



The Spheres of Our Earth

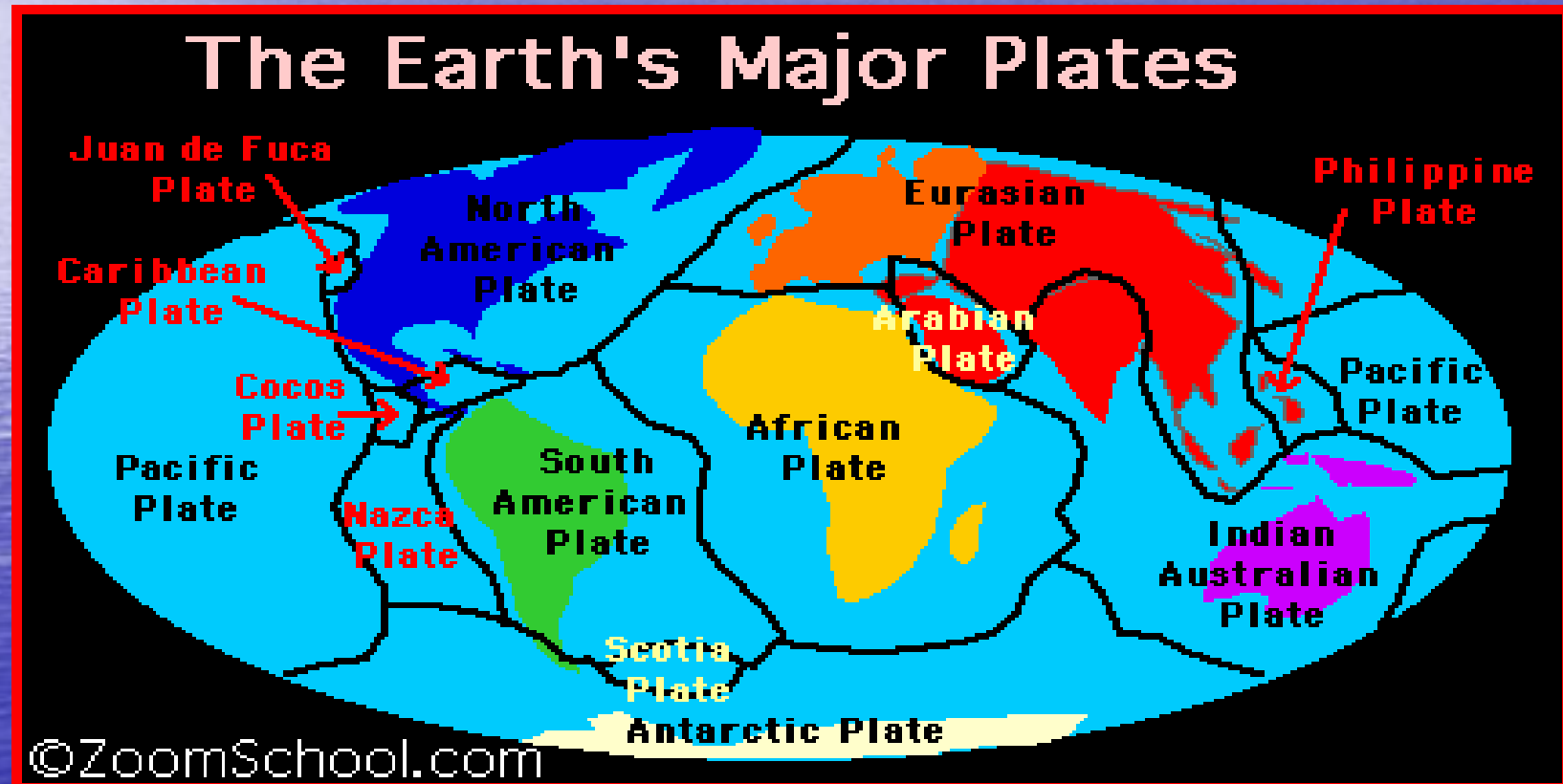
1. Lithosphere (land)
2. Hydrosphere (water)
3. Atmosphere (air)

A. Lithosphere

- 1. comprised of two parts:
 - a. crust
 - b. rigid mantle
- 2. we sit on the upper portion of the crust: a strong rigid layer approximately 100 km thick.



3. the crust is solid material yet broken into a number of different plates



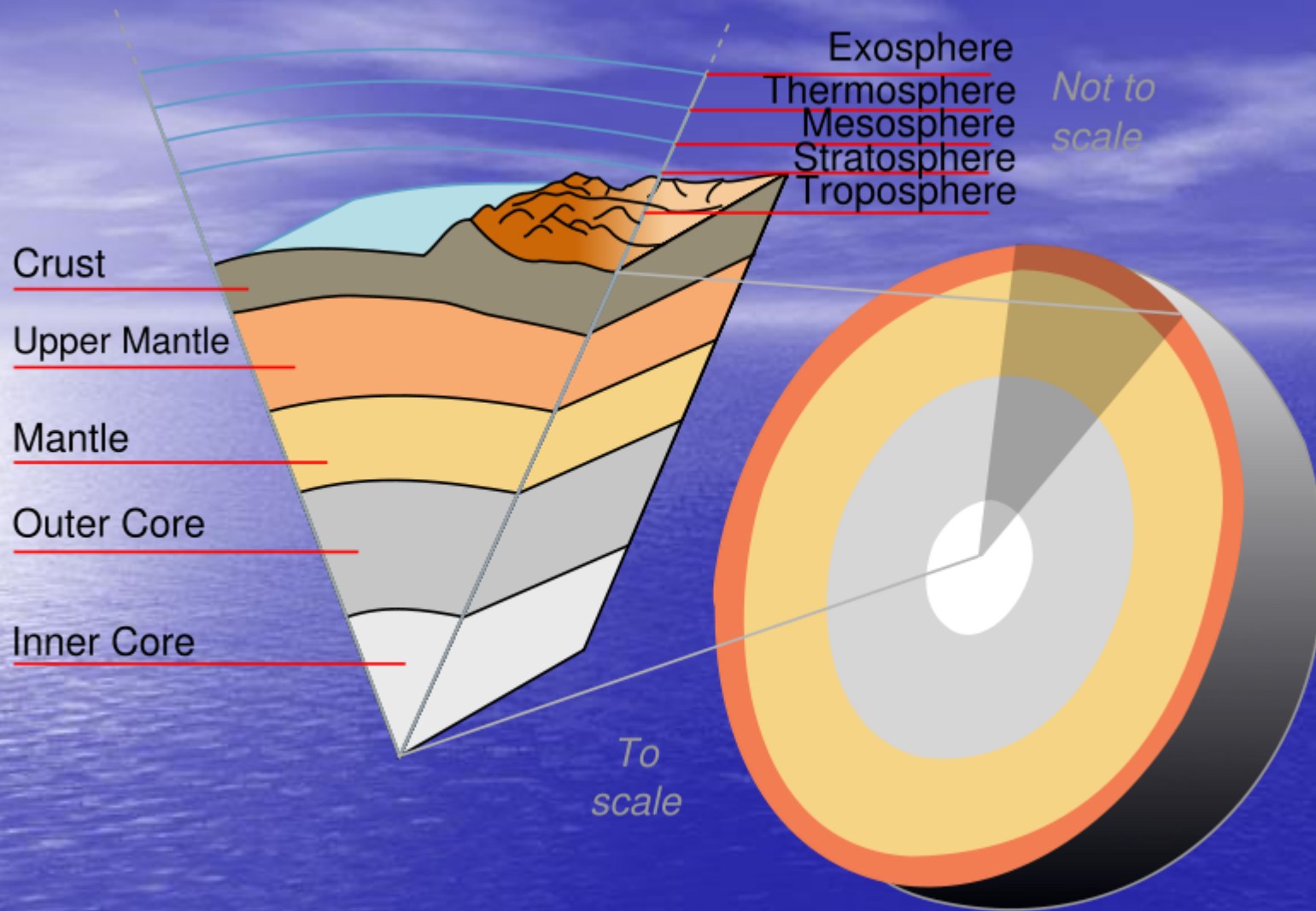
4. two most abundant elements by mass:
oxygen (O₂) and Silicon (Si)

**Average Chemical Composition
of Earth's Crust, Hydrosphere, and Troposphere**

ELEMENT (symbol)	CRUST		HYDROSPHERE	TROPOSPHERE
	Percent by Mass	Percent by Volume	Percent by Volume	Percent by Volume
Oxygen (O)	46.40	94.04	33.0	21.0
Silicon (Si)	28.15	0.88		
Aluminum (Al)	8.23	0.48		
Iron (Fe)	5.63	0.49		
Calcium (Ca)	4.15	1.18		
Sodium (Na)	2.36	1.11		
Magnesium (Mg)	2.33	0.33		
Potassium (K)	2.09	1.42		
Nitrogen (N)				78.0
Hydrogen (H)			66.0	
Other	0.66	0.07	1.0	1.0

B. The Hydrosphere

- 1. comprised of all the water on the Earth
- 2. approximately 70 percent of Earth's surface is water.
- 3. **UNIQUE** in that water is the only substance on Earth that can exist naturally in all 3 states: solid (ice), liquid (water) and gas (water vapor)/



Notice how the Hydrosphere DOES NOT appear as an individual layer!



4. the two most abundant elements
include:

a. hydrogen (66 percent)

b. oxygen (33 percent)

notice the ratio of hydrogen to oxygen!!??

C. Earth's Atmosphere

- 1. layers of gases surrounding ALL of earth.
- 2. each layer has its own distinct characteristics of temperature, pressure and water vapor content.
- 3. divided into 4 layers: each ending in the term "sphere".

4. These "spheres" include:

- a. troposphere: bottom most layer where we live.
- b. stratosphere: the ozone layer is found here.
- c. mesosphere
- d. thermosphere
- EXTRA: all the terms ending in "pause" are boundaries or interfaces separating each layer.

5. the two most abundant elements in the troposphere include:

- a. see ESRT, pg 1



What % based on ESRT?



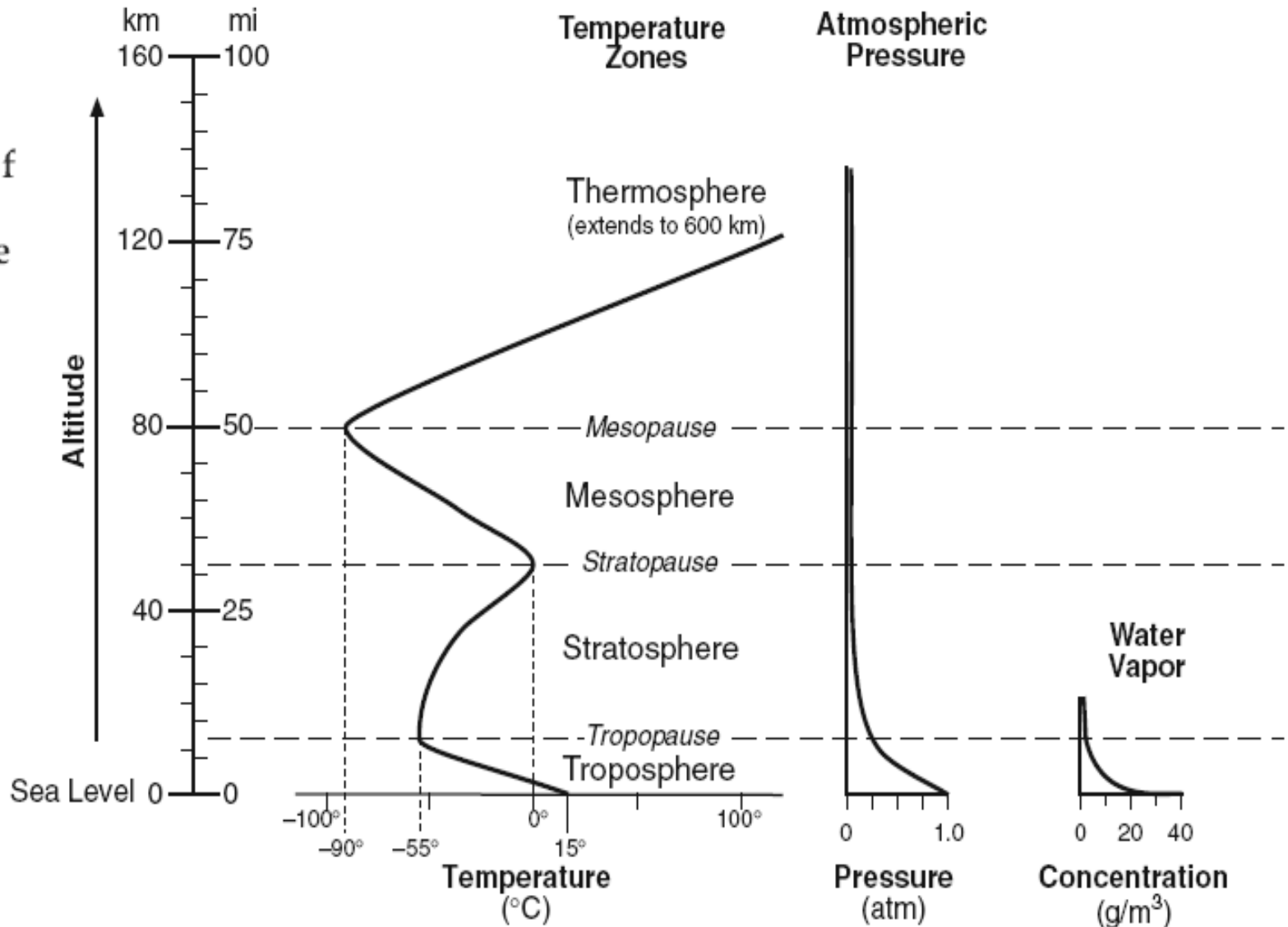
What % based on ESRT?

Remember: only layer having WEATHER! Only layer with water vapor.



ESRT pg. 14

Selected Properties of Earth's Atmosphere



D. Earth's Early Atmosphere & Oceans

- 1. Atmosphere
 - a. first, was mostly hydrogen (H_2) and helium (He).
 - b. changed over time due to:
 - volcanic out gassing = water venting to surface through volcanic eruptions and hot springs (very stinky!!)
 - photosynthesis
 - aerobically respiring organisms
 - comets and other bodies that have collided with Earth release water vapor.

2. Hydrosphere



- a. outgassing
- b. comets and other bodies
- c. rocks melting and releasing huge amounts of water.
- cooling earth caused water vapor to condense out of the atmosphere creating torrential rains.

