A sunset background with a warm orange and yellow sky. Silhouettes of trees are visible at the top left and bottom of the frame.

Goals for this Discussion

The age of the earth is controversial, even among Christians.

The Young earth position estimates the age to be less than 10,000 years.

The Old earth position estimates the age to be a few billion years.

The goal for this discussion is to give both positions and promote understanding, even though we disagree, and to glorify God as the Creator.

Why I Believe the Earth is Old

1. Scientific Evidence for an old Earth
2. A reasonable Old-Earth interpretation of Genesis 1
3. Problems with Young-Earth assertions

Michael W. Edenburn

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Where am I Coming From?

Both the Bible and Creation come from God.

They must be consistent.

Inconsistency comes from misinterpreting one or the other or both.

I absolutely do not endorse the Darwinian theory of evolution.

I absolutely do believe that God created all things, and that He did it through the agency of Christ Jesus who is my savior and lord.

The simplest interpretation of Genesis 1 is that all things were created in six 24 hour days, but it is not the best interpretation.

The interpretation I give will stay true to the context, range of word meanings, genre, and main point—that **God is the creator of all things.**

Part 1: Scientific Evidence Strongly Supports and Old Earth

Tree rings that go back 11,000 years

Ice cores estimated to be 740,000 years old

Green River shale deposits with 7.5 million annual layers

500 million year old coral reefs

3.6 billion year old rocks dated radiologically

Tree Rings

The Shulman grove in California has living trees exceeding 4,500 years old.

European oaks, both alive and dead give a record dating back 11,000 years.

Tree rings are used to calibrate C-14 dating.



Ice Cores

Greenland Ice Sheet	3 km, 110,000 years old.
Vostok Station in Antarctica	3.6 km, 420,000 years old.
East Antarctic Ice Sheet	3 km, 740,000 years old.

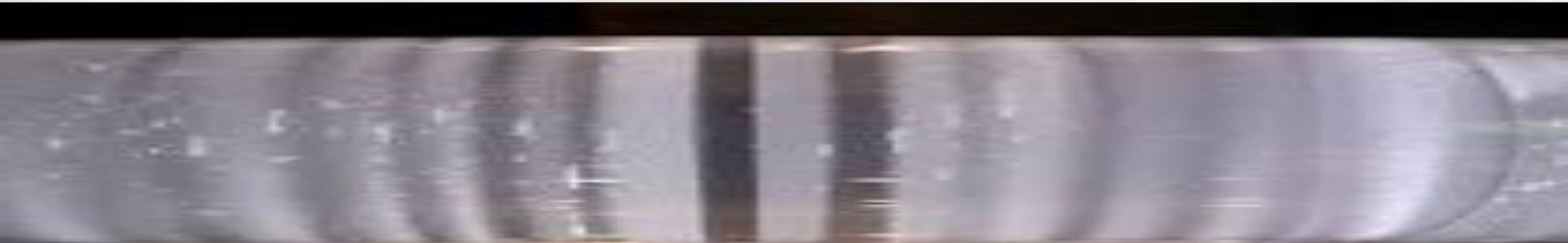
Ice is composed of H-1, H-2, O-16, and O-18 isotopes.

Isotope ratios in snow depend on seasonal temperature cycles.

Seasonal layers can be counted back to about 15,000 years.

Then, thickness is used to estimate age.

Known volcanic deposits are used to confirm the process.



Green River Shale Deposits Found in Colorado, Utah, and Wyoming

Very fine clay particles settle in lakes under calm conditions.

The same process forming annual layers is seen in some lakes today.

Each layer is a couplet with the thickness of notebook paper.

Each couplet has pollen in summer, none in winter.

Up to 7.5 million couplet layers are found in one formation.

If laid down by the flood over 150 days (see Genesis 7:24), 50,000 layers per day were required (2000/hour, 1 every 2 seconds).



500 Million Year Old Coral Reefs

Some coral reefs are dated geologically to be 500 million years old and have 400 daily growth bands in an annual growth band.

400 days/year means the earth rotated faster 500 million years ago and the length of a day has increased by 2.1 hours = 7560 seconds.

Earth's rotation is slowing by 0.000015 sec each year due to tidal action.

$7560 \text{ sec} \div 0.000015 \text{ sec/yr} = 500 \text{ M years}$

Age calculations from geology and from changing earth rotation rates agree.



Radiological Dating

Isotopes are atoms that have the same number of protons and but different numbers of neutrons.

Some isotopes are stable and some decay.

Half-life is the length of time when half of the parent isotope has decayed into its daughter(s). The beginning quantity of daughter is D_0 .

Parent	Daughter	Half-Life yrs
Be-10	B-10	1.5 million
C-14	N-14	5.7 thousand
Cl-36	Ar-36	300 thousand
K-40	Ca-40, Ar-40	1.2 billion
Rb-87	Sr-87	47 billion
Sm-147	Nd-143	110 billion
Lu-176	Hf-176	21 billion
Re-187	Os-187	70 billion
Th-232 series	Pb-208	15 billion
U-235 series	Pb-207	710 million
U-238 series	Pb-206	4.5 billion

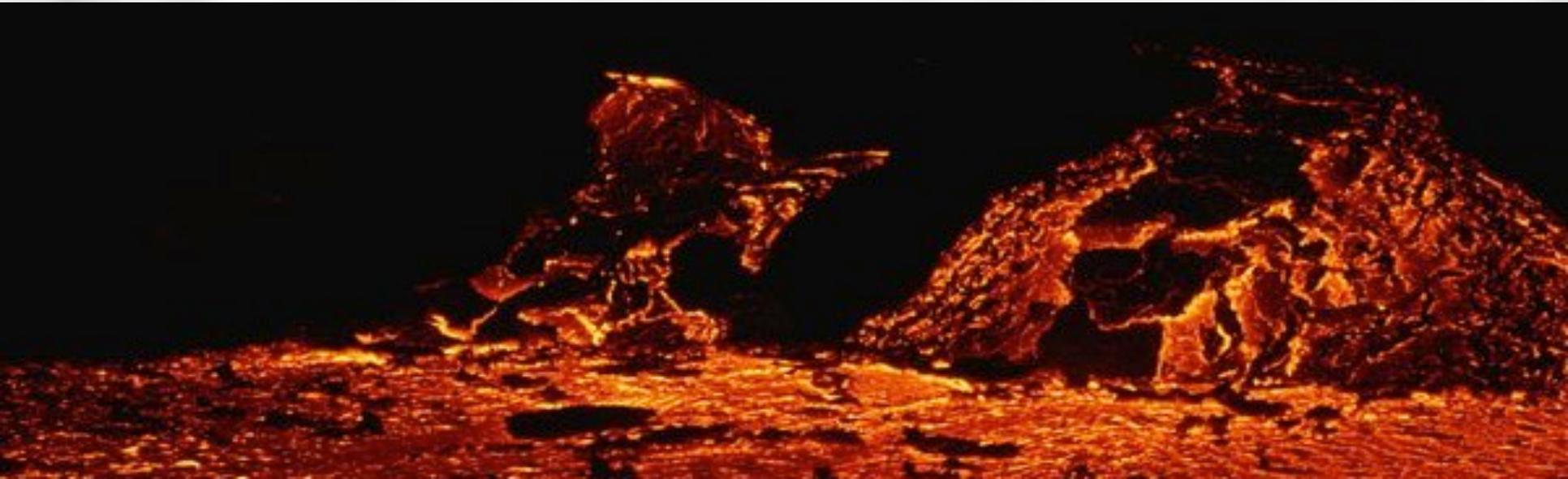
Dating Lava Using Potassium-Argon

Radiological dating depends on knowing D_0

If the daughter is a gas, like Argon, it will escape when molten lava comes to the surface, but it will be trapped when the lava solidifies.

D_0 is 0.0, or nearly so, and the daughter in the sample comes from the decay of potassium after the lava solidified.

Some daughter may remain in the lava from before it solidifies, but techniques are used to quantify this.



Radiological Dating Using Rubidium-Strontium

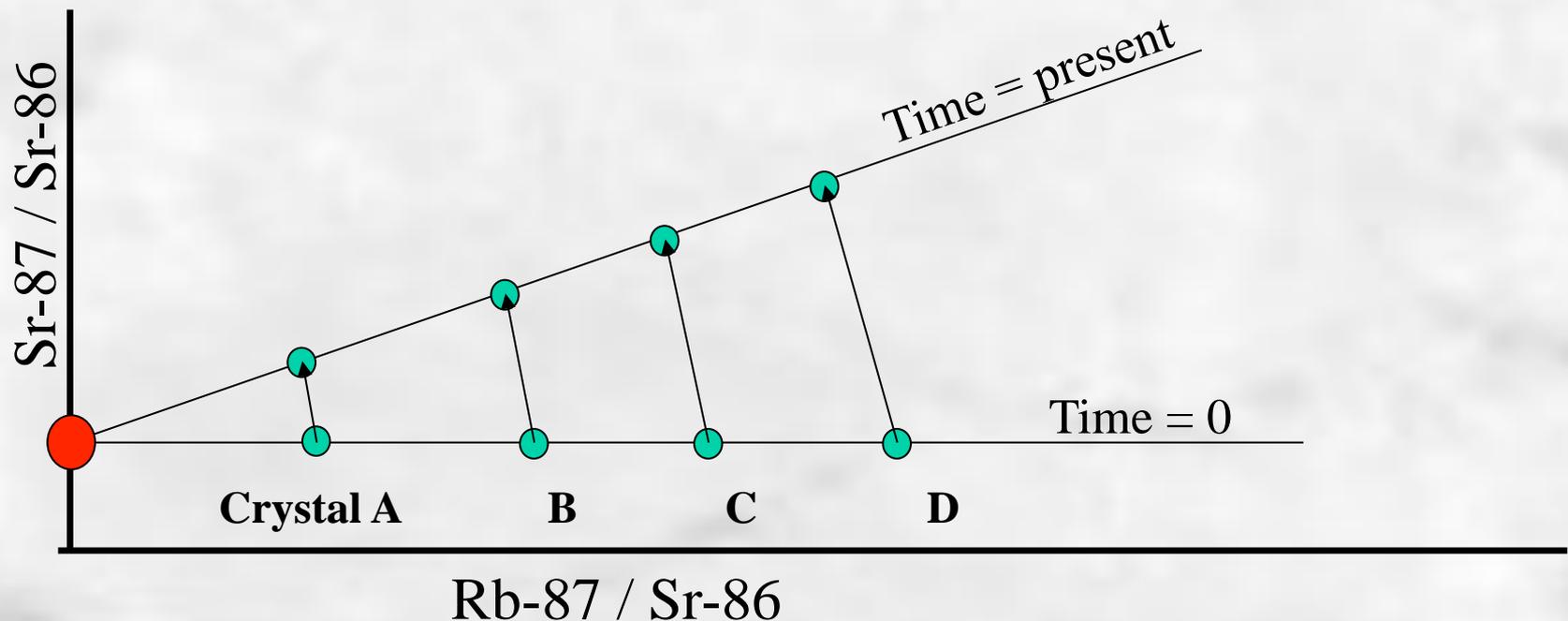
Radiological dating depends on knowing D_0 .

Rb-87 decays into Sr-87.

Sr-86 is also present but it is stable and is not the product of decay.

Different crystalline structures in the lava absorb the same ratio of Sr-87 to Sr-86 but not the same ratio of Rb-87 to Sr-86.

From this, the initial amount of Sr-87 and Rb-87 can be found.



Various Independent Measurements Estimate the Oldest Rocks are 3.6 Billion Years Old

U-Pb 3.6 billion

Pb-Pb 3.7 billion

Rb-Sr 3.6 billion

Lu-Hf 3.5 billion

Sm-Nd 3.6 billion

Western Greenland Amitsoq gneisses, from Dalrymple

Part 1 Conclusion: Scientific Evidence Strongly Supports and Old Earth

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Part 2: An Old Earth Interpretation of Genesis 1 is Reasonable

The word “day” in Genesis 1 has a range of meaning.

Evening and morning may simply refer to passing time or a creative process.

Genesis 1 uses poetic elements suggesting figurative interpretations may be reasonable.

The days may be topical and not sequential.

We use scientific evidence to help interpret other passages in scripture.

The Meaning of Day

And there was evening and there was morning, one day (a second day, a third day, a fourth day, a fifth day, the sixth day-NASB)

The Hebrew word is Yom which, like in English, can be the daylight period, a 24-hour day, or an indefinite period of time.

In the Old Testament, it is used in all three ways.

Genesis 2:4 says “This is the account of the heavens and the earth when they were created, in the day that the Lord God made earth and the heavens-NASB.”

Day here is the singular version of Yom and refers to at least several days, not a 24-hour day.

And there Was Evening and there Was Morning

Evening and morning (Ereb & Boqer) do not make a 24-hour day and may convey a different meaning:

It could mean obscure or interacted with and broke forth.

(Zodhaites; **Hebrew Dictionary**, root words)

Ereb: Dusk, evening, woven, obscure, mixed, intermingled, interact

Boqer: Dawn, morning, plough, break forth

It could simply mean a passing of time (Stoner; **A New Look at an Old Earth**; citing Lev 24:1-4, 1 Chr 16:38-40, Job 4:19-21).

Some interpret the phrase as a flow from disorder into order based on Hebrew root words (Schroeder; **Genesis and the Big Bang**).

These interpretations are slightly figurative, but they fit the range of Hebrew word meanings and the context.

Are Figurative Interpretations Reasonable?

Genesis 1 is poetic (it has a structure).

Repetitive elements:

“Then God said...” (Gen 1:3, 6, 9, 14, 20, 24)

“And there was evening, and there was morning
(Gen 1:5, 8, 13, 19, 23, 31).

“And God saw that it was good” (or “very good”)
(Gen 1: 4, 10, 12, 18, 21, 25, 31)

Hebrew scholars reject the idea that Genesis 1 is Hebrew poetry, but it has a structure, and some acknowledge poetic elements.

Gen 1 may not have been originally written in Hebrew, so rules of Hebrew poetry may not apply.

If Gen 1 is poetic, whether Hebrew poetry or not, figurative interpretations may be reasonable.

The Days in Genesis 1 May be Topical, About God's Provision, Not Sequential 24-Hour Days

Day 1. Light Day and Night	Provision 	Day 4. Stars Sun and Moon
Day 2. Sky Water	Provision 	Day 5. Birds in the Sky Sea Creatures
Day 3. Dry land Vegetation on land	Provision 	Day 6. Land Animals Man, M & F
Day 7. Rest		

This is an idea supported by Bruce K. Waltke, a Hebrew Scholar.

We Sometimes Use Scientific Evidence to Help US Interpret Scripture

Job 9:6 “He shakes the earth from its place and makes its pillars tremble.”

Job 38:4 & 6 “Where were you when I laid the foundations of the earth? On what were its bases sunk? Or who laid its cornerstone?”

Ps 75:3 When the earth and all its people quake, it is I who hold its pillars firm.

Ps 104:5 “He set the earth on its foundations. It can never be moved.”

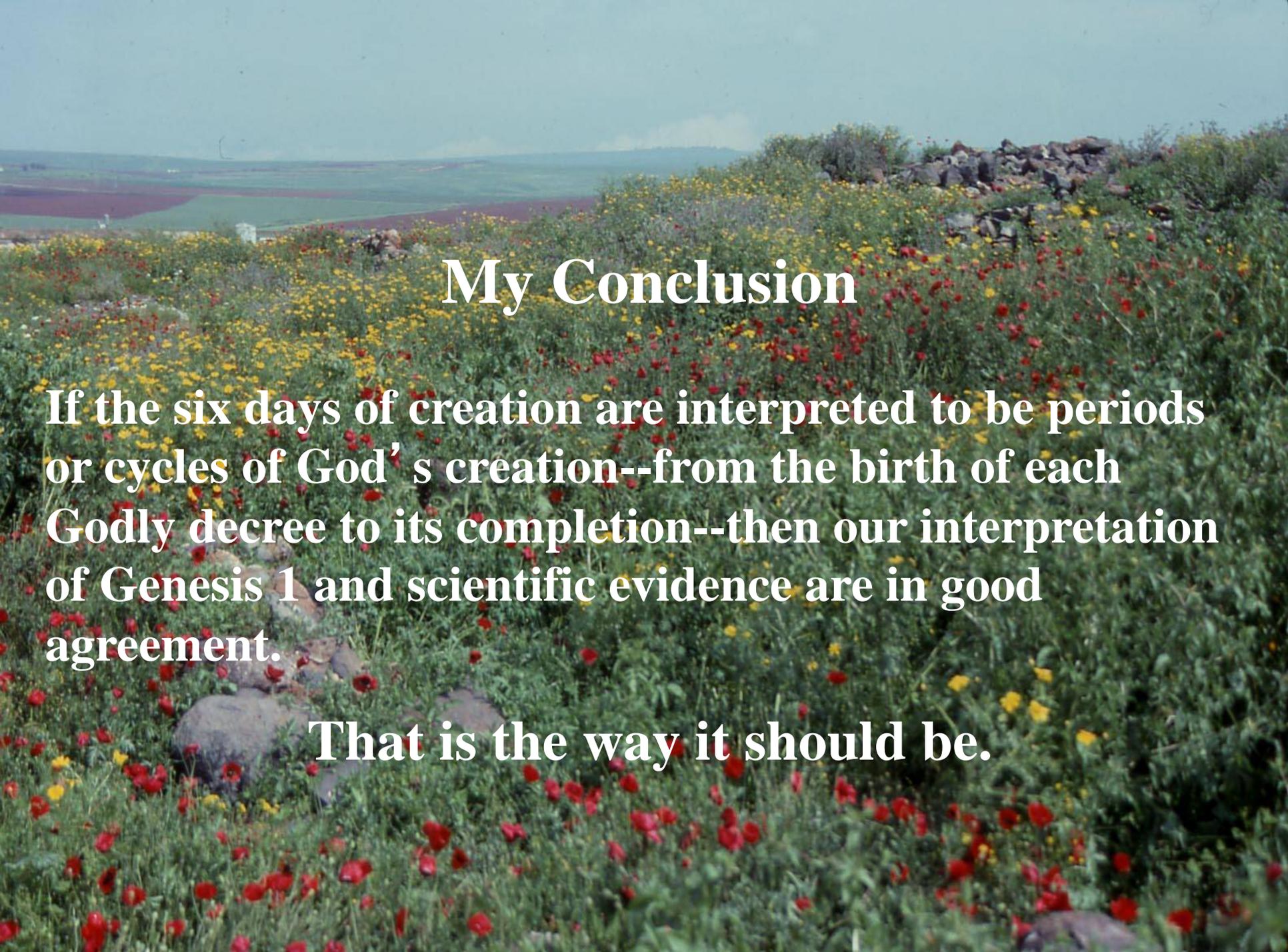
Isa 48:13 My own hand laid the foundations of the earth, and my right hand spread out the heavens;

Until Copernicus, Galileo, and Kepler we thought the earth was fixed in space. Why not now? Scientific evidence.

Summary of Genesis 1 Interpretation

- 1) The fact that Yom can imply either a 24-hour day or an indefinite period of time,
- 2) the fact that Evening and Morning do not make a 24-hour day and have a range of meanings including a passage of time or a creative process,
- 3) the possibility that Genesis 1 uses poetic elements suggesting a figurative interpretation may be reasonable,
- 4) the possibility that the days are topical and not sequential, and
- 5) The fact that we use scientific evidence to help interpret other passages in scripture,

lead me to believe that the six days of creation in Genesis 1 need not be rigidly interpreted as sequential, 24-hour days.



My Conclusion

If the six days of creation are interpreted to be periods or cycles of God's creation--from the birth of each Godly decree to its completion--then our interpretation of Genesis 1 and scientific evidence are in good agreement.

That is the way it should be.

Young-Earth Arguments

Radiological Dates are Inconsistent

For example: Lava from the Hualalai volcano dates by K-Ar from 160 million to 3 billion years old, yet the flow was known to occur in 1801.

According to G. Brent Dalrymple (Ph.D. Berkely, USGS, Oregon St. U. Geologist) the flow contained xenoliths from deep within the mantle. The xenoliths were not molten and did not give up Argon when exposed to atmospheric pressure. Hence dating the Hualalai flow using K-Ar is not meaningful.

In addition, since K has a half-life of 1.2 billion years, dating lava flows less than a few million years old with K-Ar is meaningless.

There are many ways that radiological dating can go wrong, and scientists who use it are aware of them.

There is Too Much C14 in Fossil Carbon

Cosmic radiation in the upper atmosphere produces neutrons that turn nitrogen into C14. The ratio of C14 to C12 is fairly constant.

Plants absorb C14 and C12 until they die and become fossil carbon.

The C14 decays away with a half-life of 5700 years.

There should be no measurable C14 after 50,000 years, but there is.

Does this mean the earth is only thousands of years old?

Spontaneous fission of uranium in the earth's crust produces neutrons that turn nitrogen into carbon-14.

This can explain the C14 measured in fossil carbon.

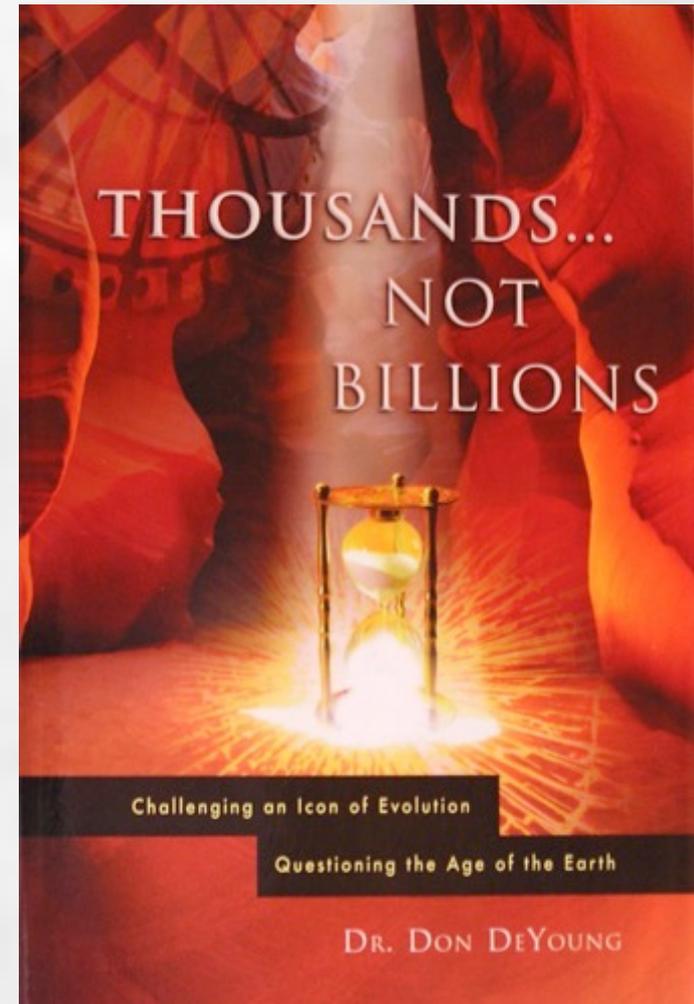
Some fossil carbon does not have measurable C14, which is inconsistent with a 10,000 year old earth.

Radiological Dates Appear Too Old Because Decay Accelerated During the Flood

The RATE Group at the Institute for Creation Research reconciles radiological dating to a young-earth point of view by asserting that radiological decay was greatly accelerated during the flood.

I calculated that if radiological decay accelerated as asserted, the flood was unnecessary—the radiation environment alone would have killed every living thing on earth.

**The Book *Thousands Not Billions*
by Dr. Don DeYoung**



What About Cosmological Arguments?

The big bang violates the Second Law of Thermodynamics:

Collisions were required for galaxies and stars to form. This generated heat, which increased entropy. The second law was not violated.

The speed of light is decreasing: This is an artifact of inaccurate measurement and extrapolation¹.

Time depends on location in the universe: Relativistic arguments, when critically examined cannot explain the young-earth—old-earth disagreement. Humphreys' model is questionable.

Galaxies should show more windup: Angular speed depends on mass distribution. Also, stars are moving into and out of arms. Density waves move slower than arm speed. Windup is reasonable⁵.

What About Solar System Arguments?

Moon dust thickness indicates a young age: YE assumptions for dust accumulation are too high. Apollo measurements show dust depth up to 100 ft. in some places^{1,2}.

At the current recession rate, the moon should be farther away: The recession rate was slower in the past and accounts for a 40,000 km increase over the past 2B years to 380,000 km today. This calculation is perfectly reasonable³.

Jupiter should be much colder considering its heat loss rate: This is explained by gravitational compression, which is a source of heat⁴.

How About Geophysical Arguments?

The earth's magnetic field is decaying too fast: They neglect magnetic reversals. Humphreys' model and the USGS model disagree over $> 6k$ year time period¹.

There is not enough mud on the sea floor: Actual rates of deposit and subduction are in good agreement².

There is not enough sodium in the sea: Their calculations do not consider removal mechanisms like precipitation and tectonics².

How About Fossil Arguments?

The flood laid down the fossil record: The record is far too orderly¹.

Dinosaur and human footprints appear together: The “human” footprints were made by a dinosaur¹.

Soft tissue, blood proteins, and histones have been found in dinosaur bones: This is very interesting, but perhaps previous presumptions about their lifetimes were incorrect.

1. Hayward; *Creation and Evolution*; Bethany House, 1985.
2. Stoner; *A New Look at an Old Earth*; Harvest House, 1997.
3. Reasons.org
4. Wikipedia
5. Scientificamerican.com

Creation Account Theories & Conjectures

All attempt to rectify Genesis 1 and scientific evidence.

1. Genesis 1 is just a story.
2. Genesis 1 is only symbolic.
3. Day refers to an unspecified period of time.
4. There are long periods of time between days.
5. The six days refer to divine fiat (Hayward).
6. Creation was revealed to Moses over seven days.
7. Time is relative. God's perspective. Cosmological theories.
8. Total recreation between Genesis 1:1 and 1:2.
9. Billions of years for Gen 1:1&2. Completion in 6 days.
10. God created Earth in six 24-hour days with appearance of age.
11. Creation in Six 24-hour days. Earth is a few thousand years old.

Eniwetok Coral Reef 100,000 Years Old

The Eniwetok reef is at least 4,600 feet thick.

Growth rate is limited by concentration of calcium carbonate in water.

Modern growth rates are 0.5 inches per year.

$4600 \text{ feet} \times 12 \text{ inches/ft} / 0.5 \text{ inches/yr} = 100,000 \text{ years}$



Dating Using Radiological Decay

We can find decay time (age) T for a sample

$$P = P_0 \exp(-0.693 T / T_{\text{half}})$$

$$D = D_0 + P_0 - P$$

$$T = \ln[1 + (D - D_0) / P] T_{\text{half}} / 0.693$$

D is the measured daughter, P is the measured parent

D_0 is the original daughter, P_0 is the original parent

Radiological dating depends on knowing D_0

Example: $D_0 = 0$; $D/P = 0.5$; $T_{\text{half}} = 1,000,000$ years

$$T = \ln[1+0.5] 1,000,000 / 0.693 = 585,000 \text{ years}$$