

Course Focus

1. Big Points about the Earth and its processes
2. Change over deep time in one place (Nashville) and its record (in rock)
-- includes the parade of life through here of which we are a part
3. Why this matters for us inhabiting this space right now.
-- Earth processes and history control our environmental issues

Organization

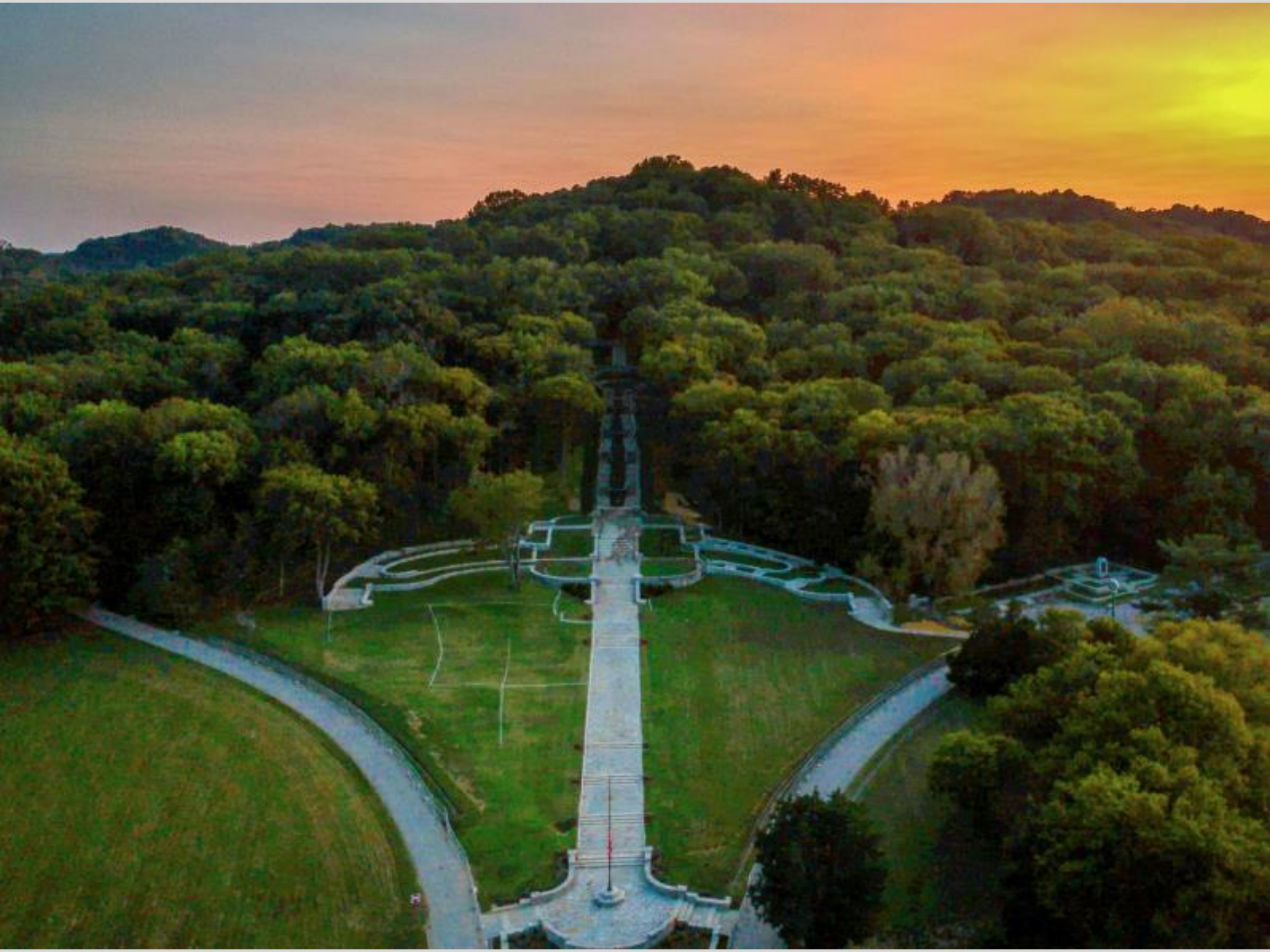
Big Points, Important Processes, Records, Time, Life, Effects on Us

Operation

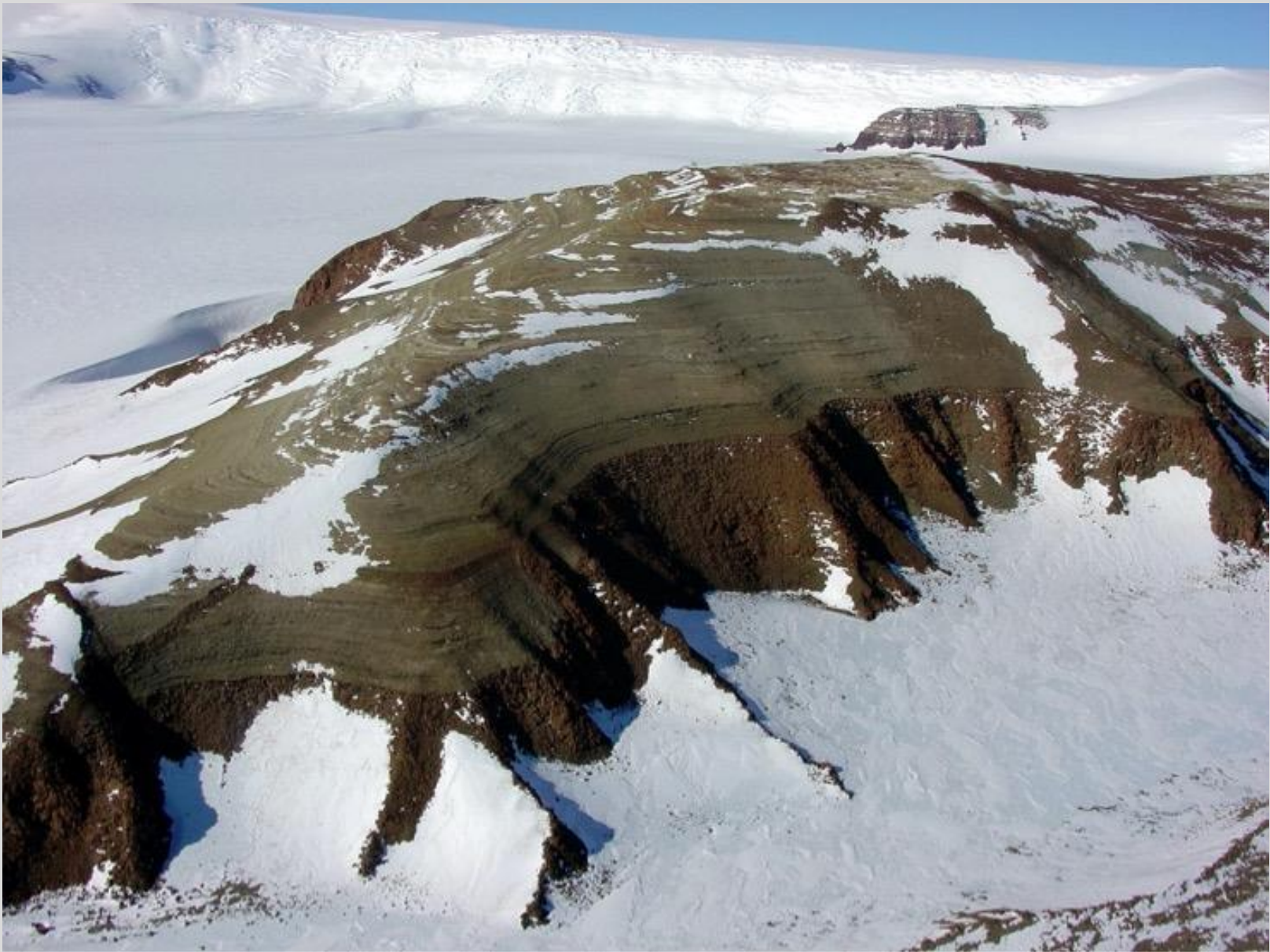
Class meetings – lectures (power points posted) Fort Negley activities
(outdoors)



Why Fort Negley?







Much better place for a geoscientist than Middle Tennessee....

. Big points about the earth

Big Point #1 - Earth has 4 major components or spheres.

What are they?



Big points about the Earth

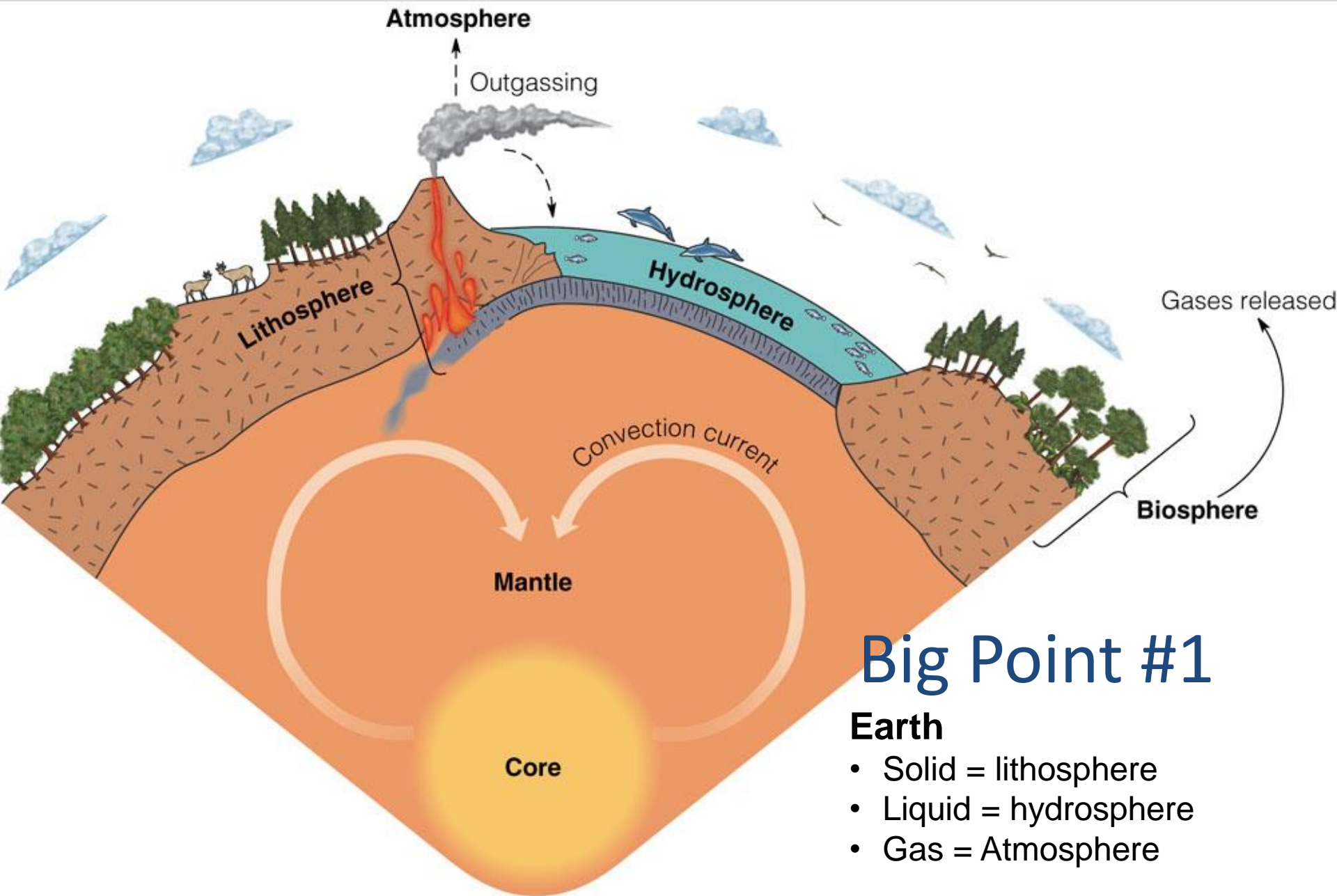
B.P. #1. Earth has 4 components -- “spheres”

Solid (“lithosphere”) - rock but also has a more specific meaning)

Water (hydrosphere) - oceans, rivers+lakes, water in ground

Air (atmosphere)

Living things (biosphere)



Big Point #1

Earth

- Solid = lithosphere
- Liquid = hydrosphere
- Gas = Atmosphere

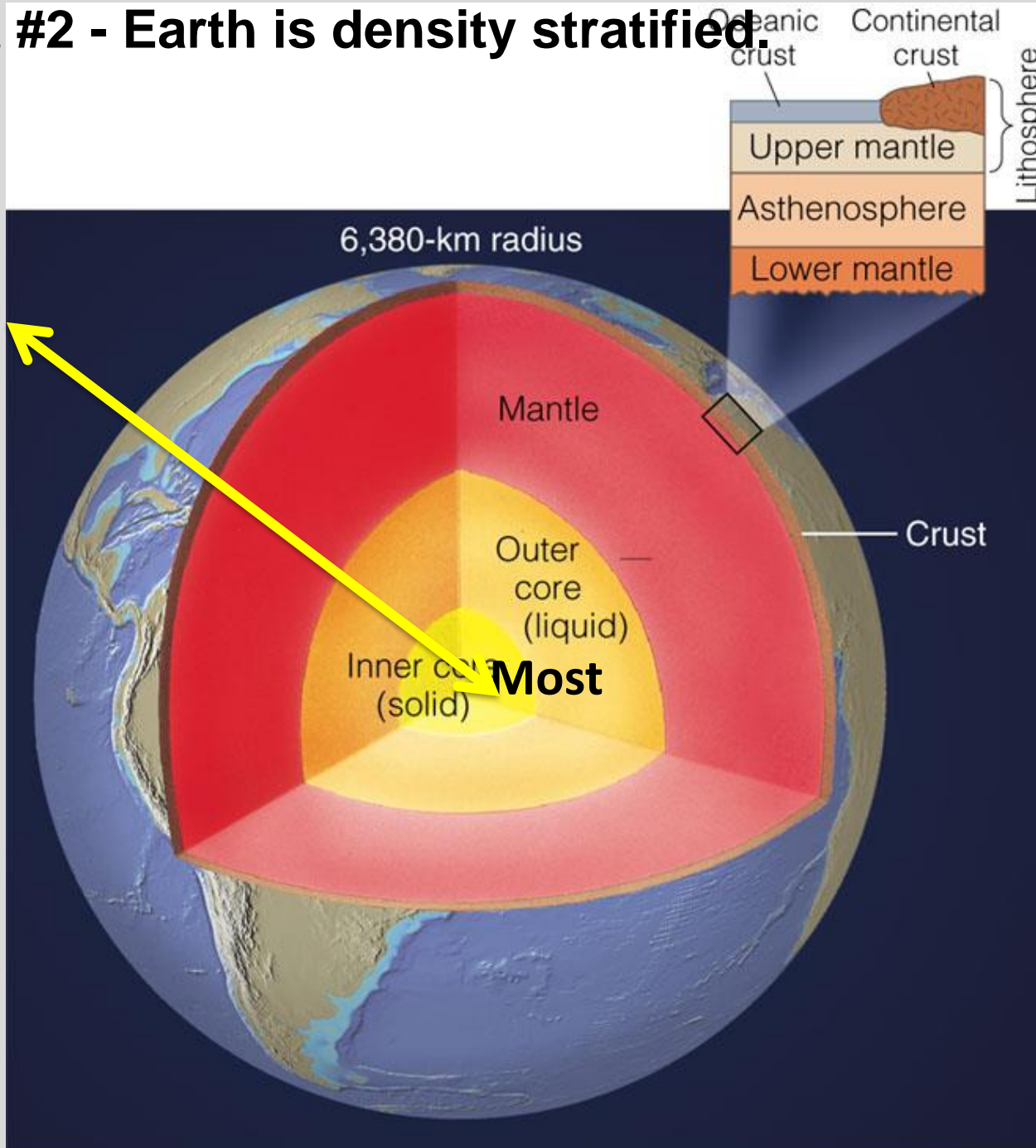
Big points about the Earth

B.P. #1. Earth has 4 components -- “spheres”

B.P. #2. Earth is density stratified - most dense in middle

Big Point #2 - Earth is density stratified.

least



Big points about the Earth

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B.P. #3 Life support systems=hydrosphere and atmosphere







Big points about the Earth

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B.P. #4 Materials move within each sphere and between spheres

Earth has always had about the same amount of “stuff” (different elements) –elements move around from one part of the earth to another

Earth is like a bowl of soup –

When formed had certain amount of each element –

-- amounts have not changed – the elements only move around to different ingredients



Time 1



time 2



time 3

Different amounts of solids and liquids and gases



Coal

What do these have in common?

Big points about the Earth

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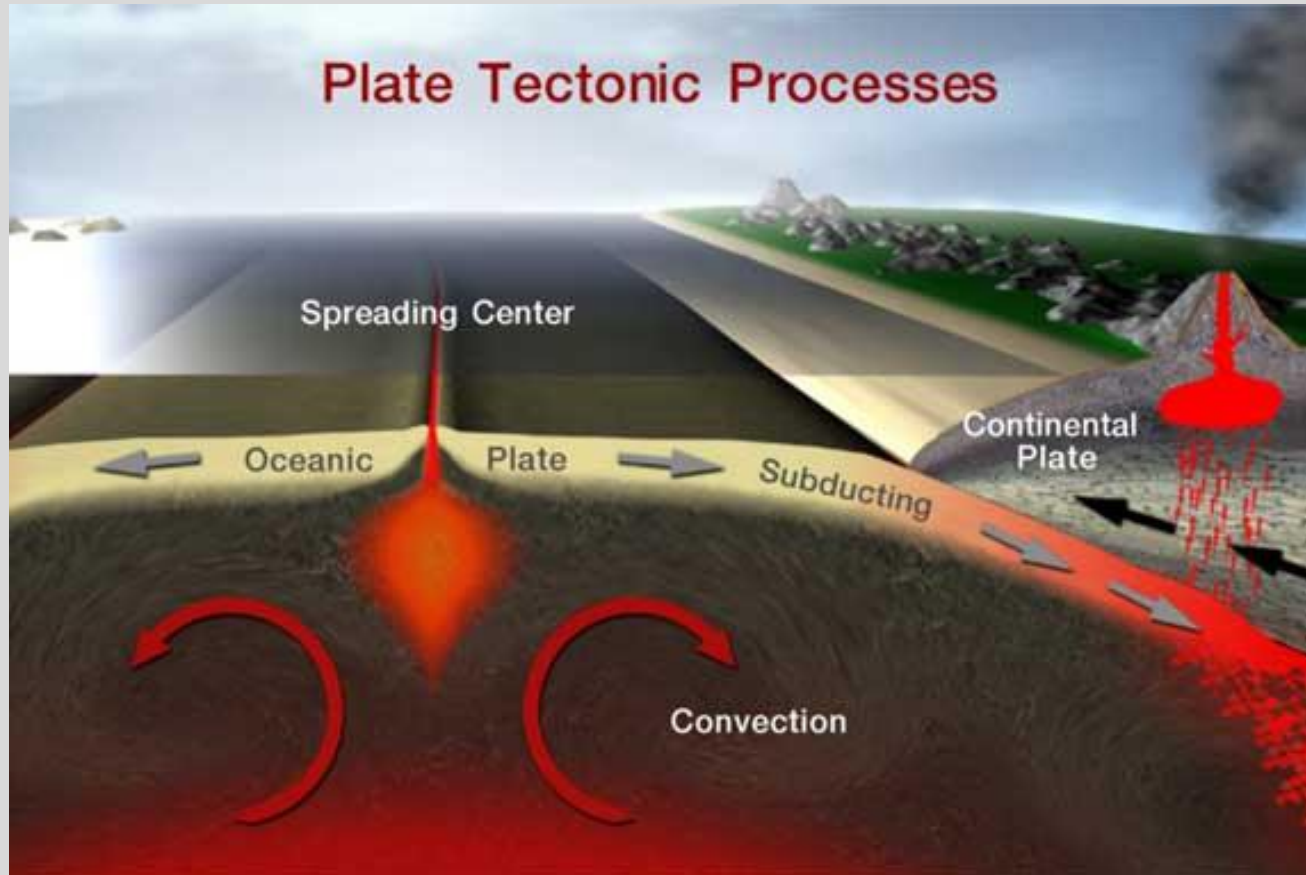
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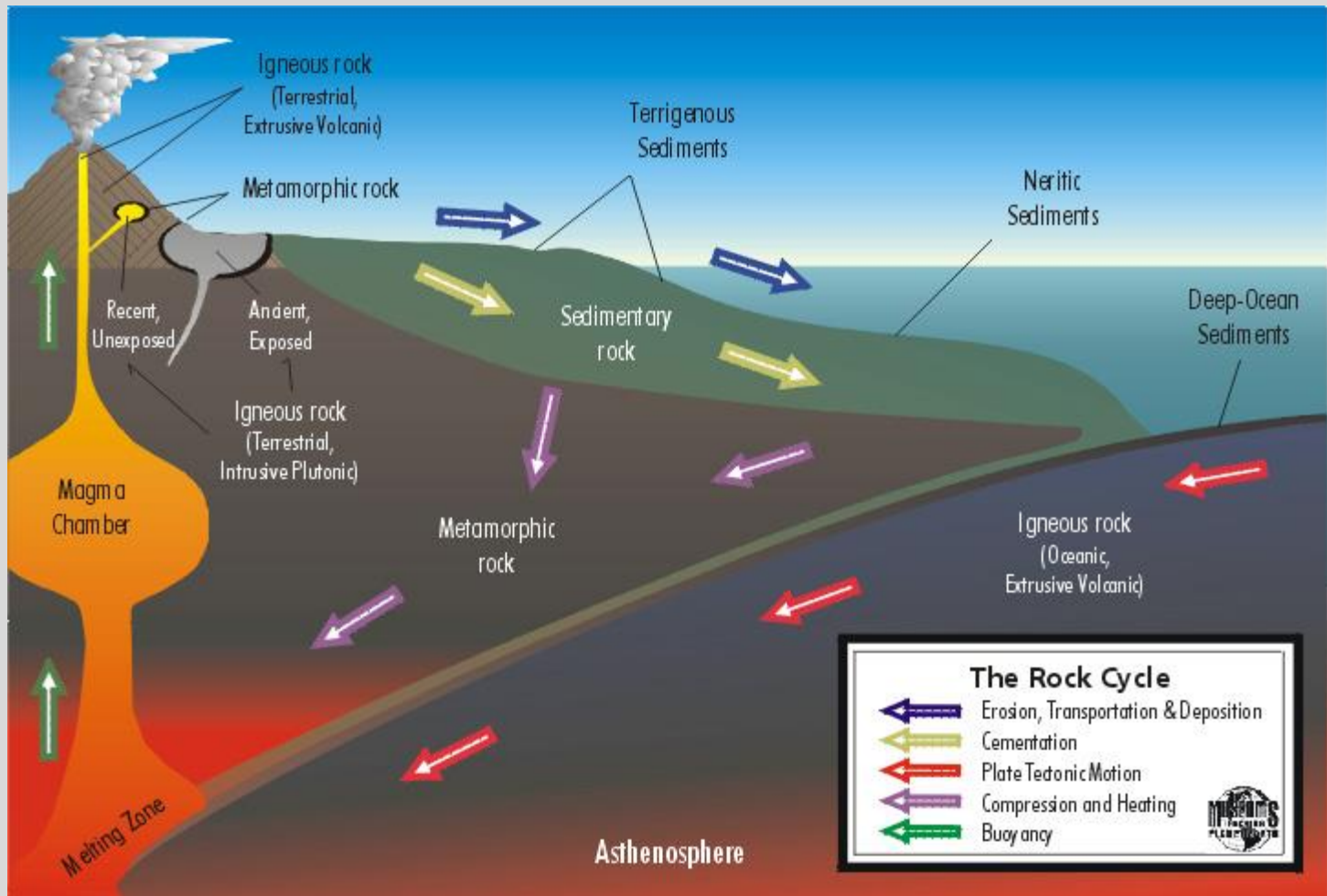
B.P. #4 Materials move within each sphere and between spheres

Earth has always had about the same amount of “stuff” - just moves around from one part of the earth to another

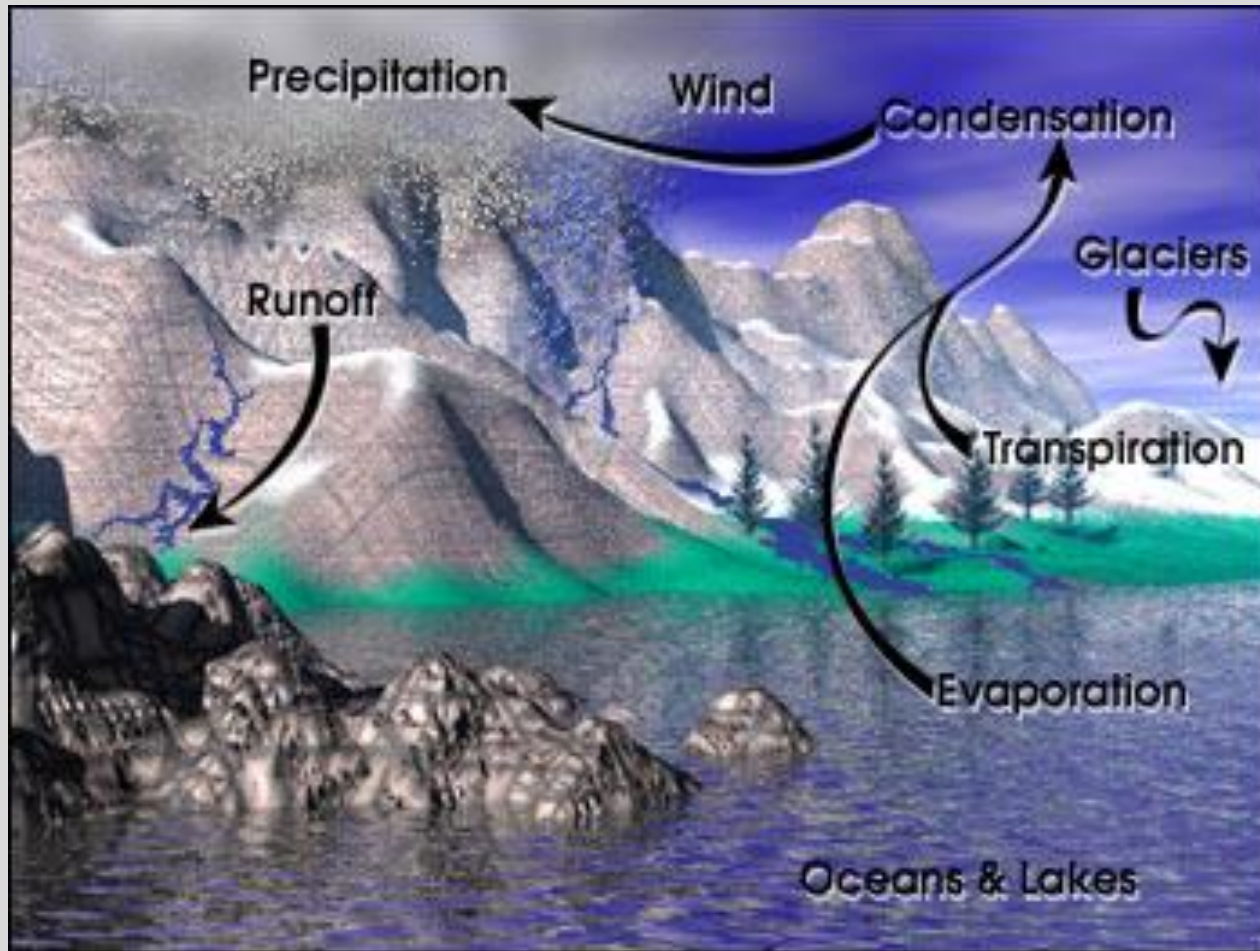
Important cycles include the plate tectonic cycle, hydrologic cycle, rock cycle, carbon cycle



Plates move transferring material from solid earth, to hydrosphere, atmosphere and back around

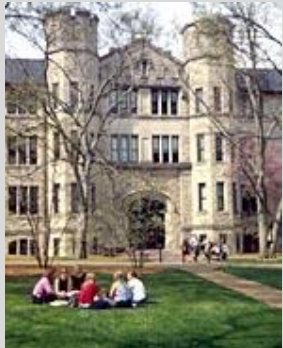
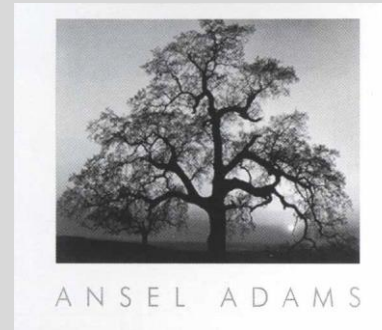
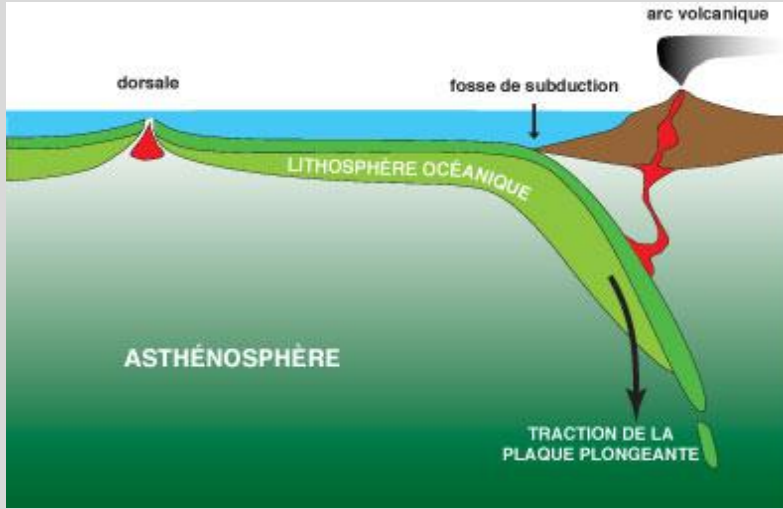


Rocks change from one type to another as a result of hydrologic, plate tectonic and carbon cycles



Water moves - within between rocks, air, oceans, ice, life (hydrologic cycle)

Carbon moves biosphere-lithosphere-atmosphere-hydrosphere over millions of years



Big points about the Earth

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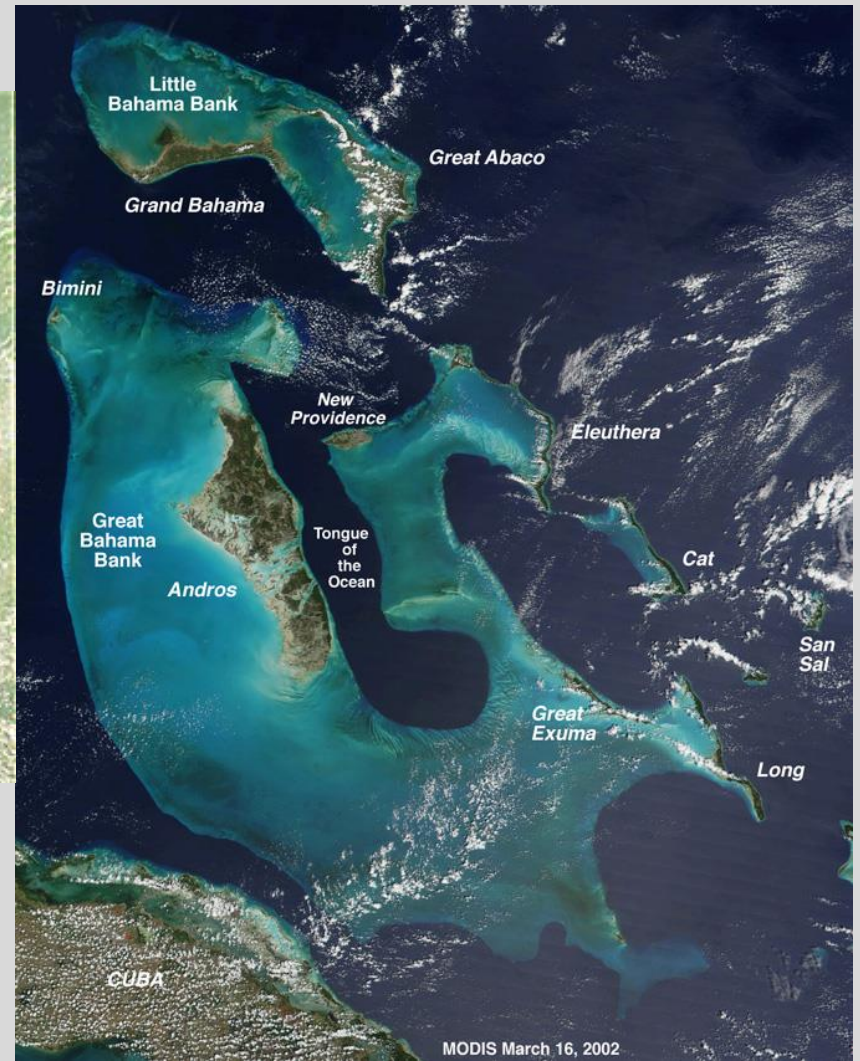
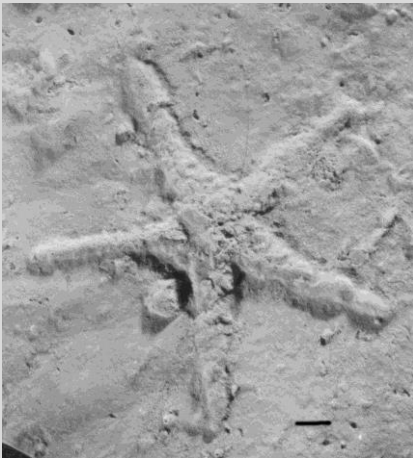
B.P. #5 Present state of earth is temporary - different in past, future

Big Point #5: Change

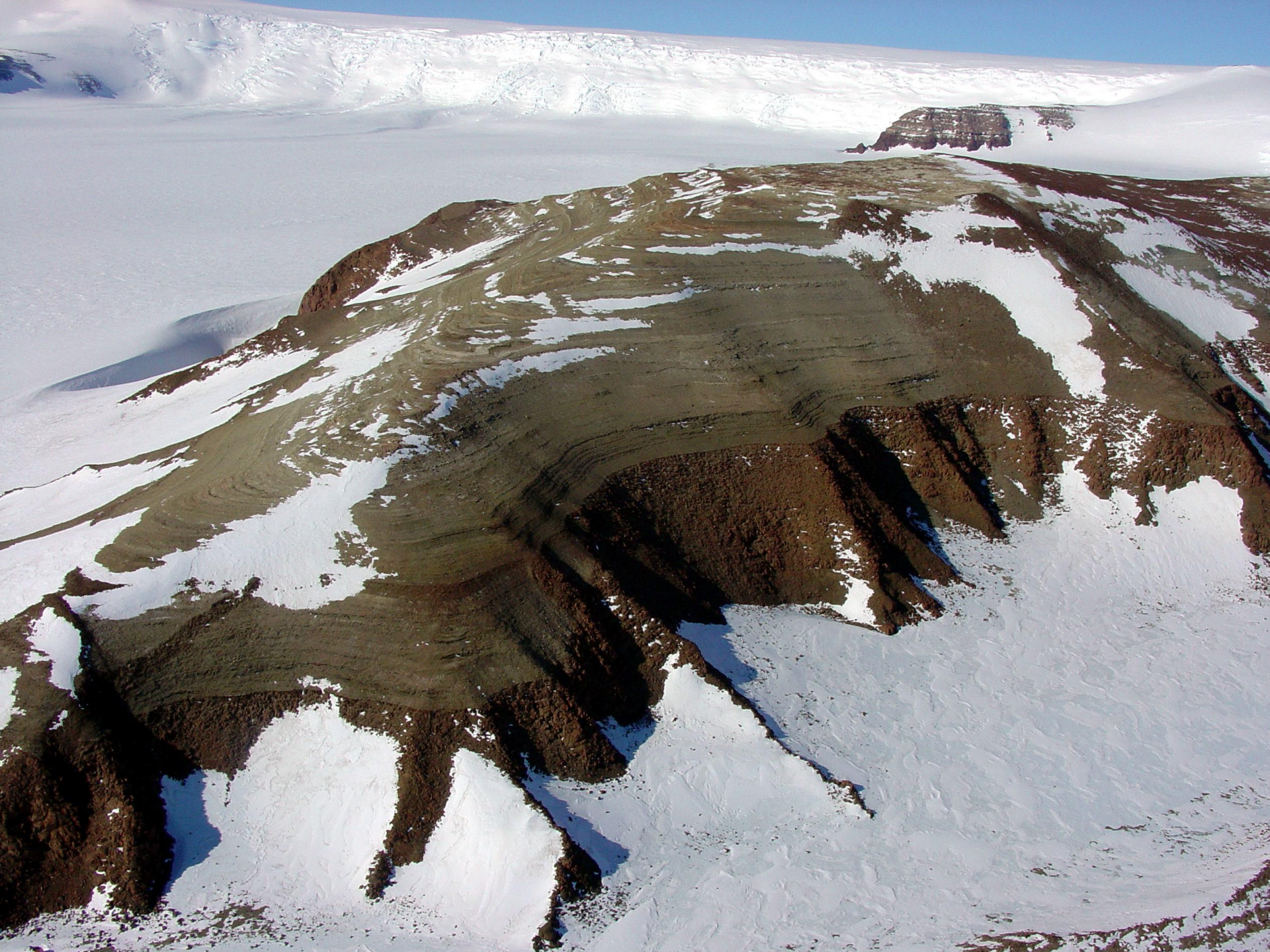
Tennessee from space

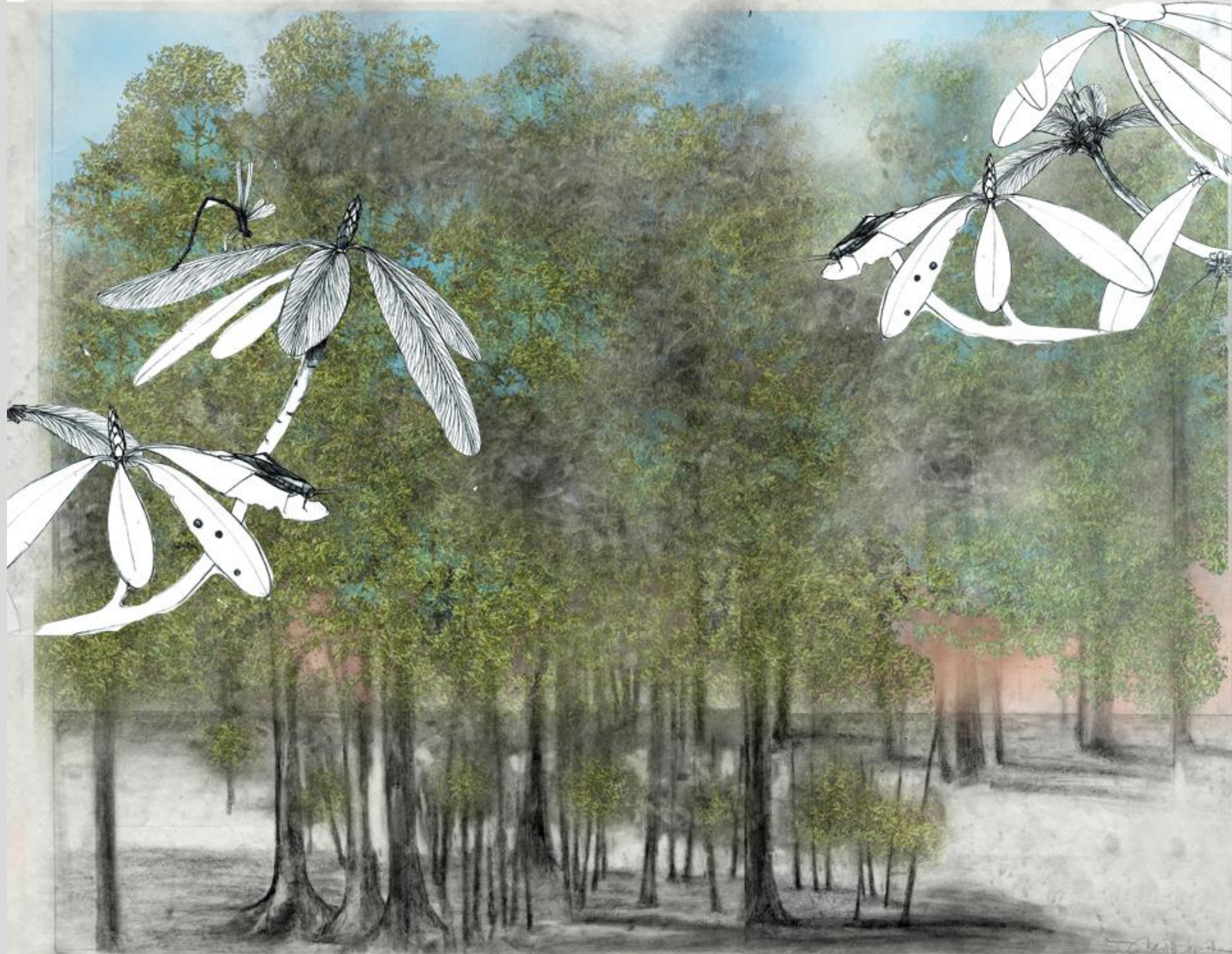


Tennessee today



**Bahamas today, Tennessee of
400 million years ago...
Shallow sea (light blue)**





Roman Antiken Glossopars quae Schell 1879

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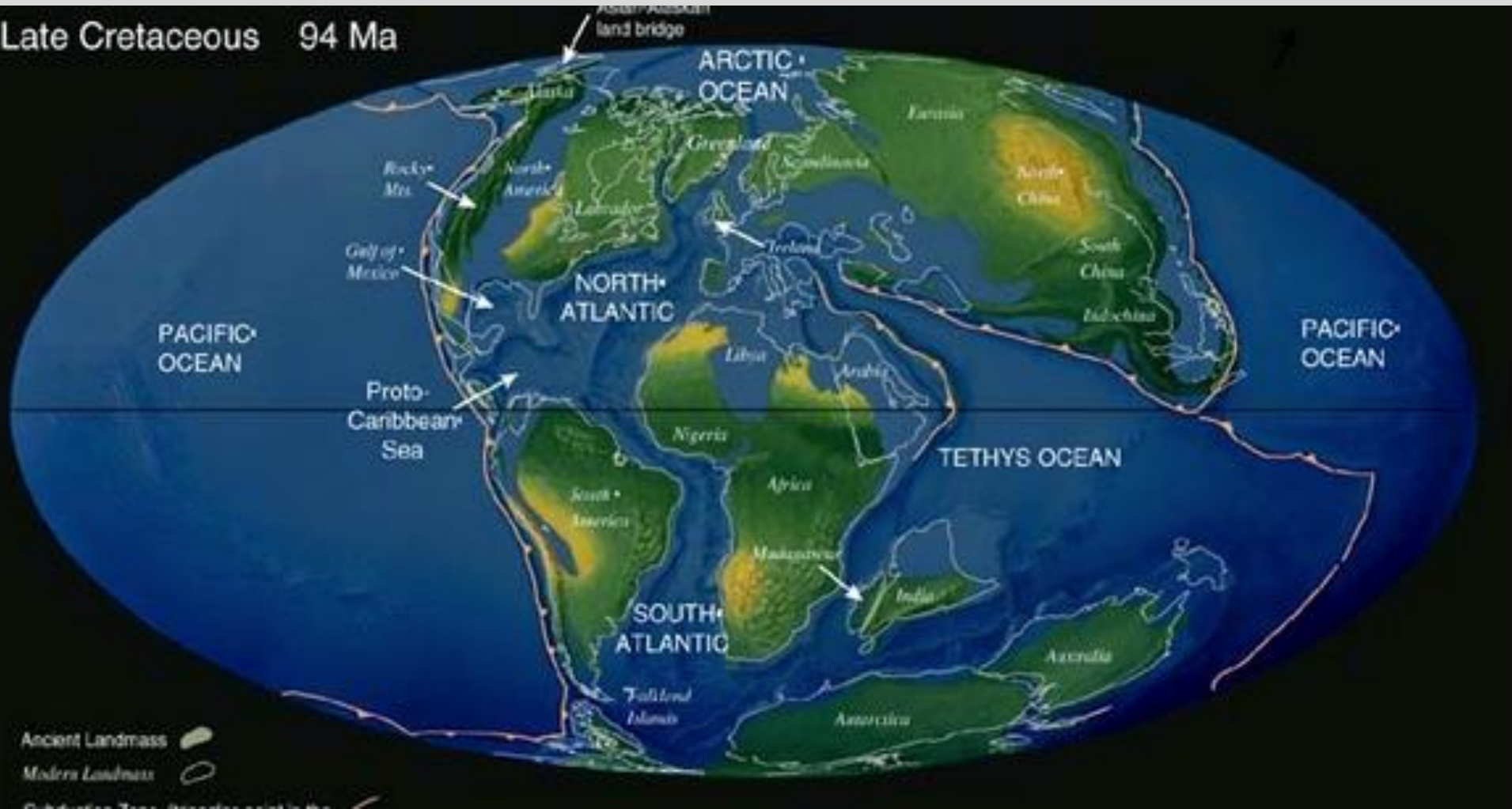
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B.P. #5 Present state of earth is temporary - different in past, future

B.P. #6 Rates and scale of earth change are difficult to comprehend – either too slow relative to human life, or too huge in scale to imagine



Late Cretaceous 94 Ma



Continents moving apart at a few cm per year

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B.P. #7 Humans are capable of altering the Earth - particularly the life support systems

The Aral Sea

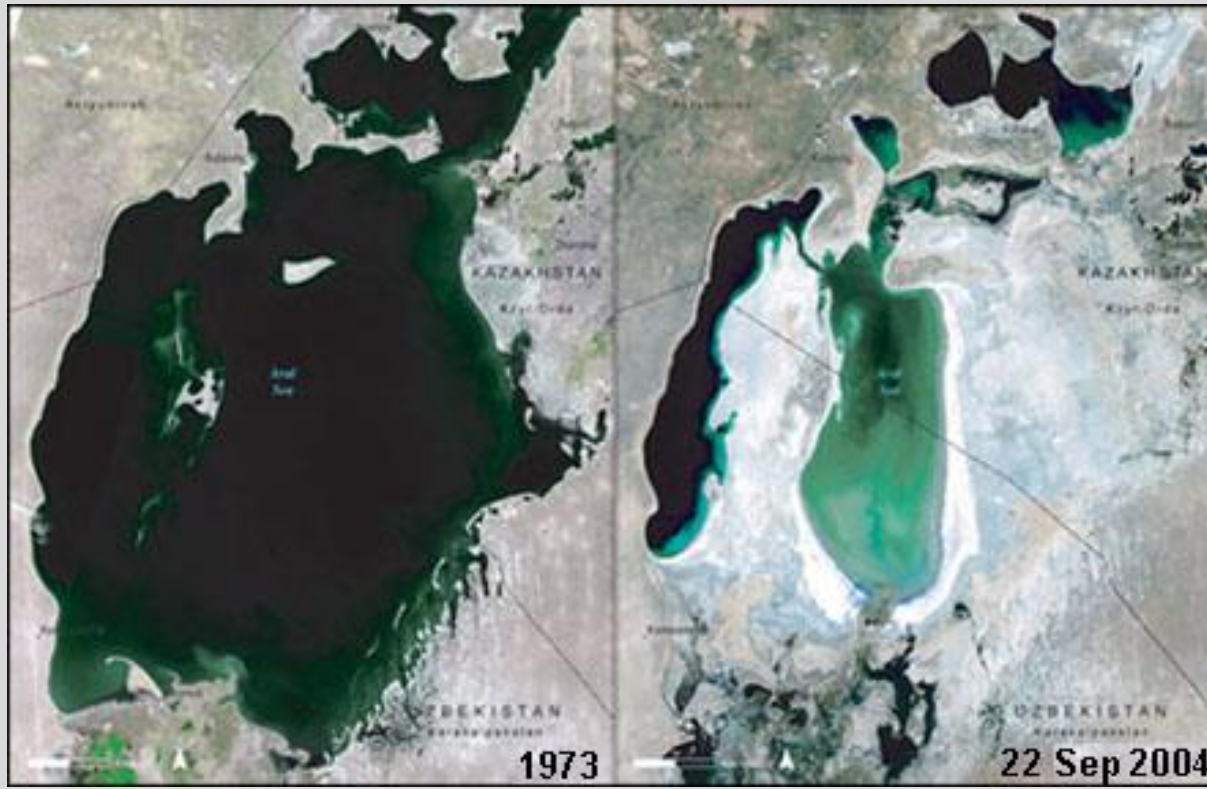
Humans alter **RATES** of processes



1957



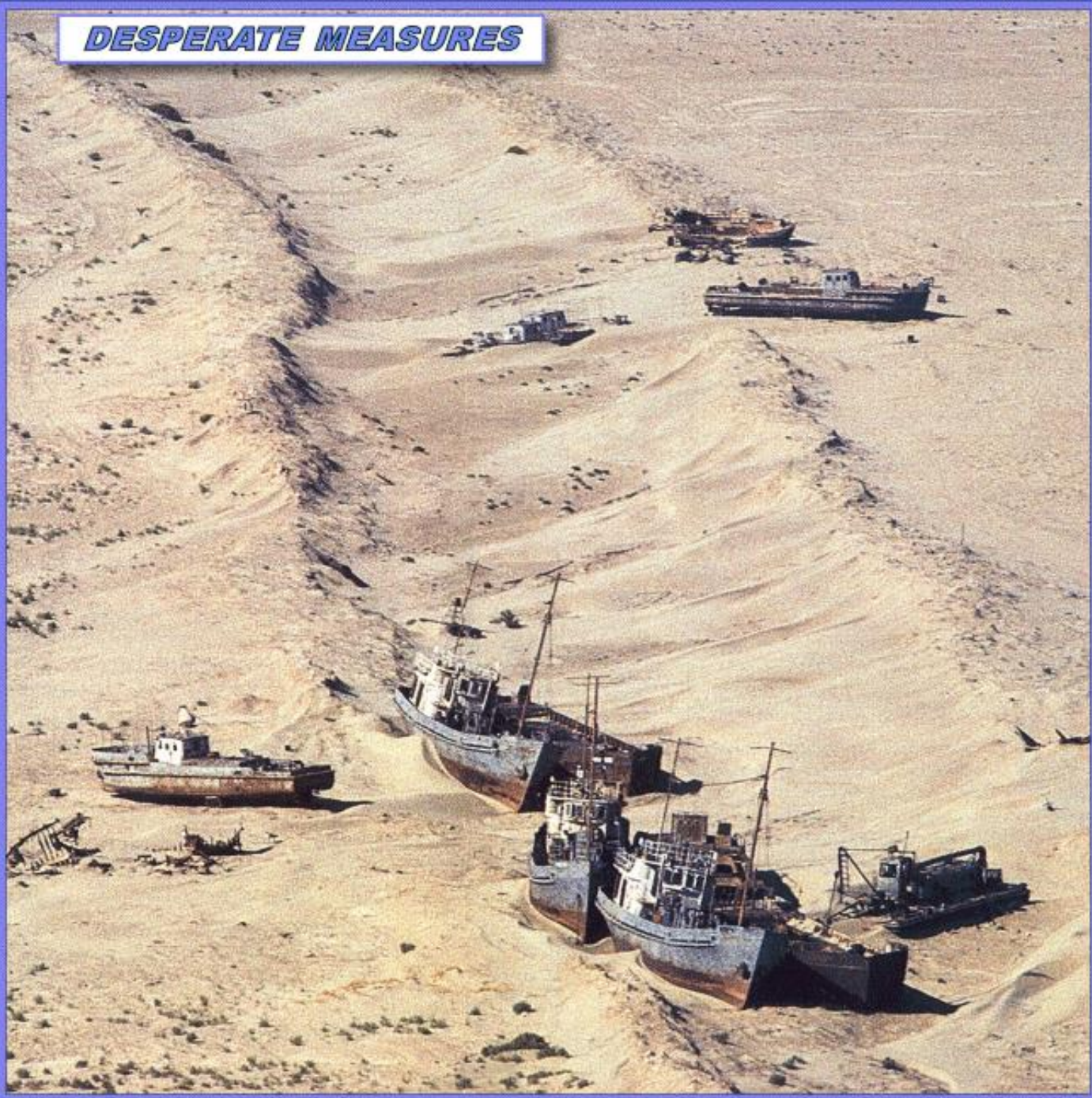
NOW



1973

22 Sep 2004

DESPERATE MEASURES



What Participants Will Be Able to Do After This Course

- Describe the spheres of the Earth and explain how they interact
- Explain major cycles of materials in the Earth.
- Give examples of how changes in Earth cycling result in changes in Earth events, the scale and rate of processes, and history, including that of Nashville.
- Locate Earth events recorded in Nashville and changes in life on a mental timeline
- Explain how Nashville's landfill woes, propensity for flooding, and development pattern are legacies of its deep-time history.
- Find and identify fossils in Nashville and explain how they live.

Next week –

1. Lecture topic - carbon, water cycles: effects on Nashville

Weather Permitting – (means $T > 25$ degrees, no hard rain or snow)

2. Hands-on activity at flag pole, Fort Negley -
~10 minutes, no walking beyond flag pole

Please dress accordingly and see or contact me with issues, questions.

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