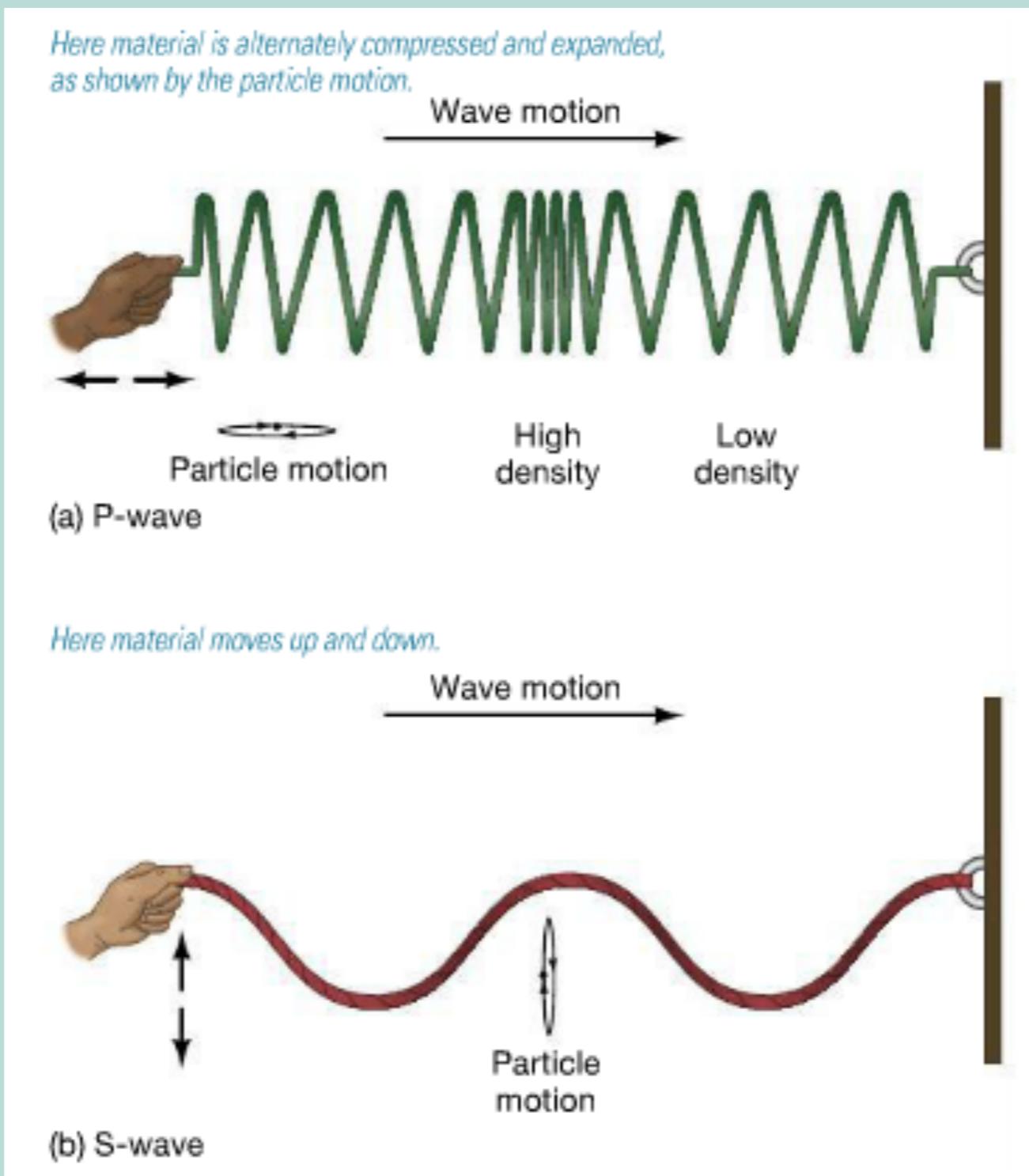


Neutron Star: 1000000000000000

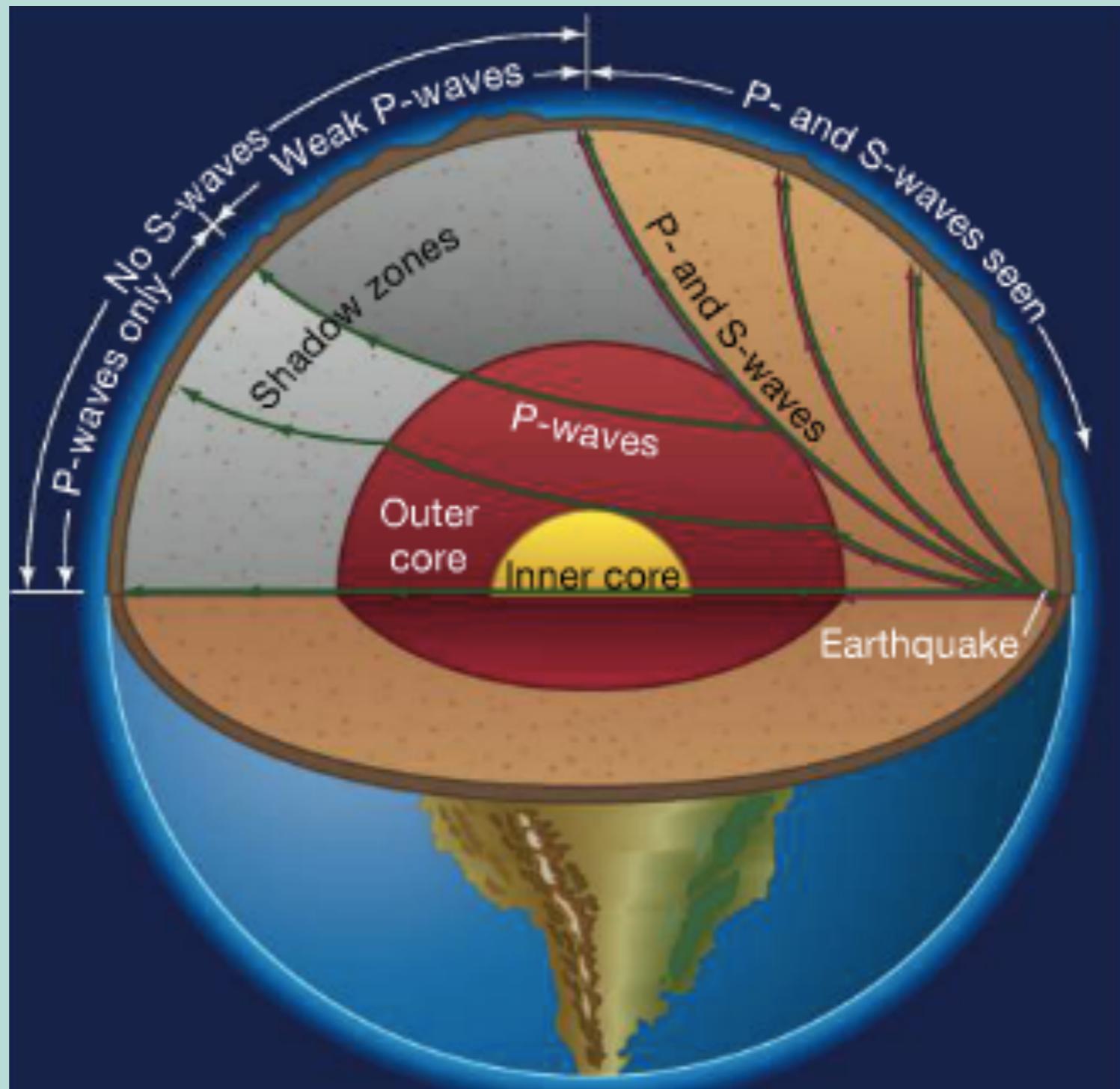
Transverse vs Longitudinal Waves

Primary vs Secondary Waves

P-waves vs S-waves



Evidence for the Core



Seismic Activity



Mt St. Helens: 24 Megatons



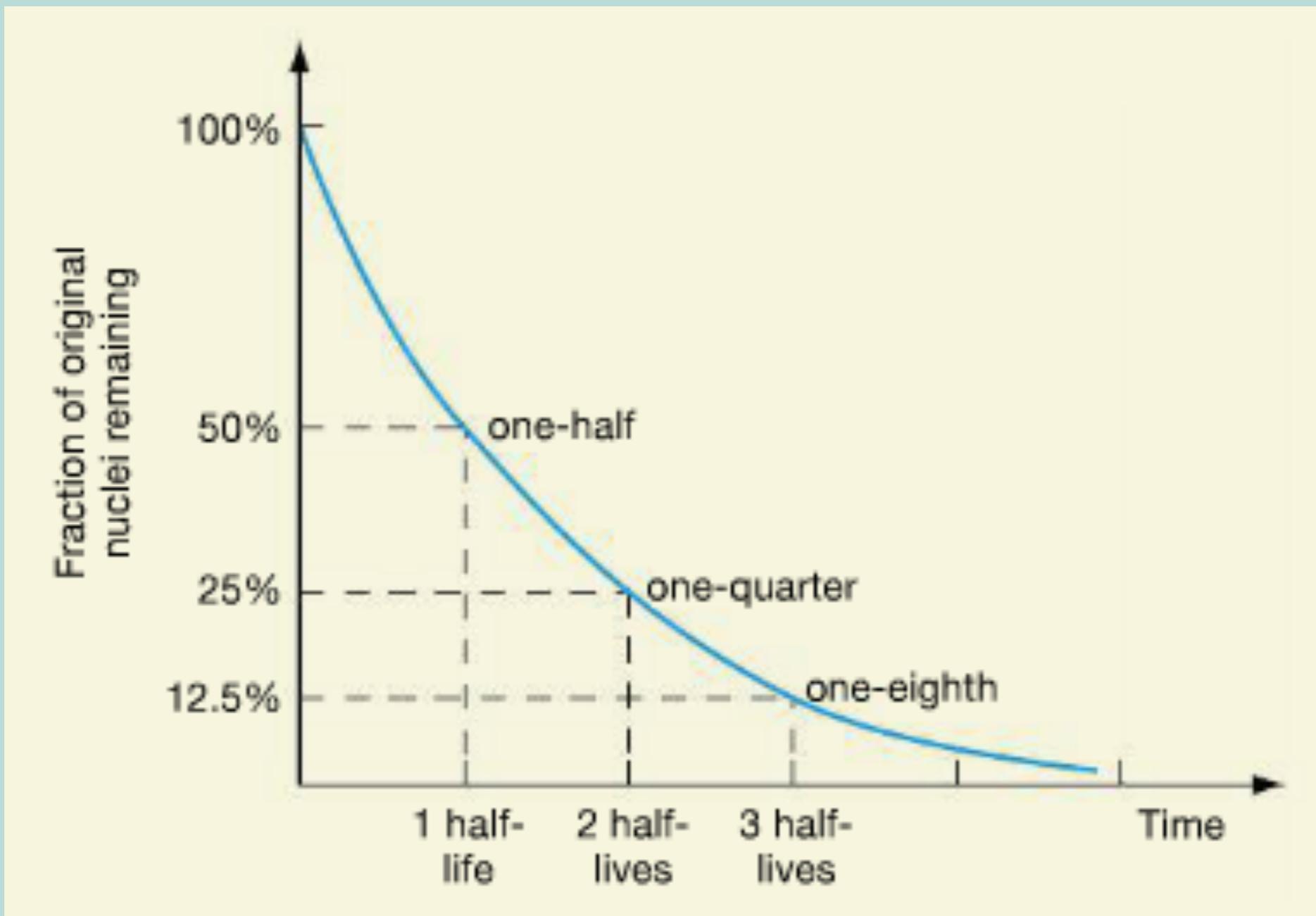
Mt. Tambora: 400 Megatons

Blast heard 1600 miles away

Indonesia, 1815

Darkness for 2 days for 400
miles

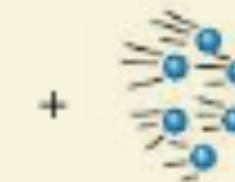
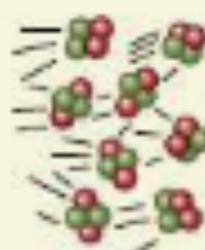
Radioactive Half-Life



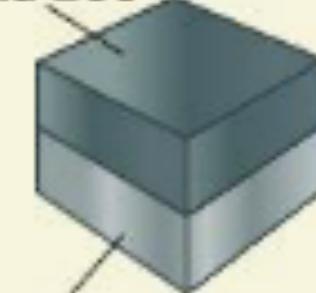


Half-life

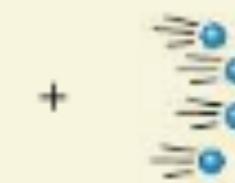
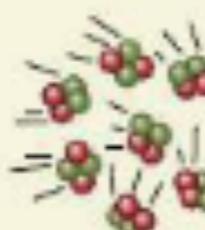
4,500,000,000
Years



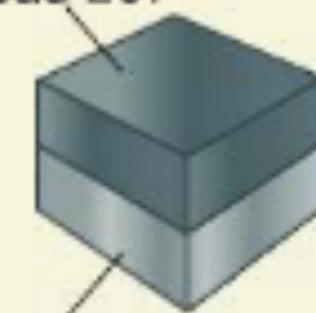
Lead 206



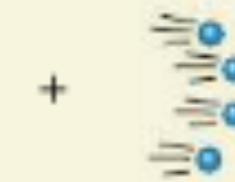
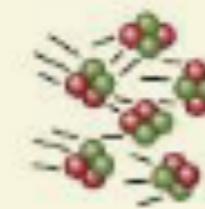
713,000,000
Years



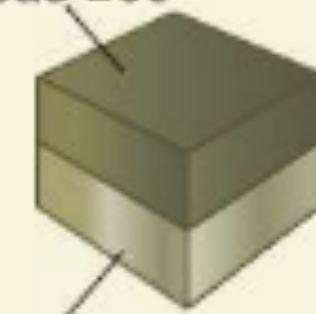
Lead 207



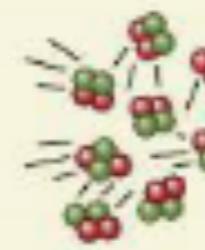
13,900,000,000
Years



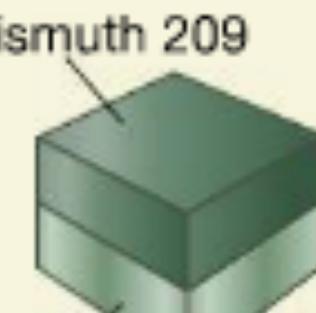
Lead 209



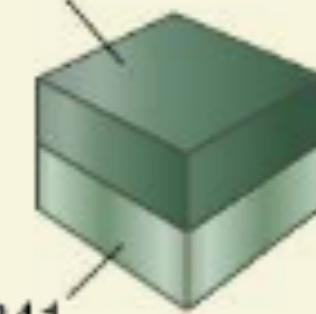
2,400,000
Years



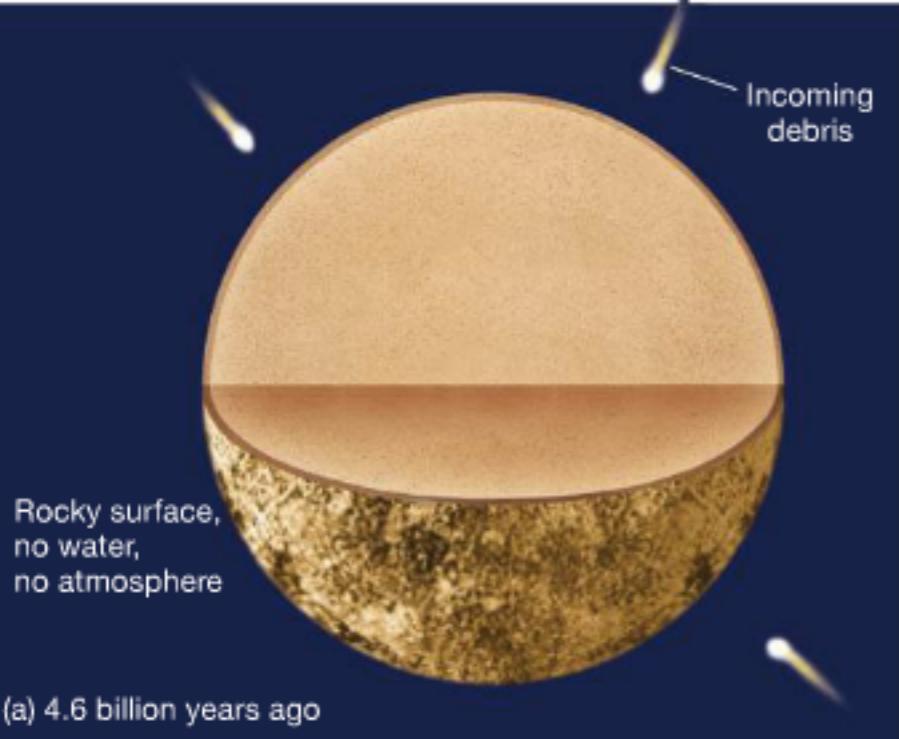
Thorium 232



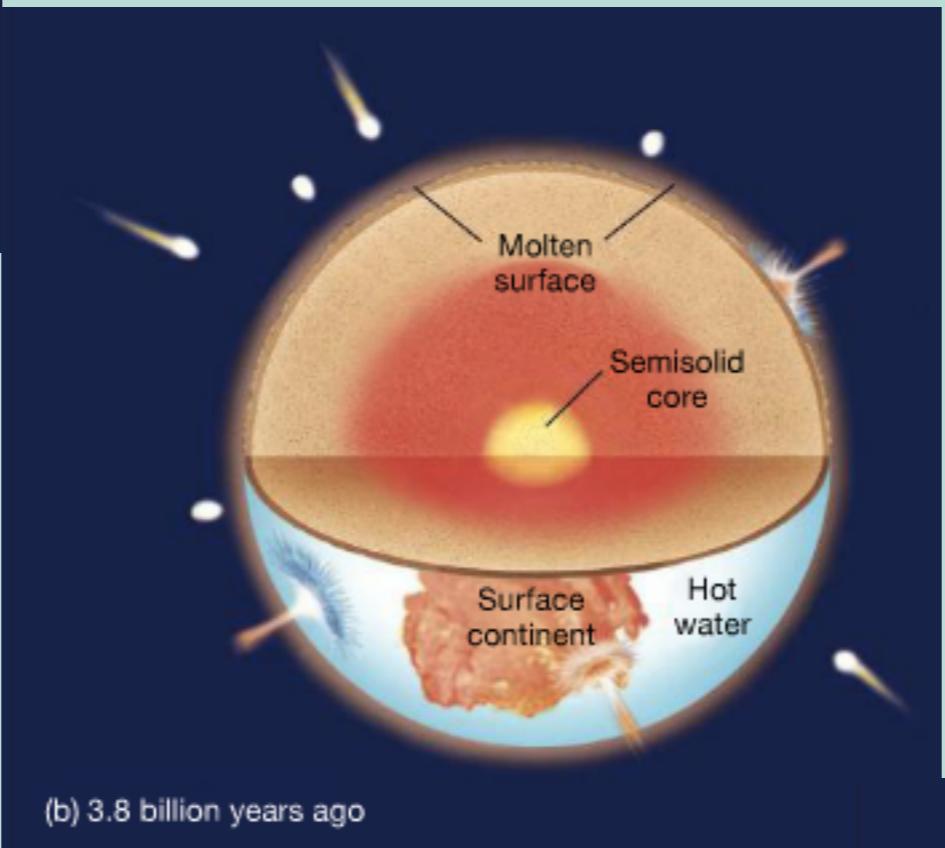
Bismuth 209



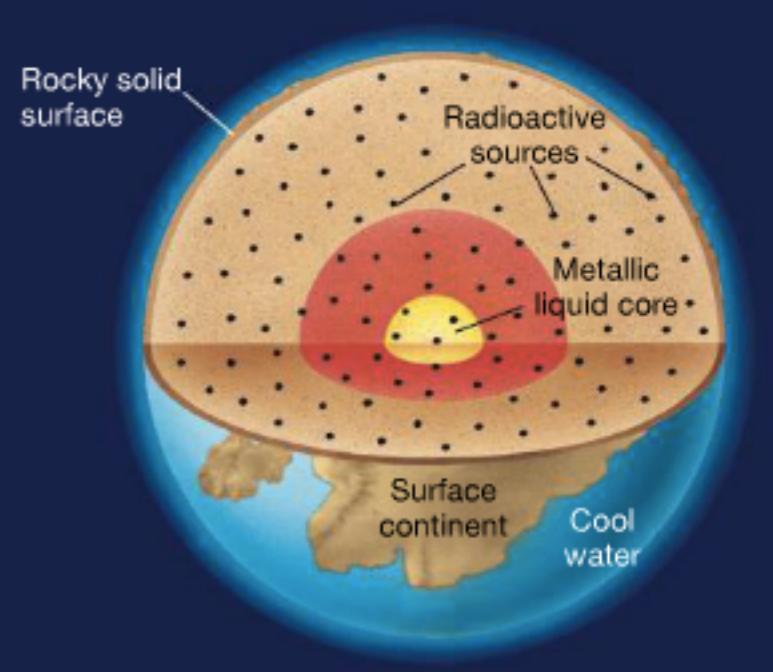
Plutonium 241



(a) 4.6 billion years ago



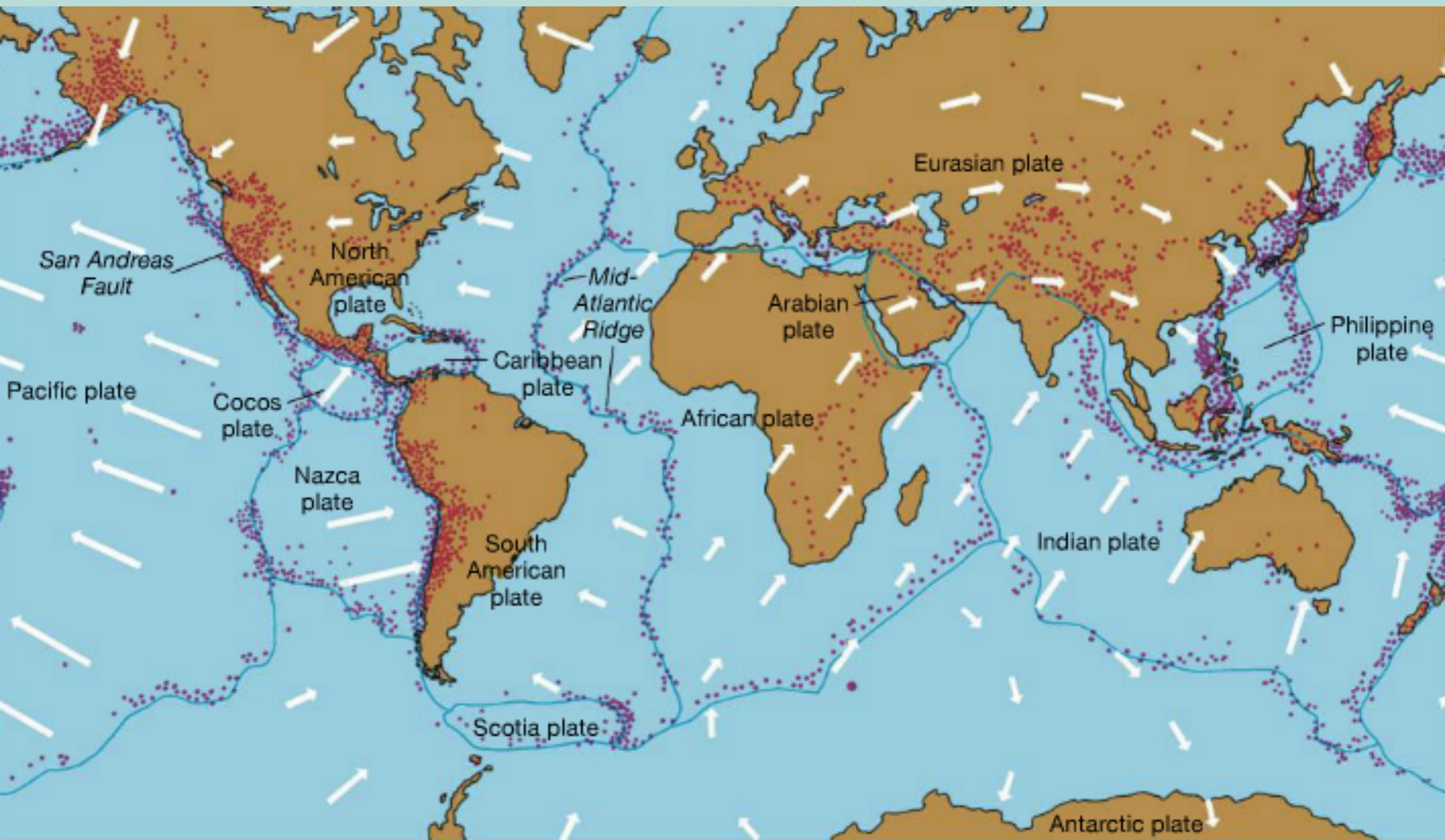
(b) 3.8 billion years ago



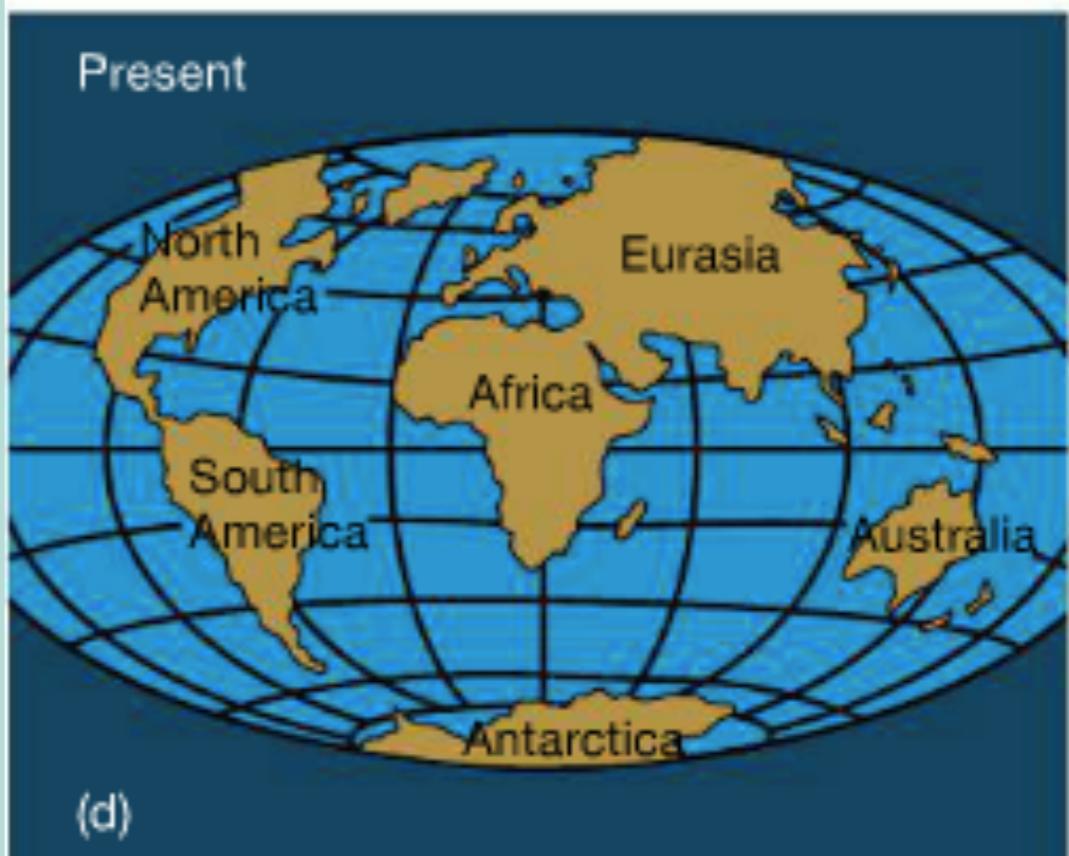
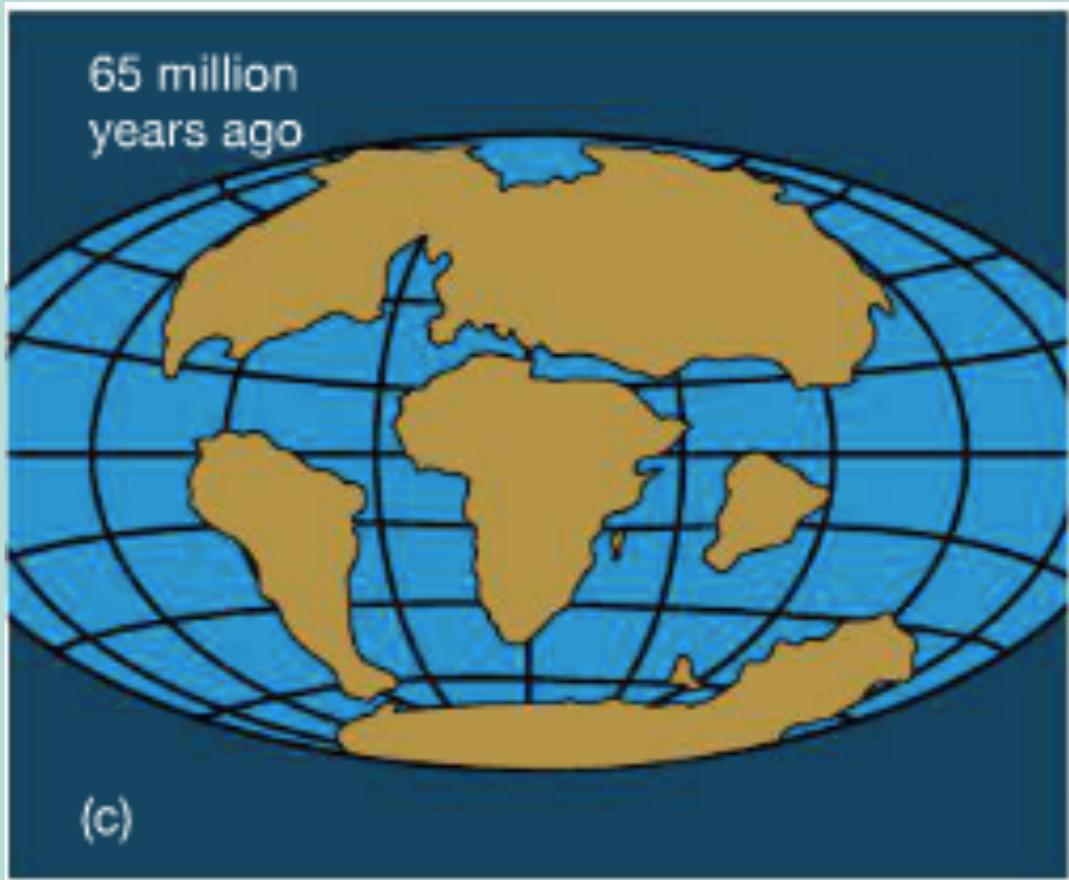
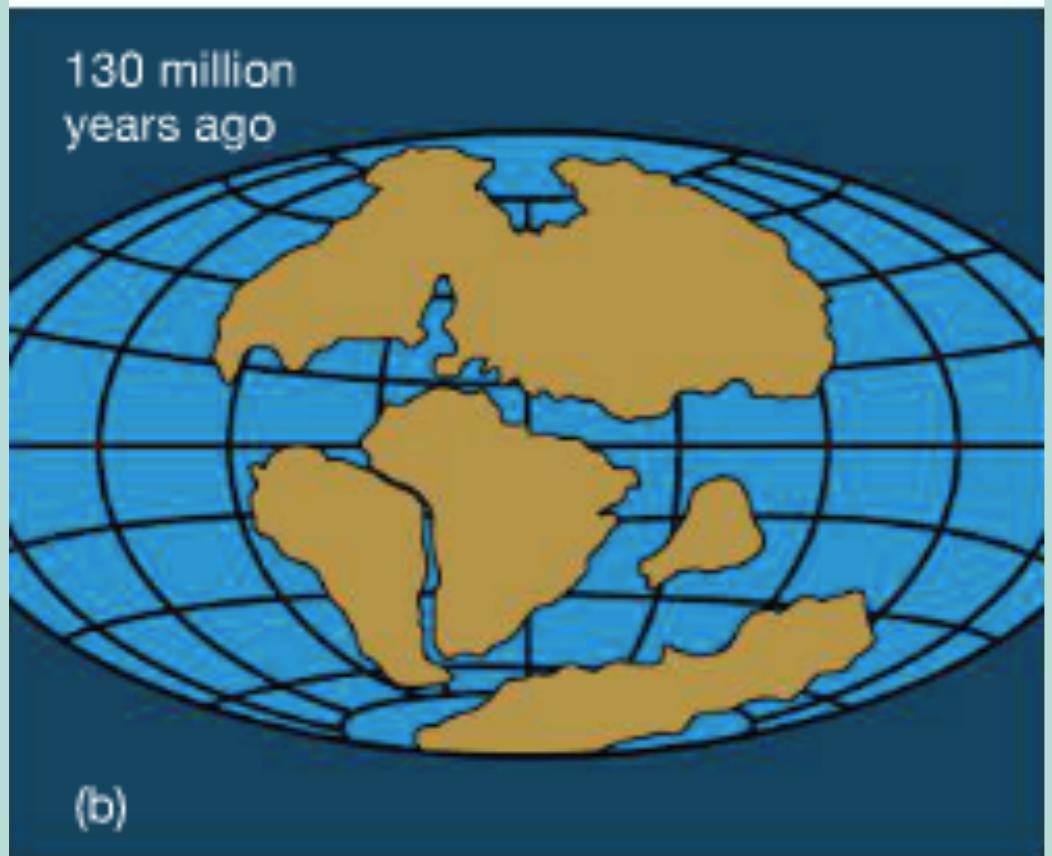
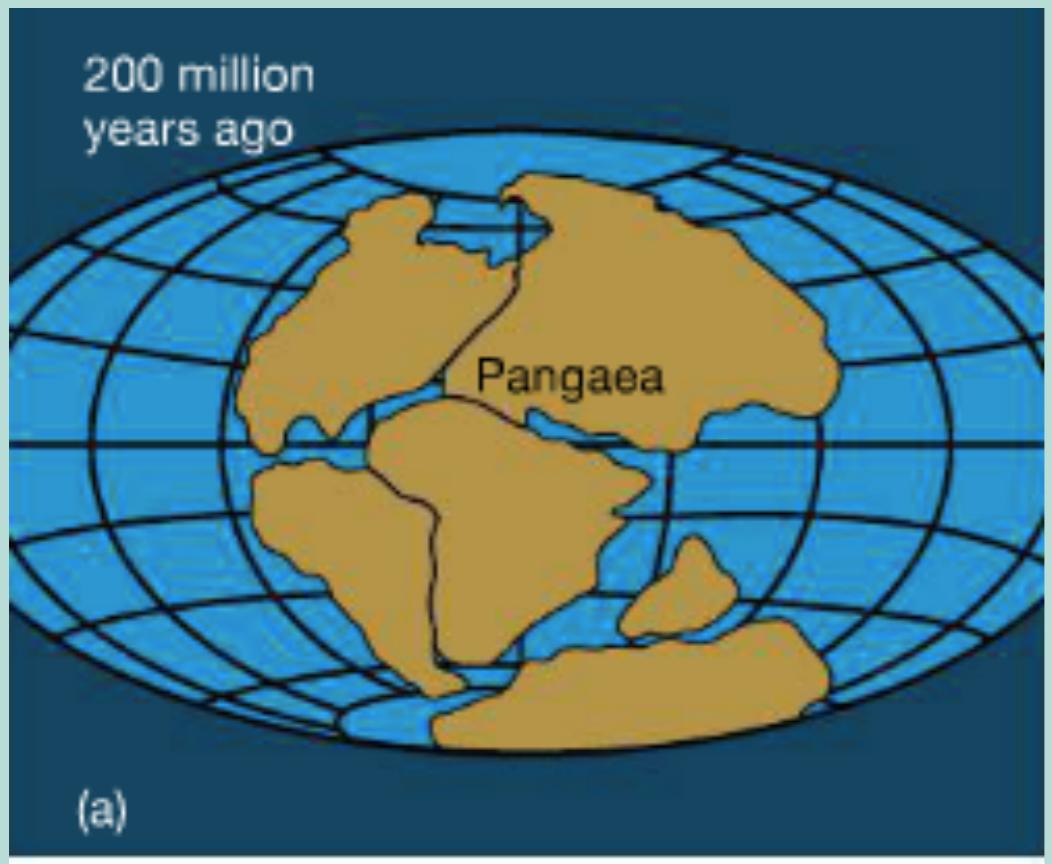
(c) -3 billion years ago

Differentiation

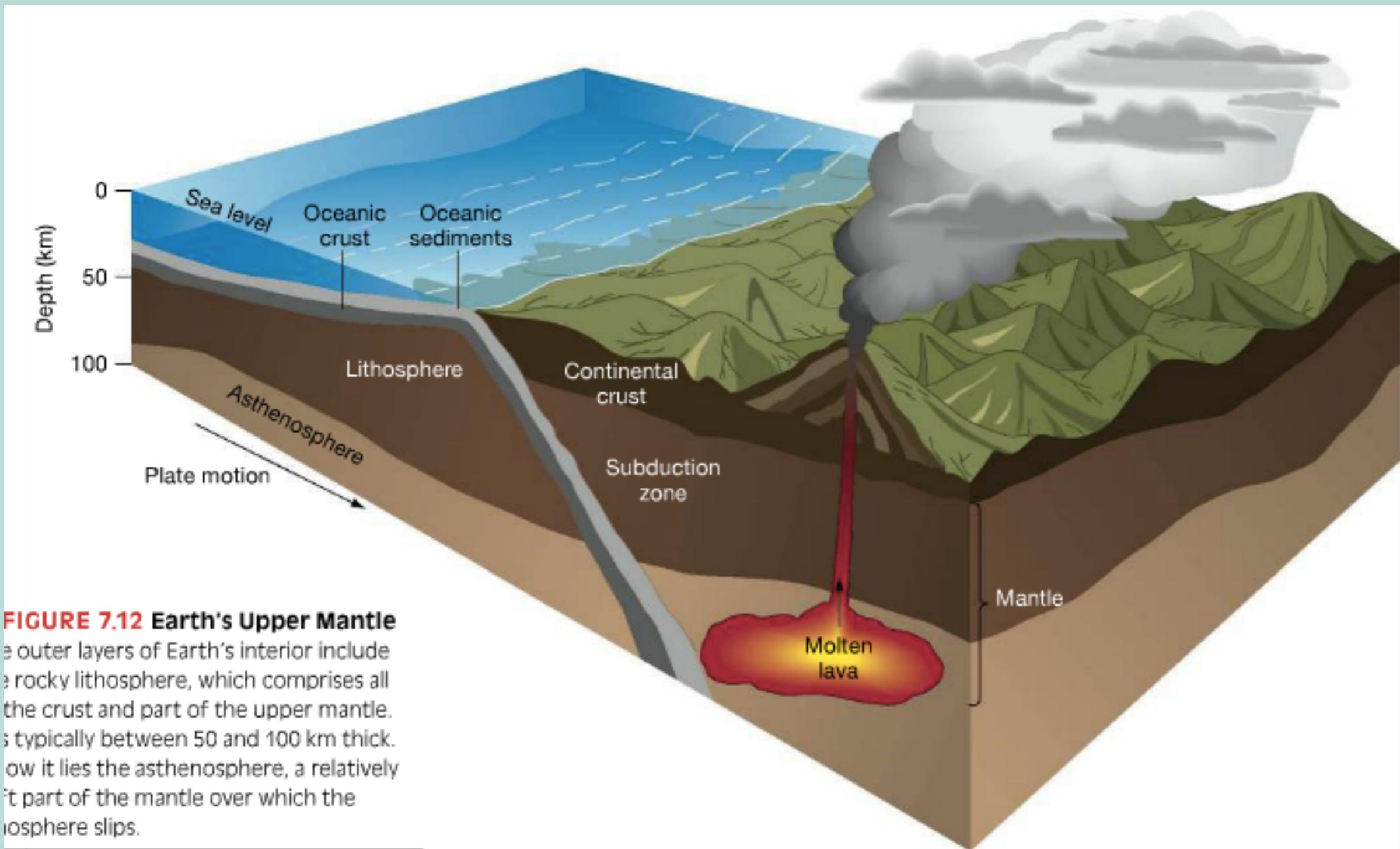
Plate Tectonics

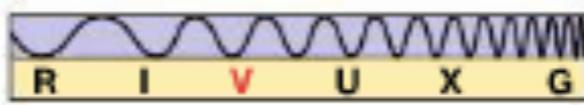
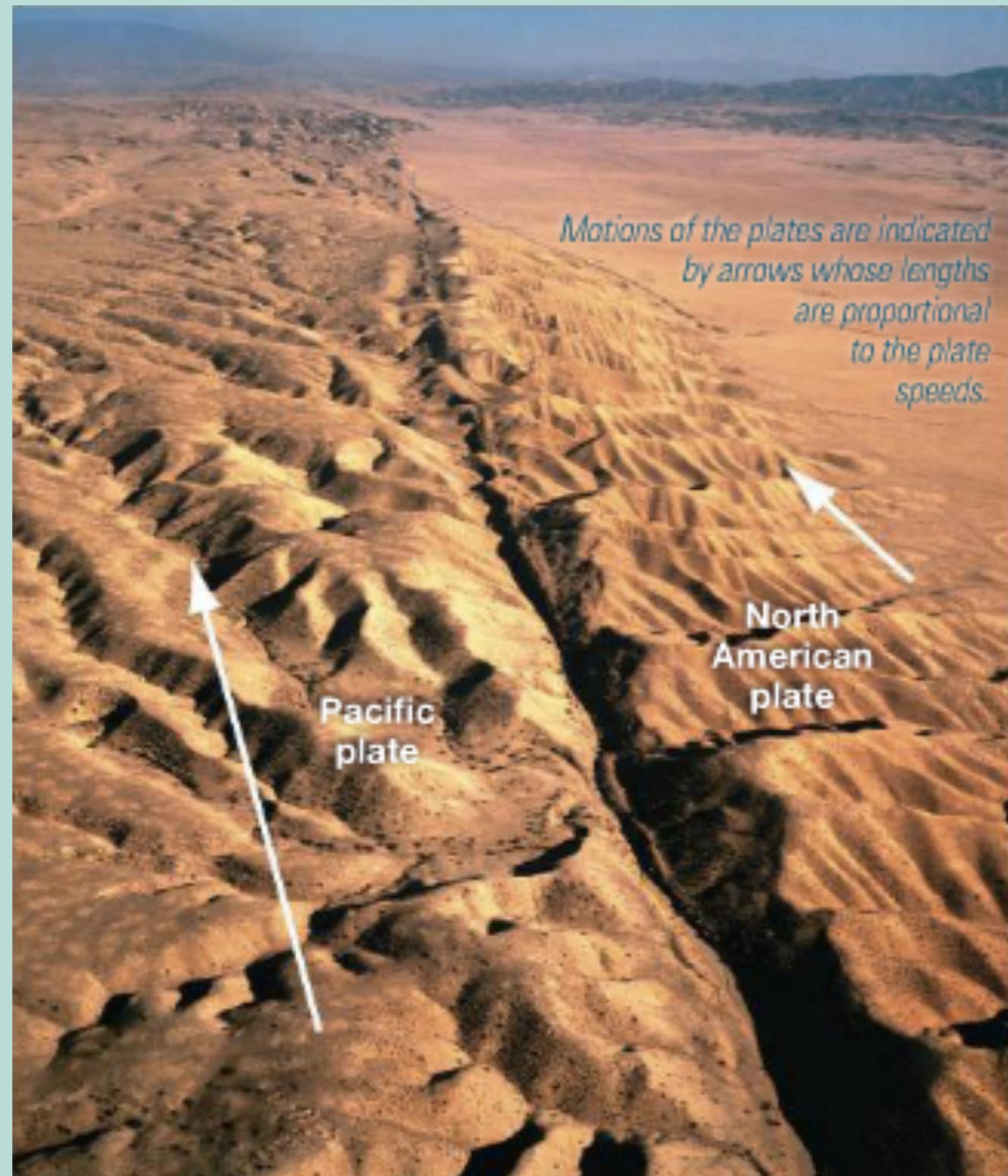


Pangea





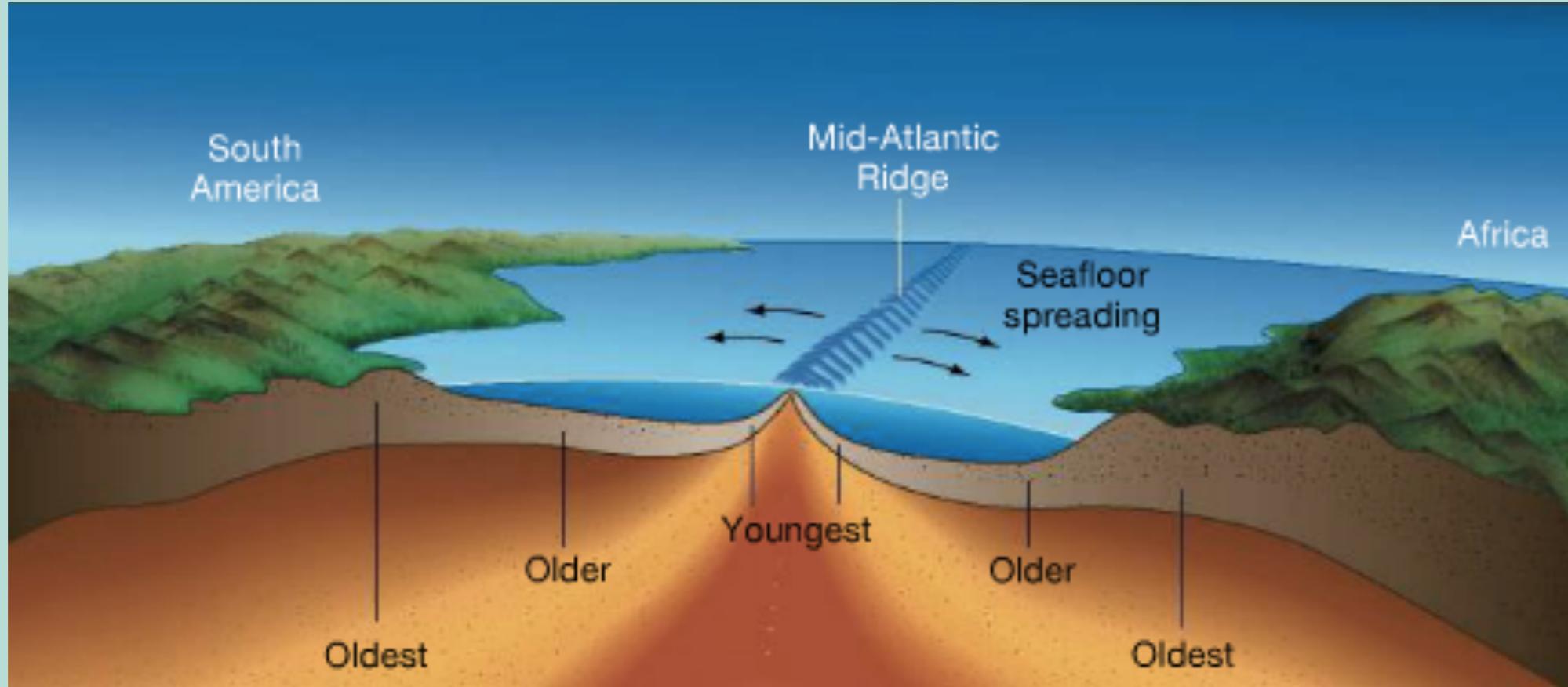




Continents Colliding



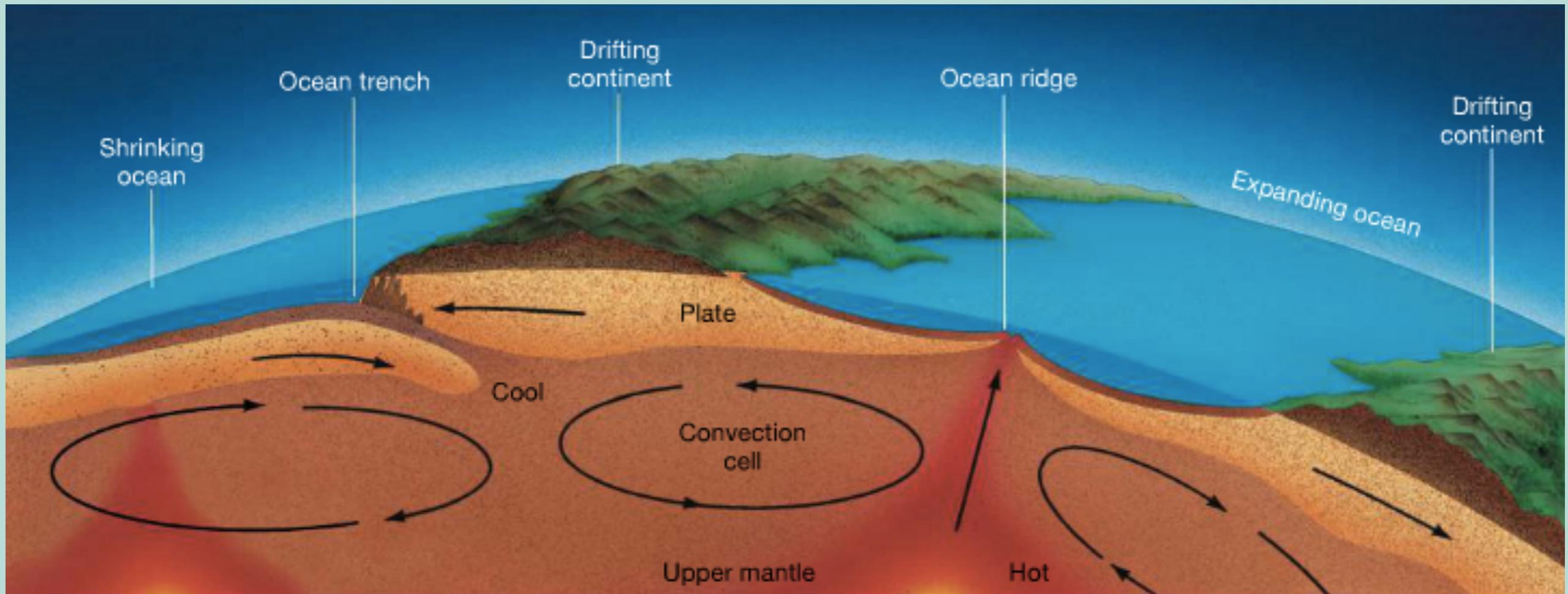
Mid Atlantic Ridge



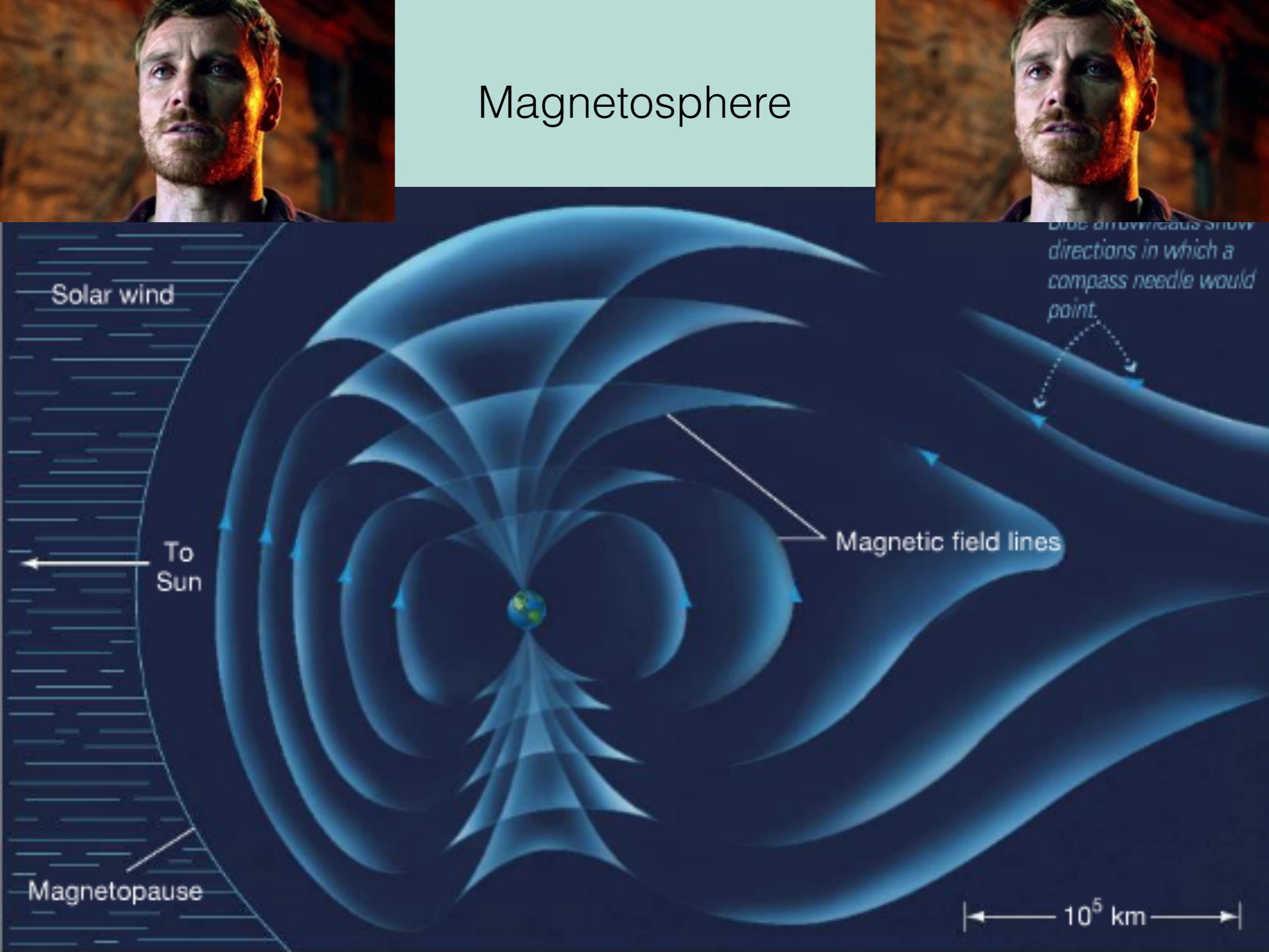
Can gauge the age of the atlantic ocean with radioactive dating

Teaches us about earth's magnetic poles

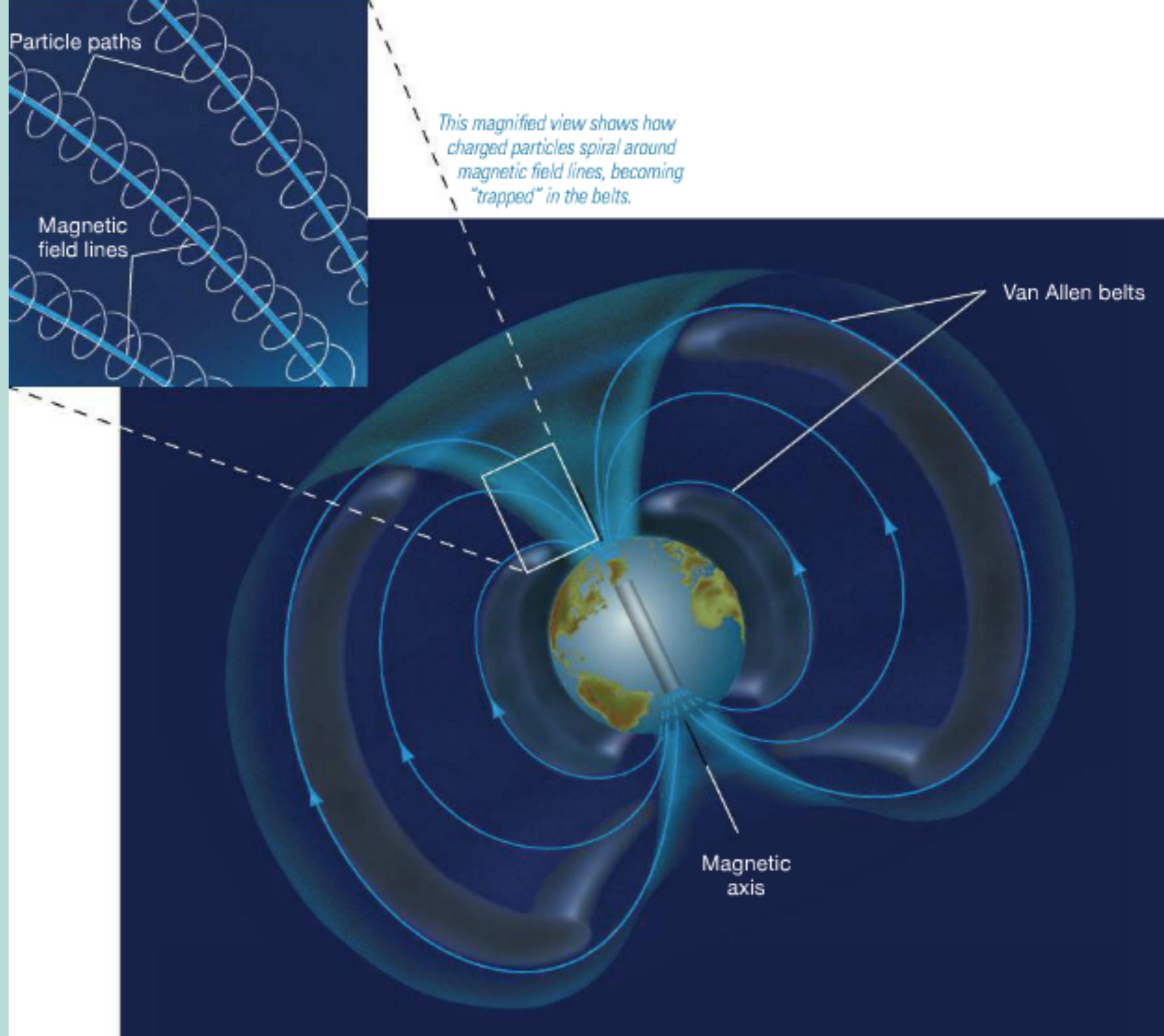
What causes the plates to drift?



Convection!



Magnetosphere



Aurora borealis



Aurora australis



© LOÏC LE GUILLET

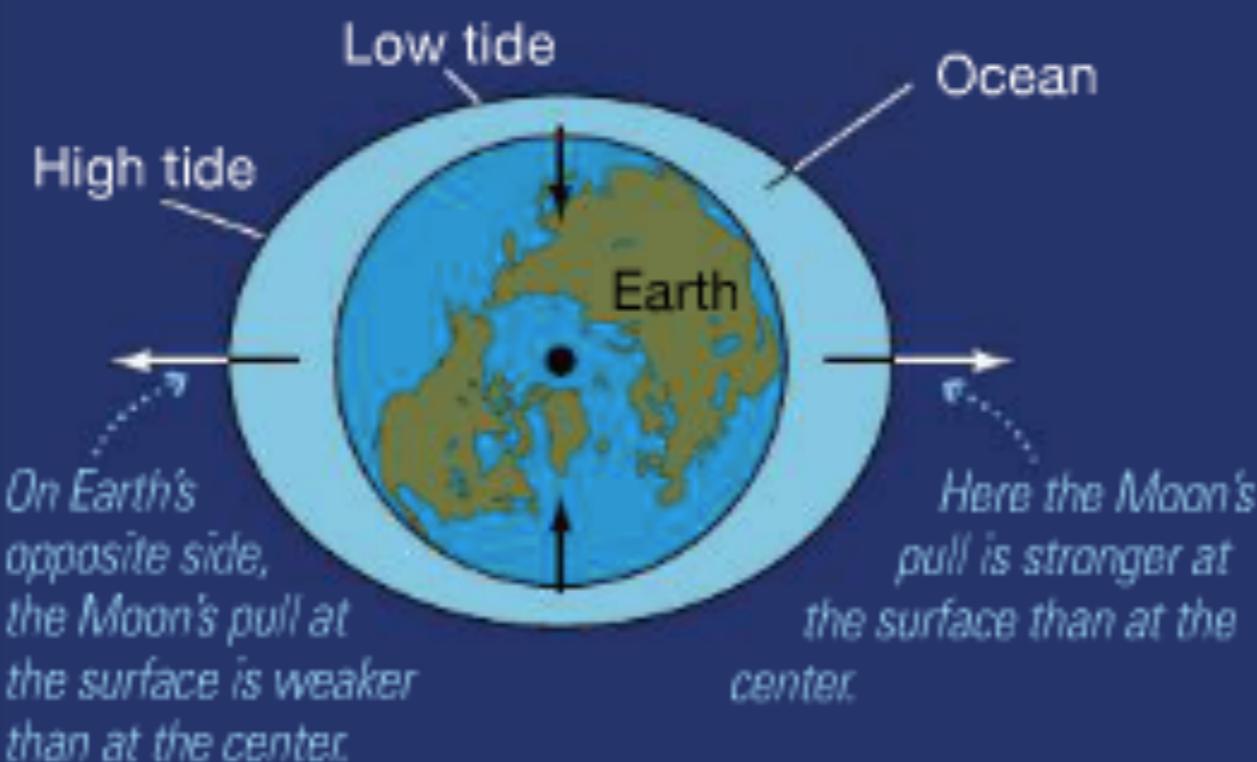


Tides

Arrow lengths indicate relative strengths of Moon's gravitational pull on parts of Earth.



(a)

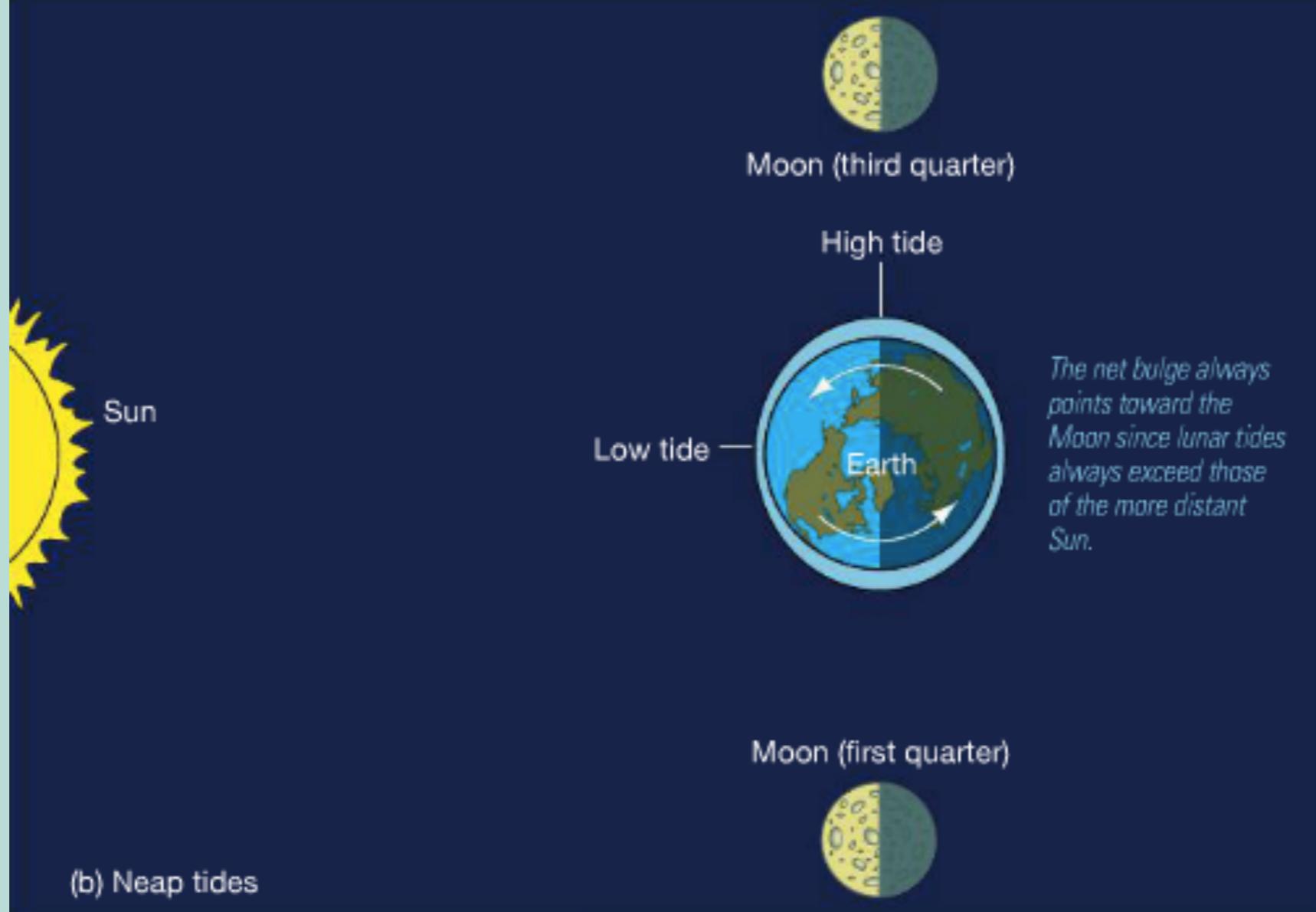


(b)

The sun is far, but it is big.

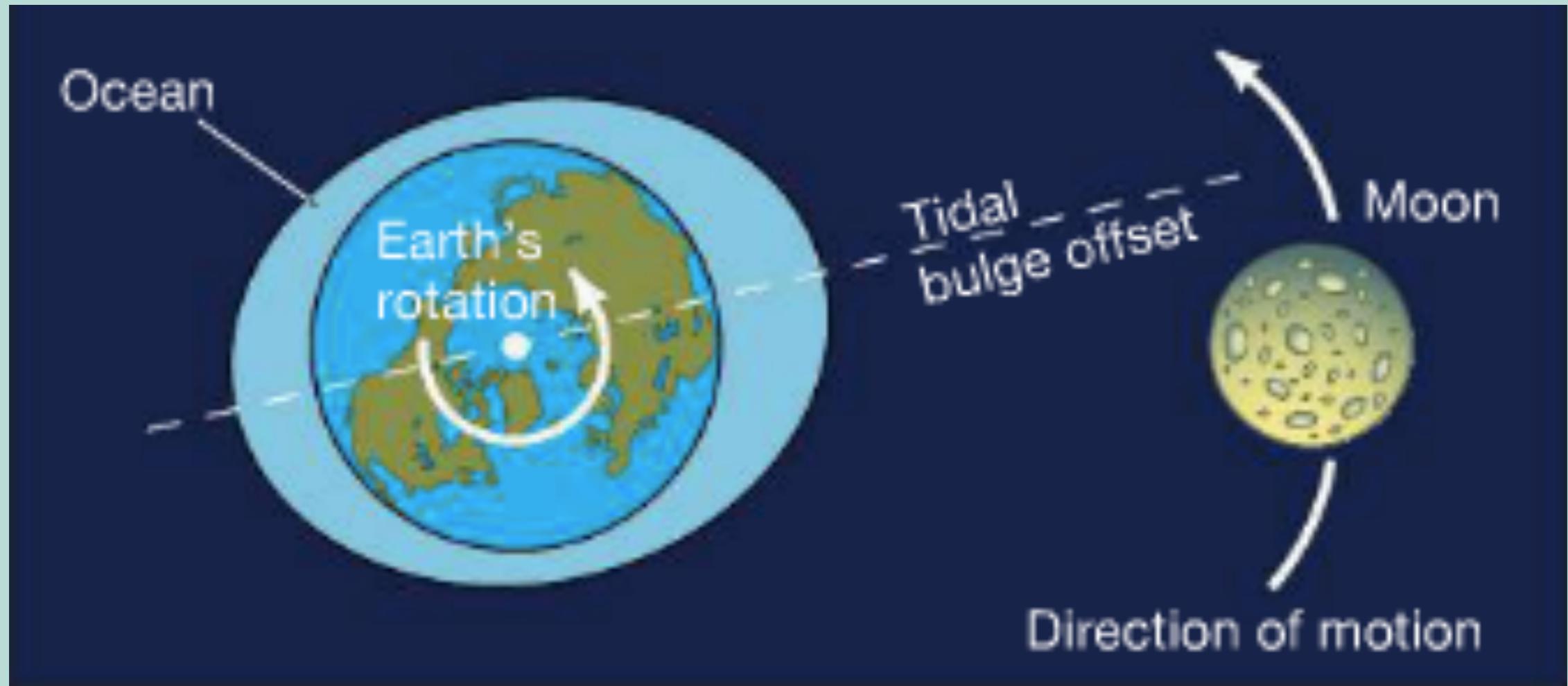


(a) Spring tides



(b) Neap tides

Tidal Locking



22 hour days, 500 million years ago (coral reef)

Result: 47 Day Days and a moon 1.5 times as far.

Life on tidally heated exomoons???

Life on tidally locked planets???