

Science Camp

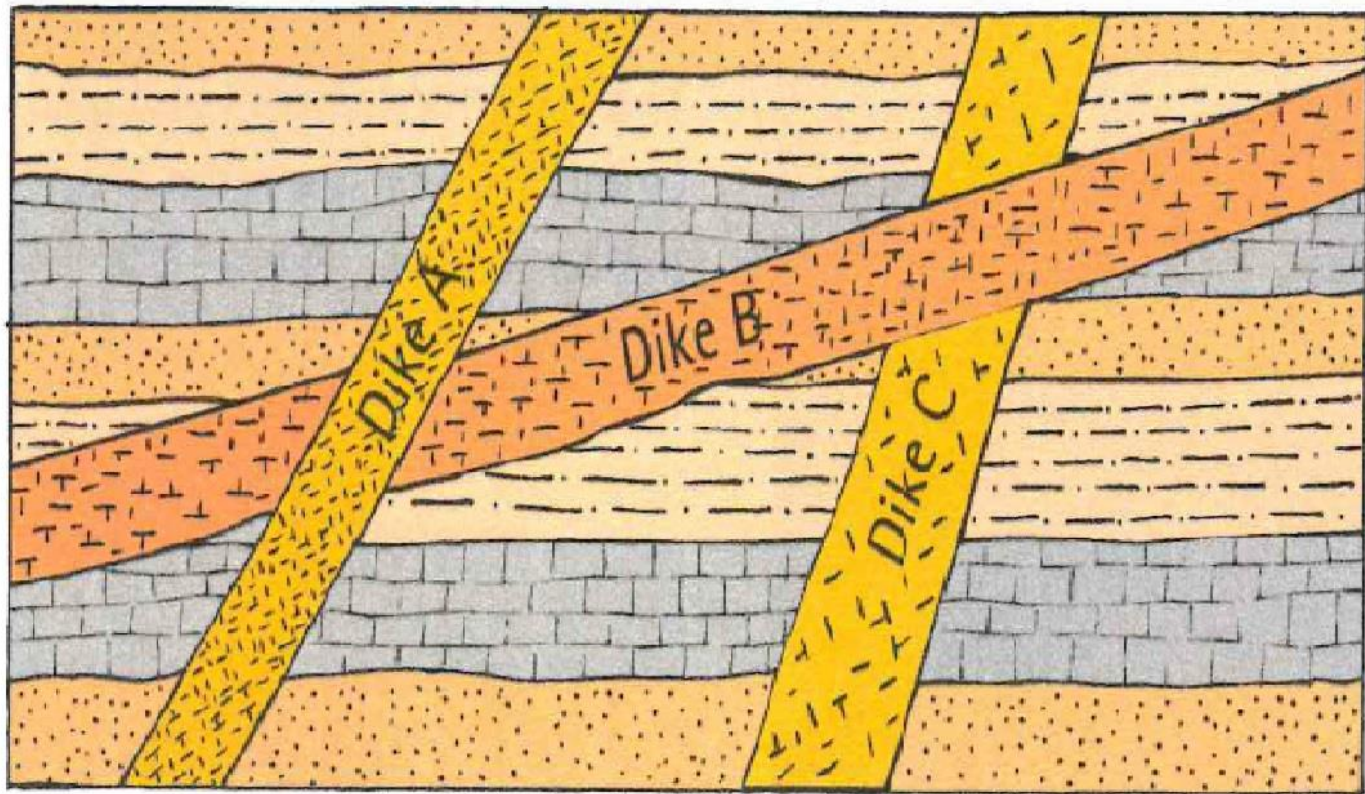
At New Hope Bible Church

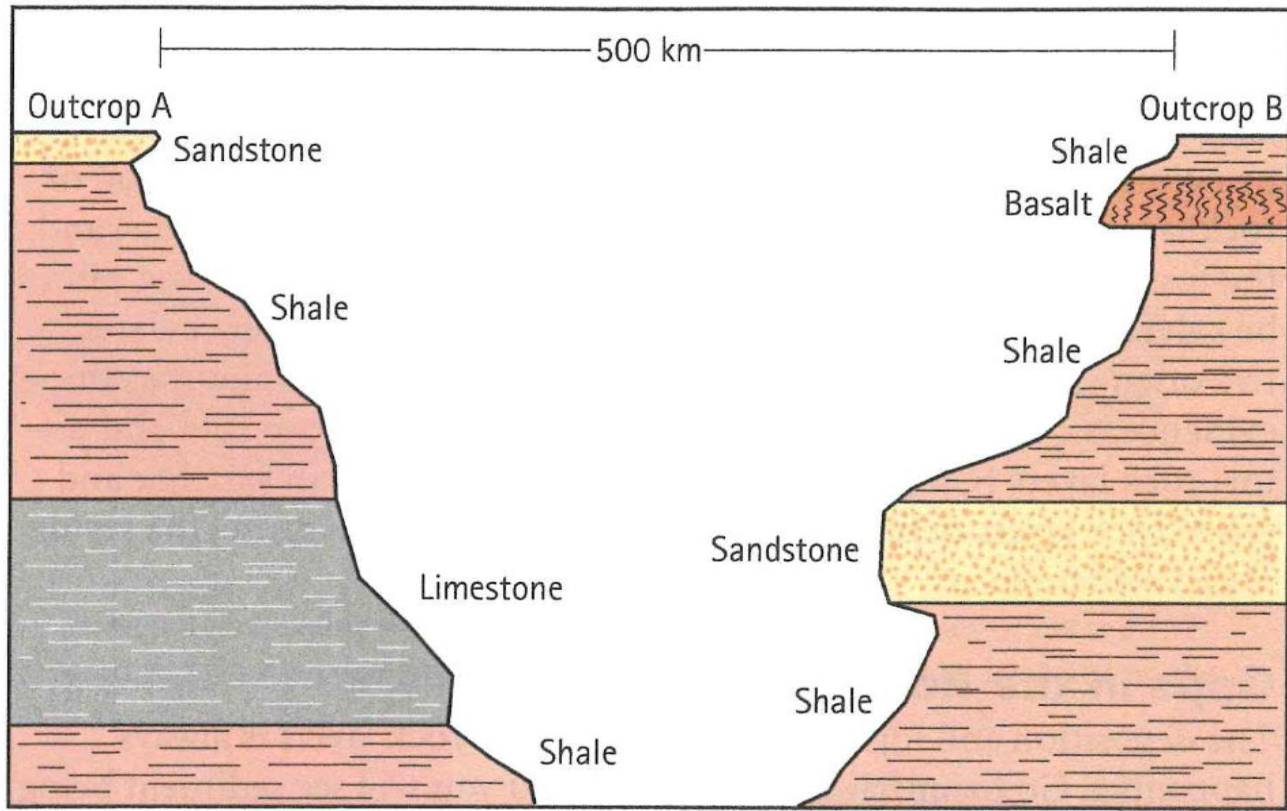
Relative Dating

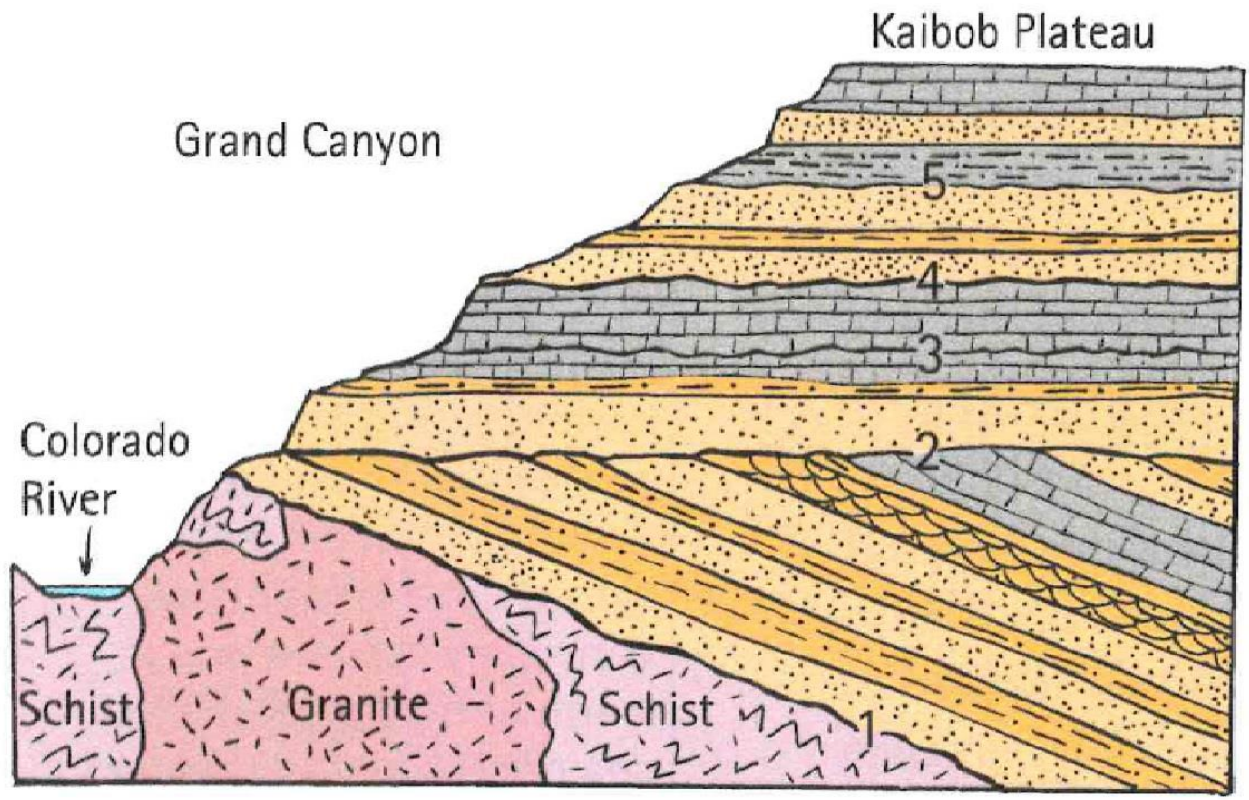
- *Determining the order of events*
 - *Contrasts with absolute dating, which gives a specific date for an event.*

Relative Dating

- *Principle of Original Horizontality*
- *Principle of Superposition*
- *Lateral Continuity*
- *Inclusions/Cross-Cutting*
 - *Inclusions*
 - *Dikes*
 - *Faults*







Grand Canyon

Kaibob Plateau

Colorado River

Schist

Granite

Schist

5

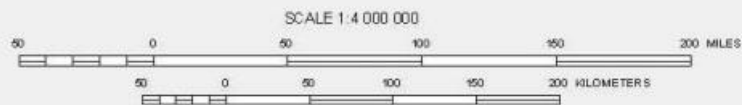
4

3

2

1

Generalized Geology of Kansas



GENERALIZED GEOLOGY OF KANSAS

QUATERNARY SYSTEM

Holocene-Pleistocene Series

-  Loess and river-valley deposits
-  Sand dunes
-  Glacial-drift deposits
-  Limit of glaciation in Kansas

NEOGENE SYSTEM

Pliocene-Miocene Series






-  Ogallala Fm

CRETACEOUS SYSTEM

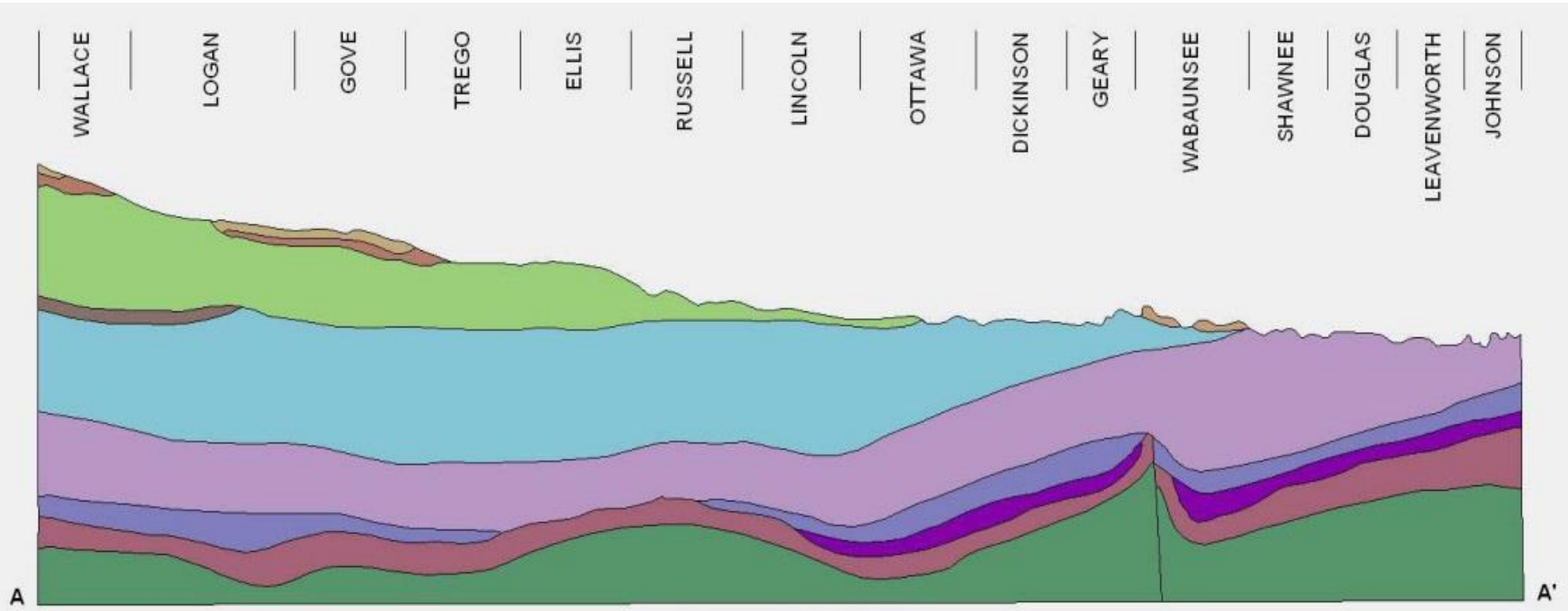
JURASSIC SYSTEM

PERMIAN SYSTEM

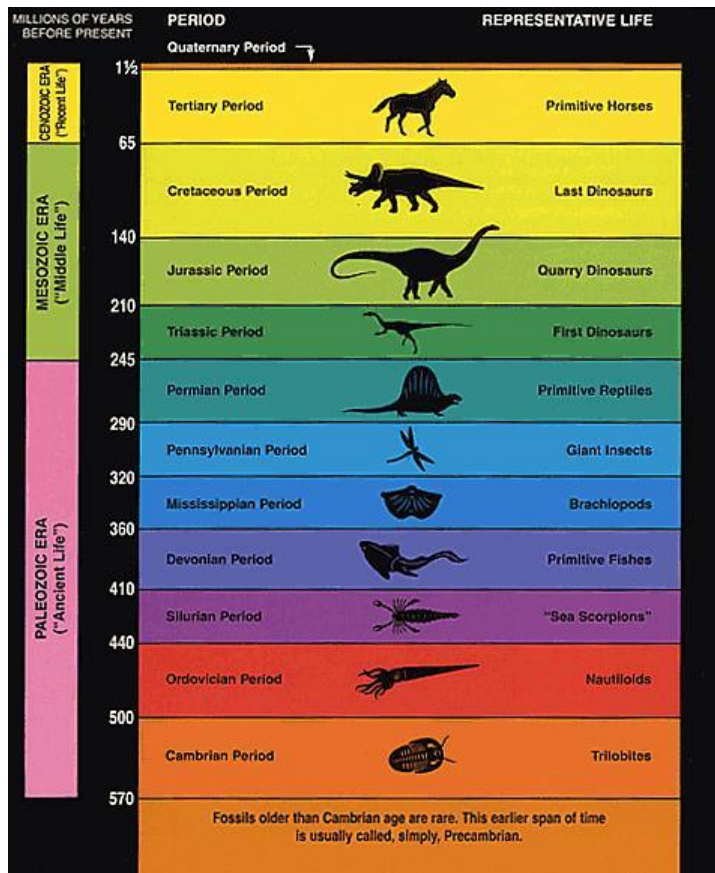
CARBONIFEROUS SYSTEM

-  Pennsylvanian Subsystem
-  Mississippian Subsystem
-  SILURIAN-DEVONIAN SYSTEM
-  CAMBRIAN-ORDOVICIAN SYSTEM
-  PROTEROZOIC EON ("Precambrian")

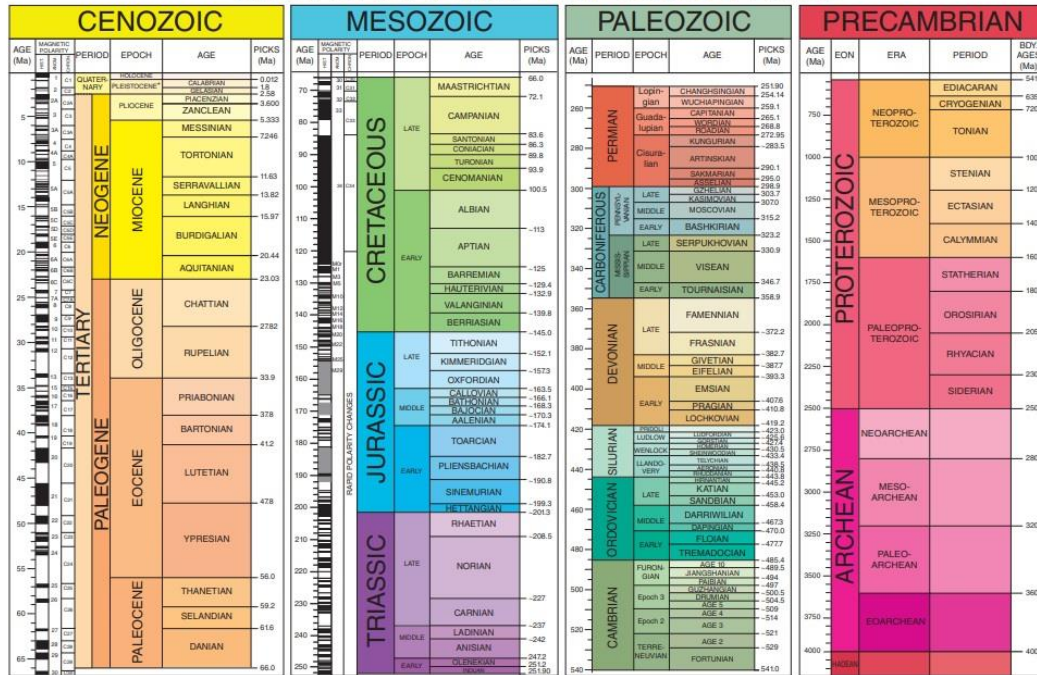
A-A' Line of cross section



Geologic cross section



GSA GEOLOGIC TIME SCALE v. 5.0



Walker, J.D., Geissman, J.W., Bowring, S.A., and Babcock, L.E., compilers, 2018, Geologic Time Scale v. 5.0, Geological Society of America, <https://doi.org/10.1130/2018.CTS00500C>, ©2018 The Geological Society of America

*The Pleistocene is divided into four ages, but only two are shown here. What is shown as Galabrian is actually three ages—Galabrian from 1.80 to 0.781 Ma, Middle from 0.781 to 0.126 Ma, and Late from 0.126 to 0.0117 Ma.

The Cenozoic, Mesozoic, and Paleozoic are the Eras of the Phanerozoic Eon. Names of units and age boundaries usually follow the Gradstein et al. (2012), Cohen et al. (2012), and Cohen et al. (2013, updated) compilations. Numerical age estimates and picks of boundaries usually follow the Cohen et al. (2013, updated) compilation. The numbered epochs and ages of the Cambrian are provisional. A *, before a numerical age estimate typically indicates an associated error of ±0.10 over ±0.80.

REFERENCES CITED

Cohen, K.M., Finney, S., Gibbard, P.L., and Fan, J.-X., 2012, International Chronostratigraphic Chart, International Commission on Stratigraphy, www.stratigraphy.org (accessed May 2012). (Chart reproduced for the 34th International Geological Congress, Brisbane, Australia, 5–10 August 2012.)

Cohen, K.M., Finney, S., Gibbard, P.L., and Fan, J.-X., 2013, The ICS International Chronostratigraphic Chart, Episodes v. 36, no. 3, p. 196–204 (updated 2017). <http://www.stratigraphy.org/index.php/ics-chart-formation>, accessed May 2018.

Gradstein, F.M., Ogg, J.G., Schmitz, M.D., et al., 2012, The Geologic Time Scale 2012, Boston, USA, Elsevier, <https://doi.org/10.1016/B978-0-444-59429-9.00004-4>.

Previous versions of the time scale and previously published papers about the time scale and its evolution are posted to <http://www.geology.org/time-scale>.



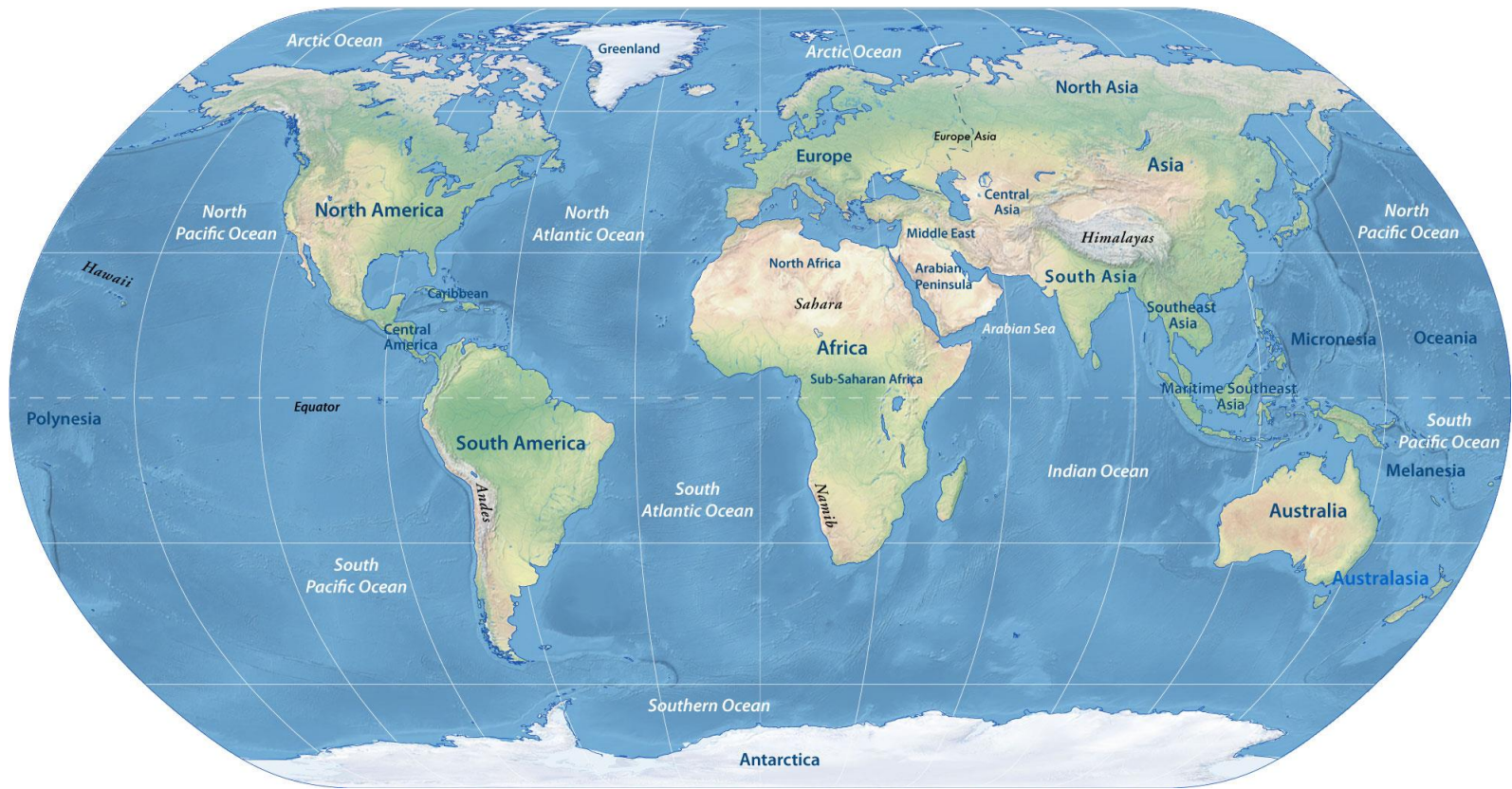
Characteristic Earth Layers		Biblical History
Cenozoic	Holocene	Early Bronze Age* (Abraham)
	Pleistocene	Ice Age + Stone Age* (Babel, Job)
	Tertiary	Post-Flood Residual Catastrophes (Pre-Babel)
Mesozoic	Earth Covered by Floodwater, Then Water Abates into Oceans (Noah)	
Paleozoic	Floodwaters Rise over Earth, + Ocean Floor Cataclysm (Noah)	
Upper Proterozoic	Pre-Flood Processes (Adam)	
Lower Proterozoic	Rock from Creation Week, Days 1-3	
Archean		

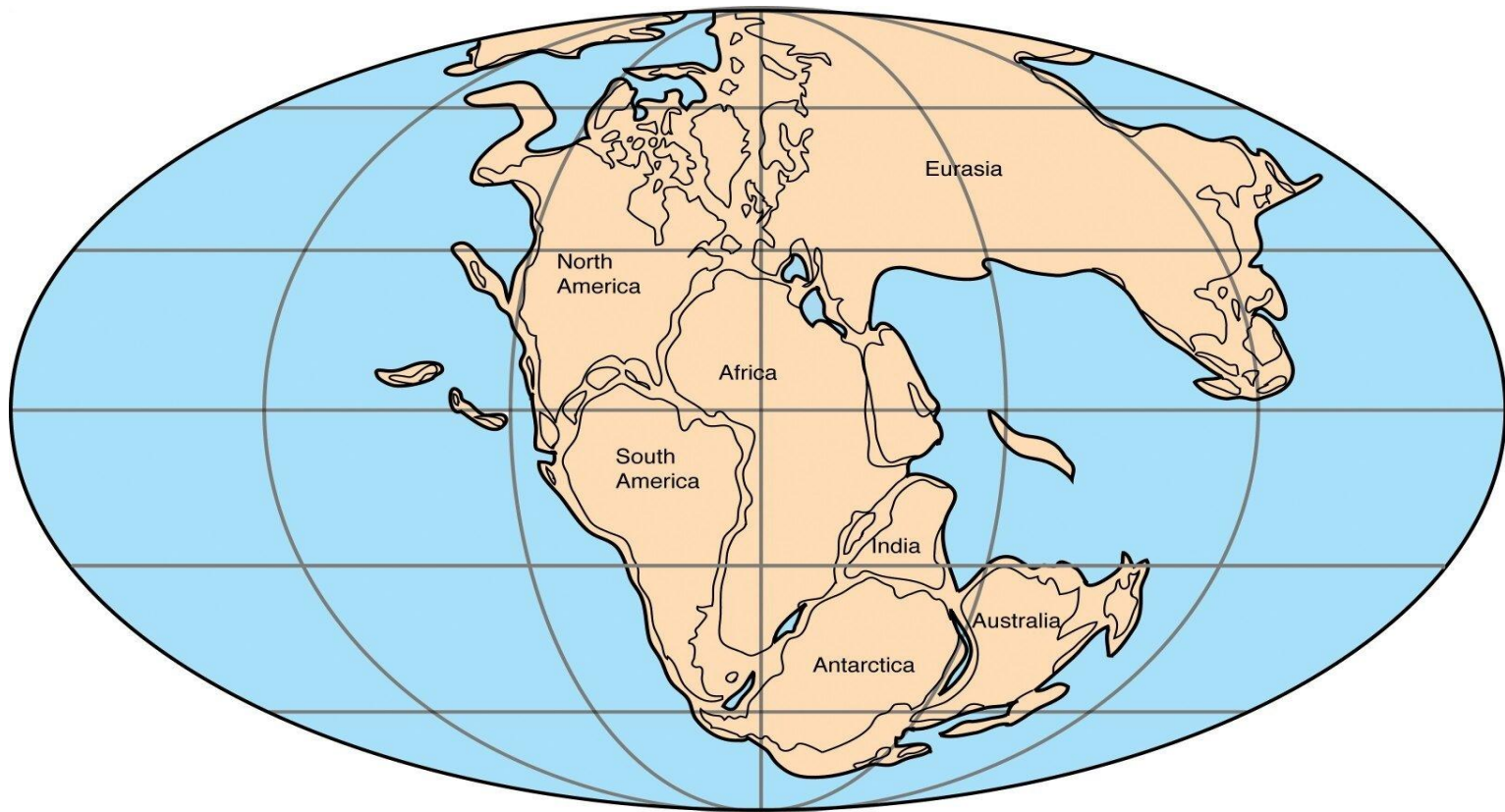
Causes of the Flood

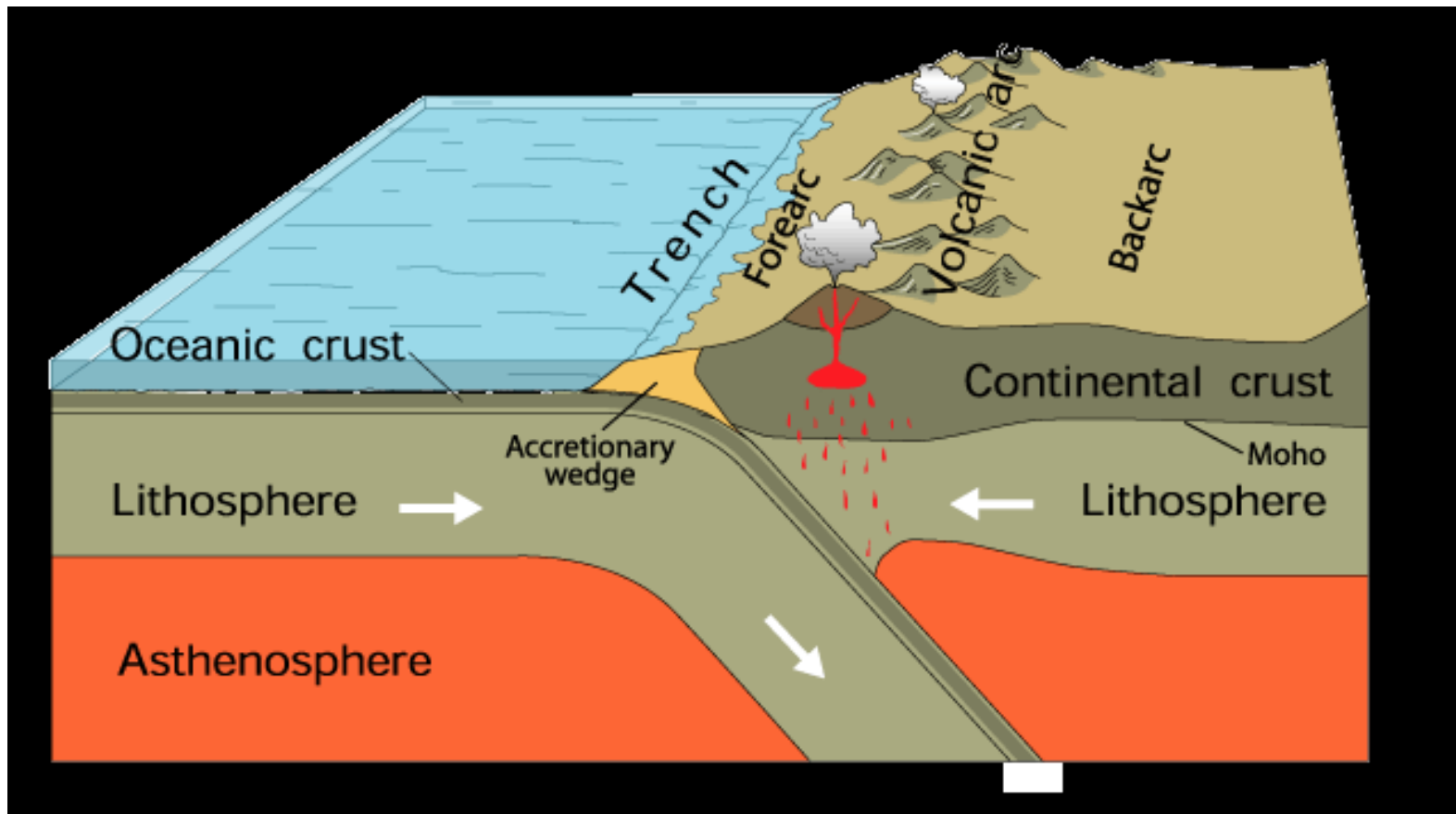
- *Fountains of the Great Deep*
 - *Possibly referring to volcanism*
 - *Maybe associated with geysers*
- *Windows of the Heavens*
 - *Probably figurative for an abundance of rain*

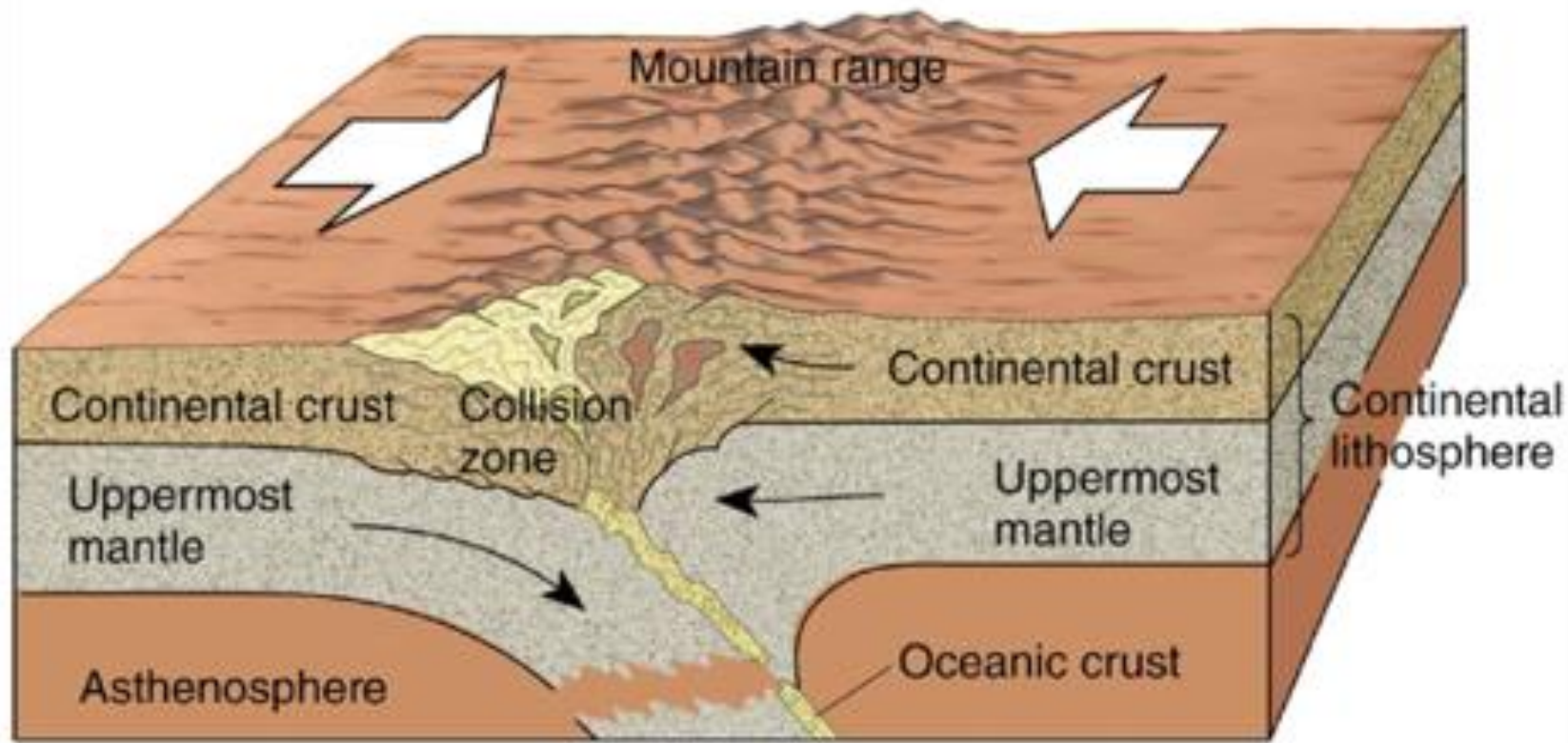
Windows of Heaven

- But Elisha said, “Hear the word of the Lord: thus says the Lord, Tomorrow about this time a seah of fine flour shall be sold for a shekel, and two seahs of barley for a shekel, at the gate of Samaria.” Then the captain on whose hand the king leaned said to the man of God, “If the Lord himself should make *windows in heaven*, could this thing be?” But he said, “You shall see it with your own eyes, but you shall not eat of it.”
 - *2 Kings 7:1-2*
 - *2 Kings 7:18-19*





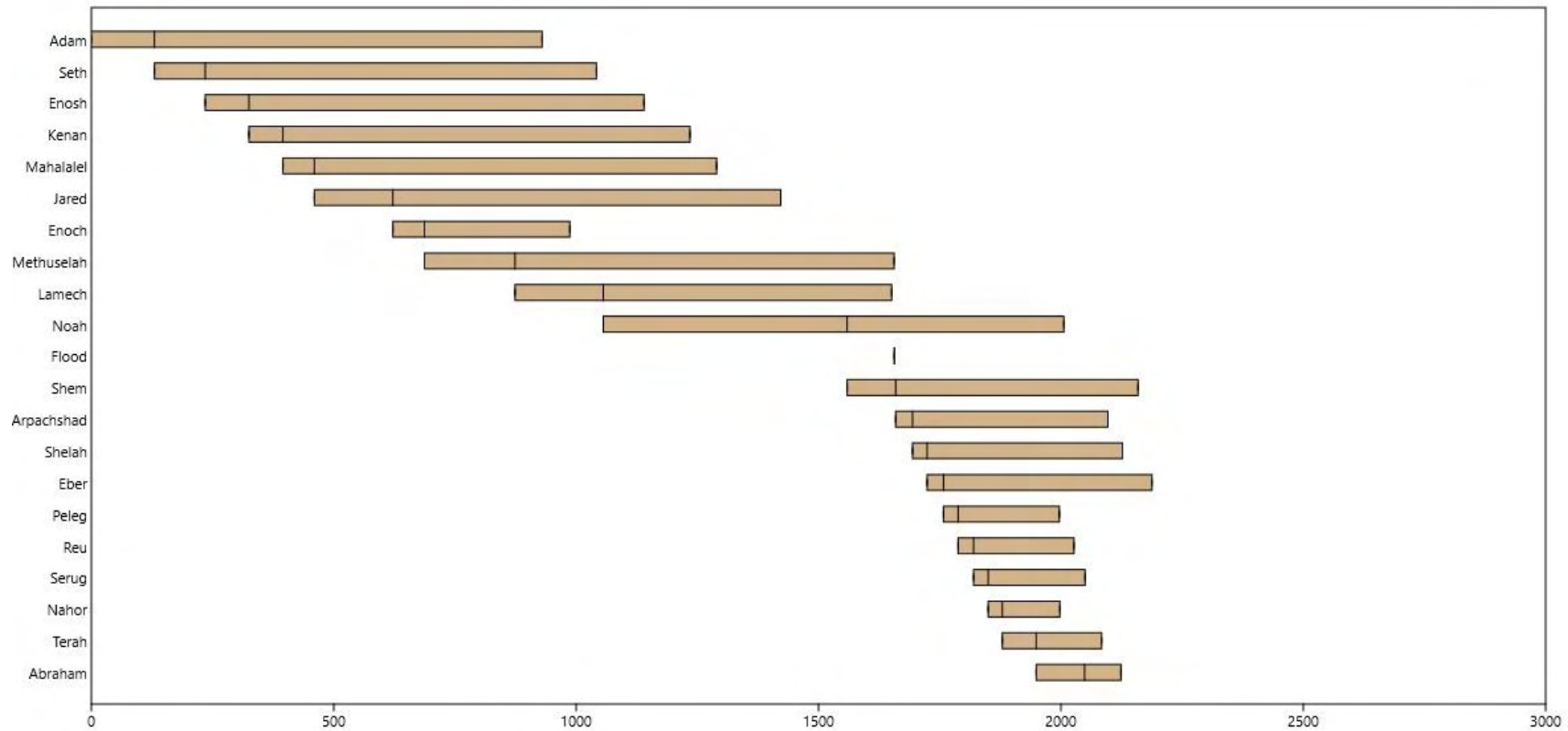




Absolute Dating

- *Determining a age for a particular event*
 - *Contrast with relative dating, which only gives a sequence of events*

Genesis 5 and 11	Age at Birth of Son	Age of Death
Adam	130	930
Seth	105	912
<u>Enosh</u>	90	905
<u>Kenan</u>	70	910
<u>Mahalalel</u>	65	895
Jared	162	962
Enoch	65	365
Methuselah	187	969
<u>Lamech</u>	182	777
Noah	503	950
<u>Shem</u>	100	600
<u>Arpachshad</u>	35	438
<u>Shelah</u>	30	433
<u>Eber</u>	34	464
<u>Peleg</u>	30	239
<u>Reu</u>	32	239
<u>Serug</u>	30	230
<u>Nahor</u>	29	148
<u>Terah</u>	70	205
Abraham	100	175



Genesis 5 and 11	Luke 3	I Chronicles 1
Adam	Adam	Adam
Seth	Seth	Seth
<u>Enosh</u>	Enos	<u>Enosh</u>
<u>Kenan</u>	<u>Cainan</u>	<u>Kenan</u>
<u>Mahalalel</u>	<u>Mahalaleel</u>	<u>Mahalalel</u>
Jared	Jared	Jared
Enoch	Enoch	Enoch
Methuselah	Methuselah	Methuselah
<u>Lamech</u>	<u>Lamech</u>	<u>Lamech</u>
Noah	Noah	Noah
<u>Shem</u>	<u>Shem</u>	<u>Shem</u>
<u>Arpachshad</u>	<u>Arphaxad</u>	<u>Arpachshad</u>
<u>Shelah</u>	<u>Cainan</u>	<u>Shelah</u>
<u>Eber</u>	<u>Shelah</u>	<u>Eber</u>
<u>Peleg</u>	<u>Eber</u>	<u>Peleg</u>
<u>Reu</u>	<u>Peleg</u>	<u>Reu</u>
<u>Serug</u>	<u>Reu</u>	<u>Serug</u>
<u>Nahor</u>	<u>Serug</u>	<u>Nahor</u>
<u>Terah</u>	<u>Nahor</u>	<u>Terah</u>
Abraham	<u>Terah</u>	Abraham
	Abraham	

Assumptions When Using an Absolute Dating Method

- *The original condition of the "clock" is known*
- *The "clock" has been unaffected by anything outside of it (that is, the "clock" is a closed system)*
- *The "clock" has been "ticking" at a constant rate*





Radioisotope Dating

- *Isotopes are atoms of the same element but with different atomic weights (different numbers of neutrons)*
 - C-12, C-13, C-14
- *Some isotopes are unstable and break down*
 - C-14, K-40, U-235, U-238
- *When the radioactive isotope (radioisotope) decay, it produces a daughter isotope*
 - C-14 \longrightarrow N-14
 - K-40 \longrightarrow Ar-40
 - U-235 \longrightarrow Pb-207
 - U-238 \longrightarrow Pb-206

Decay Equation

$$A = A_0 e^{-\lambda t}$$

A = Amount of parent isotope remaining

*A*₀ = Starting amount of parent isotope

e = Constant

λ = Decay constant

t = Time



Dating Zircon Two Ways

- *Method 1: Radioisotope dating using U-Pb*
 - *Age: 1.2 billion years*
- *Method 2: Helium diffusion*
 - *Age: 6,000 years*

Which age is correct?

Dating Zircon Two Ways

- *If the Bible is the Word of God, then helium diffusion is correct*
- *If we rely on only observations, then U-Pb is more likely to be correct*

Dating Zircon Two Ways

- *One way to reconcile these two hourglass readings is to suggest that one of them has a "valve" at its bottleneck controlling the trickling rate, a valve that was adjusted drastically in the past, either by natural mechanisms or possibly by direct intervention from God.*
 - Pg. 66
- *Finally, the preponderance of Biblical and geoscience evidence for a young world points to a change that would only affect dating methods which depend on slowly-decaying nuclei.*
 - Pg. 67
 - Dr. Russell Humphreys () "Young Helium Diffusion Age of Zircons Supports Accelerated Nuclear Decay" in *Radioisotopes and the Age of the Earth*, Larry Vardiman, Andrew Snelling, and Eugene Chaffin, eds., pg. 25-100

Actualism

- *Uniformitarianism*
 - *Present observations at present rates were responsible for the formation of things that are observed today*
 - *"The present is the key to the past"*
- *Actualism*
 - *Present phenomena operating in the past were responsible for the formation of things in the present*
 - *Does not require constant rates*

Dating Zircon Two Ways

- *Method 1: Radioisotope dating using U-Pb*
 - *Age: 1.2 billion years*
- *Method 2: Helium diffusion*
 - *Age: 6,000 years*

As Christians Who Accept the Bible as the Word of God...

- *The Bible is our anchor.*
 - *We start with the Bible as our foundation of truth. All other knowledge, facts, observations, and inferences are subject to what the Bible says.*
 - *Thus, we use relative dating to understand the sequence of the Flood, not a sequence of long ages.*
 - *Thus, we interpret radioisotope dating as inaccurate because it contradicts the Biblical record.*

As Christians Who Accept the Bible as the Word of God...

- *What if some were unfaithful? Does their faithlessness nullify the faithfulness of God? By no means! Let God be true though every one were a liar, as it is written, "That you may be justified in your words, and prevail when you are judged."
- Romans 3:3-4*

As Christians Who Accept the Bible as the Word of God...

- *We accept the basic observations of science*
- *We accept that the Bible is true beyond what science can show us*