

Physical Geology Course Overview

Dale H. Easley

University of Dubuque



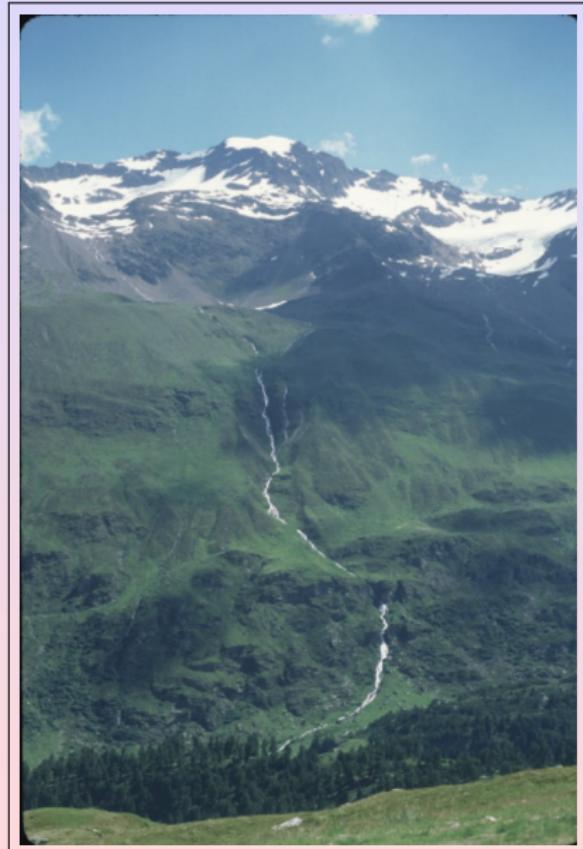
Material for Test 1: Where are we?



To understand local geology, learn these:

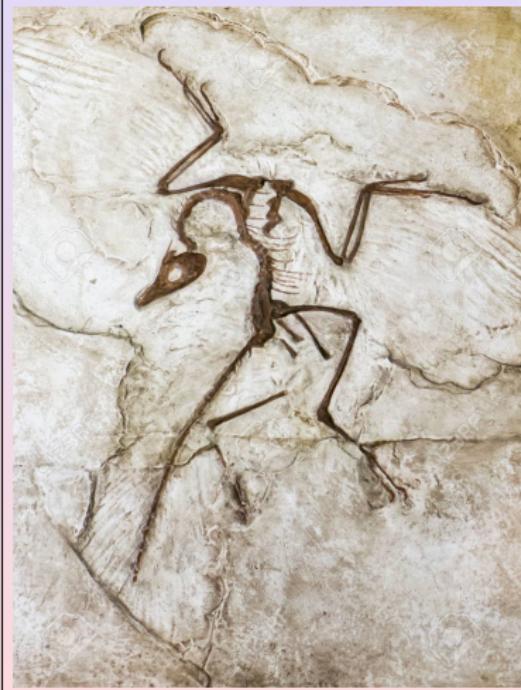
- Physical geology processes)
 - Uniformitarianism
 - Not catastrophism
- Historical geology
 - Geologic time
 - Evolution of landscapes and organisms
- The scientific method

A good story has place, time, and plot.



Age Dating

Relative



Copyright: Jaroslav Moravcik

Absolute



Relative dating



- Superposition
- Cross-cutting relationships
- Original horizontality
- Inclusions
- Fossil succession

Absolute dating using radioactive isotopes



Atomic Nuclei of Three Isotopes of Carbon

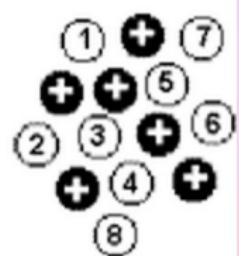
^{12}C



^{13}C



^{14}C



⊕ Proton

○ Neutron

What is an *isotope*?

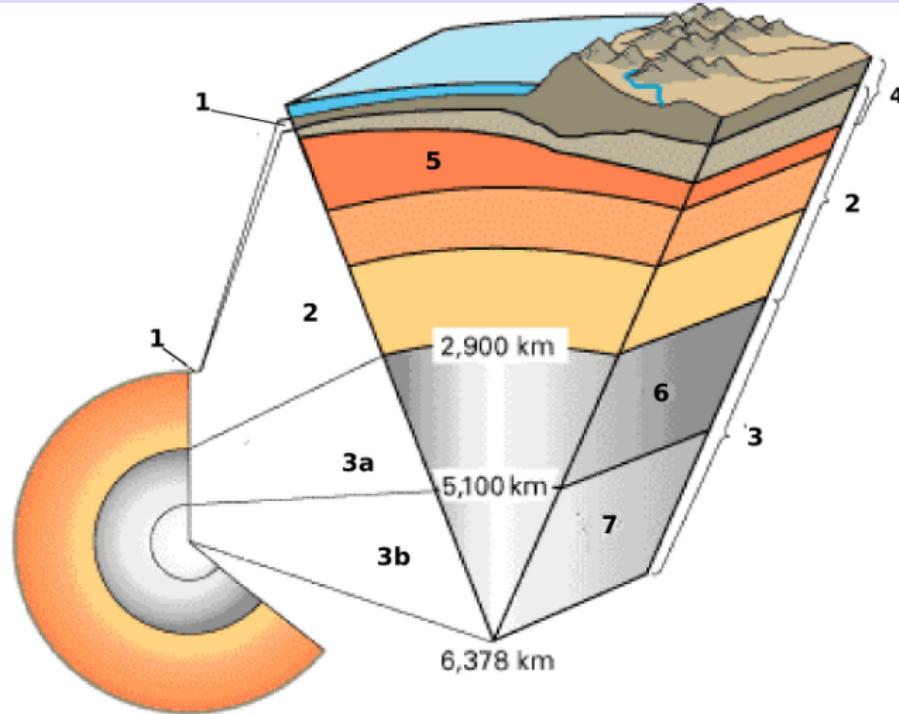
Geologic Time Scale

EON	ERA	PERIOD	EPOCH	Ma		
Phanerozoic	Cenozoic	Tertiary	Holocene	0.011 -		
			Pleistocene	Early	0.8 -	
				Early	2.4 -	
				Late	3.6 -	
				Early	5.3 -	
				Middle	11.2 -	
				Early	16.4 -	
				Late	23.0 -	
				Early	28.5 -	
				Late	34.0 -	
		Paleogene	Eocene	Early	41.3 -	
				Middle	49.0 -	
				Early	55.8 -	
				Late	61.0 -	
				Early	65.5 -	
			Mesozoic	Cretaceous	Late	99.6 -
					Early	145 -
					Late	161 -
	Middle	176 -				
	Early	200 -				
	Late	228 -				
	Middle	245 -				
	Early	251 -				
Paleozoic	Permian	Late	260 -			
		Middle	271 -			
		Early	299 -			
		Late	306 -			
		Middle	311 -			
		Early	318 -			
		Late	326 -			
		Middle	345 -			
Proterozoic	Mississippian	Early	359 -			
		Late	385 -			
		Middle	397 -			
		Early	416 -			
		Late	419 -			
		Early	423 -			
		Late	428 -			
		Middle	444 -			
Archean	Ordovician	Early	488 -			
		Late	501 -			
		Middle	513 -			
		Early	542 -			
		Late	Neoproterozoic (Z)	1000 -		
		Middle	Mesoproterozoic (Y)	1600 -		
		Early	Paleoproterozoic (X)	2500 -		
		Late		3200 -		
	Early		4000 -			
Hadean						

Another use for isotopes: Telling past temperatures (the isotope dance)



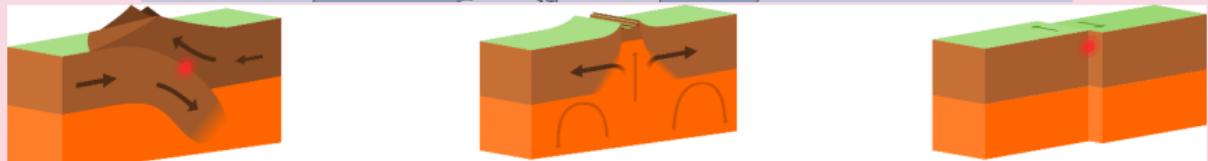
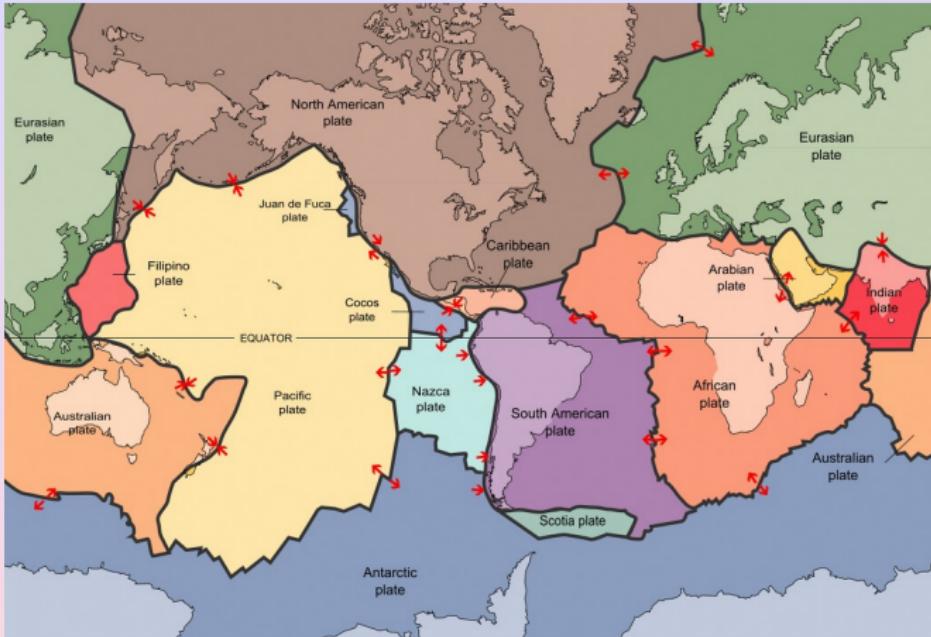
The interior of the Earth



https://upload.wikimedia.org/wikipedia/commons/f/f7/Earth_cross_section-i18.png

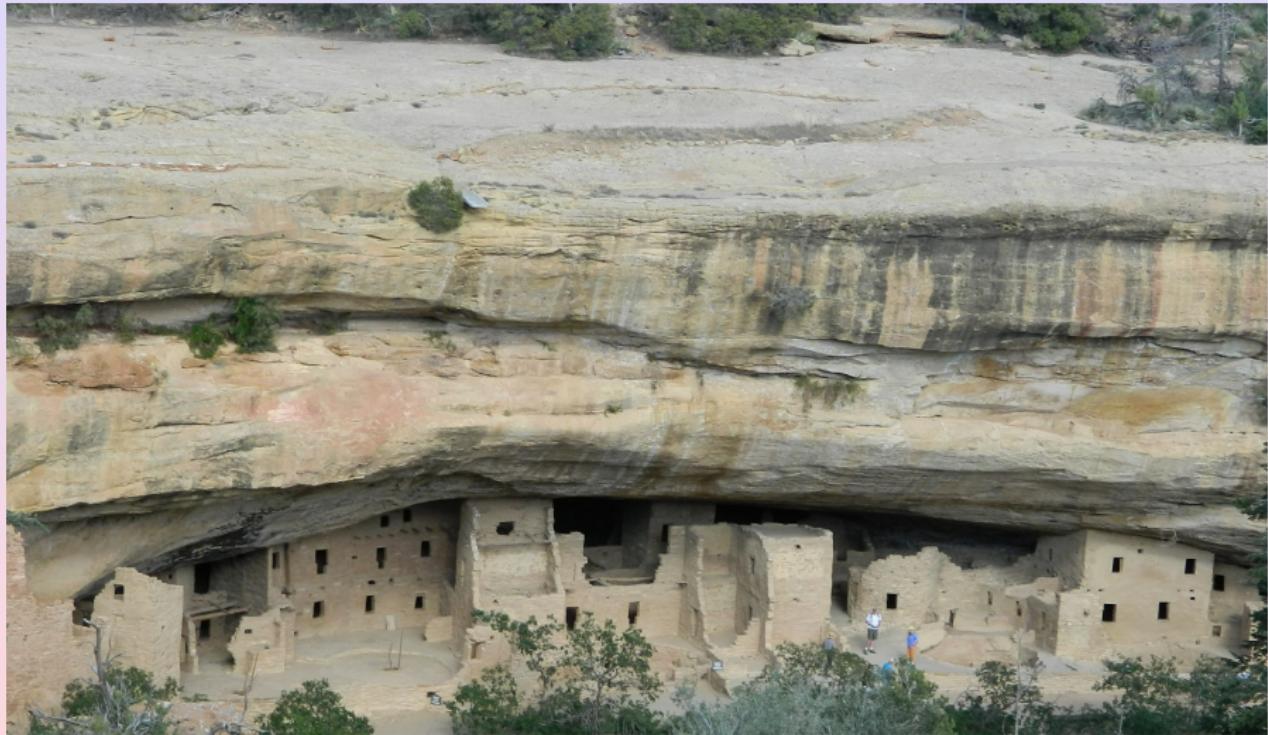
We live on the outermost scum. Notice the continents are thicker than the ocean bottoms.

The scum is in motion: Plate tectonics

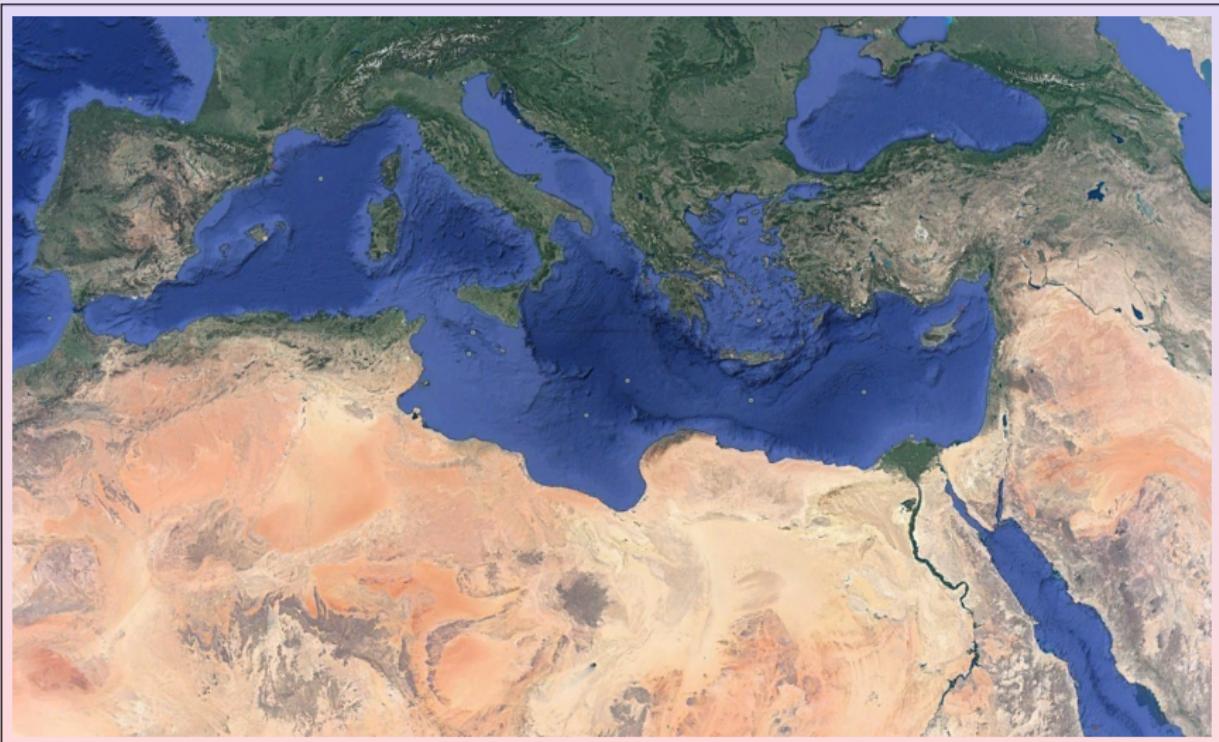


https://en.wikipedia.org/wiki/Plate_tectonics

Sketch time: The rock cycle



Sketch time: Why do we think the Mediterranean sea was once a desert?



Remember the review questions!

