

monly used neo-Cuvierism as a way station between Flood geology and total abandonment of the Flood. We contend that neo-Cuvierist thinking is seriously wrongheaded, and recommend that it be considered dead and buried once and for all.

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References

1. Oard, M.J., Vertical tectonics and the drainage of floodwater: a model for the middle and late diluvial period, Part II, *CRSQ* 38(2):79–95, 2001. See pp. 89, 90.
2. Lim, S.-K. *et al.*, A preliminary report on sauropod tracksites from the Cretaceous of Korea, *Gaia* 10:109–117, 1994; Paik, I.S. *et al.*, Dinosaur track-bearing deposits in the Cretaceous Jindong Formation, Korea, *Cretaceous Research* 22:79–92, 2001.
3. Holt, R.D., Evidence for a Late Cainozoic Flood/post-Flood boundary, *CEN Tech. J.* 10: 128–167, 1996.

Filling the details in Humphreys' cosmology

Regarding Humphreys' reply to my letter in which I raised some concerns about his cosmology, I would like to thank Humphreys for the clarifications he offered in response to my point 3, and the calculations he presented in response to point 4. However, there were some other issues which I raised that Humphreys has not addressed.

1. *Expansion of the universe.* The Hebrew of Genesis 1 suggests 'and it was so' relates to both the creation of the expanse *and* the separation since the latter is a direct result of the former. This is evident when we look at the use of this same clause in

the descriptions of the other days. On day three, this phrase refers to *both* the gathering together of the waters *and* the appearance of dry land, not just the appearance of dry land. Again, on day four, the 'And it was so' does not refer just to their illumination of the Earth, but also to their functioning as markers for seasons, days and years. Therefore, it seems to me that the interpretation Humphreys suggests is a case of 'special pleading' in the light of what Scripture explicitly states.

Furthermore, all the 'other possibilities' Humphreys provides for the way the stretching occurs deny that the creation of the expanse was a completed event as indicated by 'And it was so' (Heb. *Wayyehi-kēn*).¹

2. *Euclidean Zone.* In the light of point 1 above, Humphreys' favoured option of a Euclidean zone appearing and disappearing on Day 4 is a non-starter. A Euclidean zone appears when matter and space contract causing a black-hole to white-hole bounce. However, the language of Scripture indicates that the universe had already stopped stretching/expanding during Day 2, so this model is not a valid option because it does not square with what Scripture states.

5. *Friedmann-Lemaître space-time expansion.* I particularly feel that Humphreys' has not addressed my concerns over the employment of Friedmann-Lemaître (F-L) space-time expansion. Humphreys writes:

'The concept of spacetime expansion goes deeper than work by Friedmann and Lemaître. It is enmeshed in general relativity theory itself, which pictures space-time as a material that can be bent and stretched.' Humphreys seems to have missed the point I was making.

Although general relativity theory pictures space-time as a material that can be bent and stretched, and although F-L space-time expansion is a perfectly valid solution to the field equations, this does not mean that space-time expansion is an actual, physical reality. Mathematical models are just that—models. Furthermore,

there are other solutions such as Einstein's static space-time, which do not involve space-time expansion.

Humphreys may be correct in saying that the claims of falsification of F-L space-time expansion by the operation of the Global Positioning System (GPS) did not originate with Gentry, but he does not address the claims, dismissing them as simply 'non-peer-reviewed allegations on the Internet'. Gentry has written a technical paper which Humphreys is aware of and which discusses this issue in great detail.² In it, he cites C. Møller's theoretical analysis which contradicts the F-L prediction of in-flight wavelength lengthening,³ and the principal GPS investigator, C.O. Alley's actual experience in setting up the GPS.⁴ Humphreys says he 'tried to chase them down to their roots' but found that 'they seem to be without documentation'. However, all the documentation needed is in Gentry's paper.

I also note that Humphreys did not address the fact that F-L space-time expansion involves massive energy losses and therefore violates the law of conservation of energy.

The strangest thing of all about Humphreys' response is that, regarding my requests for clarification and more details, he feels 'no particular obligation to produce them', because (a) he has staked no claim on creationist cosmology as his exclusive domain, and (b) he has many other research areas to explore besides cosmology. He adds:

'So I encourage Kulikovsky and others to fill in the details for themselves, or to depart from my sketchy map entirely and discover for themselves new hills and valleys in spacetime.'

This is a particularly odd thing to say given that on numerous occasions in the past Humphreys has promised to respond to any published criticisms of his model. If Humphreys wishes his cosmological model to be taken seriously then the responsibility to defend it lies with him alone.

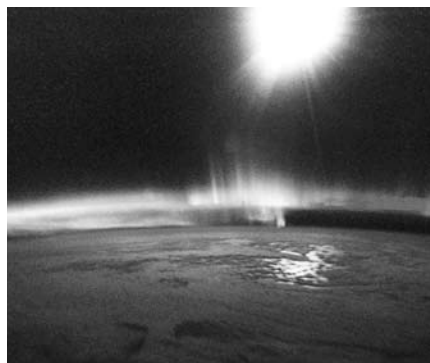
Humphreys encourages myself and any others to fill in the missing details

for ourselves. But even if I had the required level of training in physics and general relativity, why would I waste my time working on a model, which I believe is based on premises that appear to be demonstrably false? In any case, it is Humphreys' model, so let *him* fill in the gaps!

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References

1. The clause *Wayy'hi-kēn* appears twice outside of Genesis 1 (Judges 6:38; 2 Kings 15:12). Both instances clearly refer to completed events.
2. Gentry, R.V., Flaws in the big bang point to GENESIS, a new millennium model of the cosmos: part 5—relativistic operation of the GPS exposes the fatal flaw in big bang's cornerstone expansion postulate, *Orion Foundation* <www.orionfdn.org/PosterSession/arX5iv.pdf>, 2001.
3. Møller, C., *The Theory of Relativity*, 2nd edition, Clarendon Press, Oxford, pp. 405–406, 1972.
4. Alley, C.O., Proper time experiments in gravitational fields with atomic clocks, aircraft, and laser light pulses; in: Meystre, P. and Scully, M.O. (Eds), *Quantum Optics, Experimental Gravity, and Measurement Theory*, Plenum Press, New York, pp. 363–427, 1981.



Humphreys clarifies cosmology again:

I take these continued questions from Andrew Kulikovsky (whom I will call 'AK' to save wear and tear on my keyboard) as prompting from the Lord to share some more thoughts I've had on cosmology. I hope they

will be useful to creationist physicists doing research in that field. Here are my replies to his points as numbered above:

1. *Continuing expansion of the cosmos.* AK's case for expansion stopping at the end of the second day is less than compelling. But even if he were correct, is he correct in claiming no expansion ever resumed after that? He says that the phrase 'and it was so' in Genesis 1:7 refers to completed action. I agree (although the real issue is 'Which action was completed?'). But his claim implicitly assumes that such a completed action is *never to be repeated forevermore*. In contrast, one of the non-Genesis Scriptures he cites that uses 'and it was so', 2 Kings 15: 12, describes the ending of a promised four-generation dynasty. Was that the only time in all history afterward that such a dynasty ever ended? Probably not.

More important, there are Biblical hints for expansion after the second day. My book¹ points out seventeen Scriptures² that say that God 'stretches out' or 'spreads out' the heavens. A few of the Hebrew verbs in those verses are in the perfect tense, which usually refers to past action. However, most of the verbs are in the participle form, which is indefinite as to time and includes the possibility of continuing action in the present. English translations of the latter are often in the present tense ('stretches' instead of 'stretched'), thus conveying that sense of the participle.

Most important, two of the heaven-stretching verses clearly refer to a time *after* the second day of Creation, most likely to the time of the Genesis Flood.³

So, because Scripture appears to leave room (at the very least) for episodes of expansion after the second day, and possibly continuous expansion as well, I prefer to 'hang loose' on the issue.

There are also some strong *scientific* hints that expansion is going on right now: (1) the anomalous sunward acceleration of deep space probes,^{4,5} and (2) the Milgrom empirical equation for the force keeping stars in orbit

within galaxies,^{6,7} including the motion of our own Sun around the center of our own galaxy, the Milky Way. Both phenomena involve a particular value of acceleration on the order of

$$Hc = 7 \times 10^{-8} \text{ cm/s}^2,$$

where *c* is the speed of light and *H* is the Hubble constant, about 70 km/s per Megaparsec. The Hubble constant relates redshift and distance, and general relativity connects it directly with the rate of expansion of space. Thus phenomena (1) and (2) seem to relate the rate of expansion to things taking place right now in our immediate solar neighborhood. That suggests the expansion is still going on today.

Notice that time dilation episodes on Earth would affect the rate of expansion. That is, even if the expansion rate were nearly constant as measured by distant clocks, it would nonetheless undergo great spurts of acceleration as measured by time-dilated clocks on Earth.

2. *Euclidean (timeless) zones.* If the above section is valid, then episodes of expansion or continuous expansion could and did occur after the second day. That eliminates AK's objection to having a Euclidean (timeless) zone. However, his question should have been, 'What would cause such a zone to occur again on the fourth day after having occurred once during the second day?' It may have been a result of something my physicist friend Roy Holt suggested to me some time ago: that God created additional matter on the fourth day to make the stars. The Genesis 1 account does not use the word 'create' in connection with the stars, but Isaiah 40:26 does. The newly created additional mass would cause the 'fabric' of space ('membrane of space' would be a better picture) to sink again below the critical potential (see my previous *TJ* letter⁸), causing time to cease again in the vicinity of the center. After that, the continuing expansion (stretching) would again bring the 'fabric' back above the critical potential, allowing clocks on Earth to resume ticking, as my previous letter showed.

5 (a) *Reality of expansion.* For some strange reason, AK appears to associate expansion of space one-for-one with the Friedman-Lemaitre (F-L) metric, the basis of the big bang theory. But my cosmology derives an expansion from a different basis, the Klein metric, as I explained in my articles and book. Both the Klein metric and the F-L metric are solutions of the Einstein field equations. That is why I said that the capability for expansion of space is a basic feature of general relativity itself, not fundamentally tied to one cosmology or another.

To put it another way, if general relativity is valid, then we get expansion and cosmic redshifts as a very natural consequence. Einstein's 1917 cosmology, which AK mentions, had to prevent expansion (which Einstein at that time didn't want) in a very artificial way. He arbitrarily jammed a new number into his theory, the famous 'cosmological constant'. It had to have a very precise value in order to prevent expansion or contraction. Any other value allowed space to move. So general relativity makes it easy to get expansion. Although AK seems to want to isolate expansion as the villain, his real enemy is general relativity itself. And if he chooses to attack that theory, he must reckon with the fact that it has passed 87 years of rigorous experimental tests with flying colors.⁹ The bottom line is that, so far, relativity is about as close as any physical theory we have to representing what AK calls 'actual, physical reality'. Following hard on relativity's heels is that expansion of space which AK seems to dislike so much.

(b) *Expansion and the GPS.* The Internet postings AK is relying upon are not peer-reviewed. Those posts contain *interpretations* of various parts of the literature, and interpretations need to be tested by peer review. The first reference AK mentions¹⁰ is a special-relativistic theoretical study of gravitational red shifts. It says nothing at all about the general-relativistic phenomenon of *expansion* red shifts, which is what AK questions.

I wasn't able to get a copy of AK's second reference, but I notice it dates

from over twenty years ago, during the early days of GPS. A much more recent review article¹¹ says the GPS data are fully consistent with general relativity. They do not contradict space expansion. As a matter of fact, because of the smallness of the effects, it would be very difficult to make a local satellite experiment that *could* measure the effects of expansion. The deep space probe data of item 1 above seem to be the first evidence for here-and-now expansion.

(c) *Energy conservation and expansion.* Long ago, cosmologists resolved the alleged problem quite satisfactorily,¹² but they did not publicize the result well. My chapter in the RATE book explains it fairly simply.¹³ The bottom line is that the energy lost from red-shifted photons goes into accelerating the expansion, thus conserving energy.

AK still appears a mite peeved that I have not yet filled in all the details of my cosmology. I do indeed answer all *peer-reviewed* published criticisms, and also most non-peer-reviewed ones (such as here in the letters section of *TJ*) if I think the effort seems worthwhile. But answering criticisms and filling in all the details are two different things. The latter requires much work. I have many projects on my 'to do' list, such as my work on the RATE research initiative. I also have been trying to understand cosmology at a very basic level. For example, what is the root cause of time dilation? Until I get answers I am satisfied with, I'd much rather step back and let other creationists make their contributions to the field. I have no desire to dominate creationist cosmology.

To his credit, AK acknowledges he does not have the 'required level of training in physics and general relativity' to create his own cosmology. But then why does he feel qualified to pass judgment on general relativity,¹⁴ claiming it appears to be 'demonstrably false'? One has to understand a theory to criticize it credibly. Similarly, why does he feel qualified to approve the non-peer-reviewed Internet papers he is so deeply trusting? Relativity and

cosmology are very subtle subjects, and it is easy even for people trained in those fields to make a mistake. I am painfully conscious of my own propensity for error. I exhort all creationists pondering cosmology to be aware of the damage that Adam's sin and our own sins have done to our ability to think clearly. As David said in Psalm 19:12, 'Who can understand [discern his own] errors?'

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References

- Humphreys, D.R., *Starlight and Time*, Master Books, Green Forest, AR, 1994.
- Humphreys, Ref. 1, p. 66. Job 9:8, Psa 104:2, Isa 40:22, Jer 10:12, Zech 12:1, 2 Sam 22:10, Job 26:7, Job 37:18, Psa 18:9, Psa 144:5, Isa 42:5, Isa 44:24, Isa 45:12, Isa 48:13, Isa 51:13, Jer 51:15, Eze 1:22.
- Humphreys, Ref 1, p. 68. 2 Sam 22:10, Psa 18:9, Hebrew texts.
- Anderson, J.D. *et al.*, Indication, from Pioneer 10/11, Galileo, and Ulysses data, of an apparent anomalous, weak, long-range acceleration, *Physical Review Letters* **81**(14):2858–2861, 1998.
- Anderson, J.D. *et al.*, Study of the anomalous acceleration of Pioneer 10 and 11, *Physical Review D* **65**:082004, 1–50, 2002.
- Brada, R. and Milgrom, M., Stability of disk galaxies in the modified dynamics, *Astrophysical Journal* **519**:590–598, 1999.
- Sincell, M., Heretical idea faces its sternest test, *Science* **287**:672–573, 2000.
- Humphreys, D.R., D. Russell Humphreys replies and clarifies cosmology, *TJ* **16**(3): 76–78, 2002.
- Will, C.M., *Was Einstein Right? Putting General Relativity to the Test*, Basic Books, New York, 1986. Also see Ref. 11 for more recent data.
- Møller, C., *The Theory of Relativity*, 2nd ed., Clarendon Press, Oxford, pp. 401–406, 1972.
- Ashby, N., Relativity and the global positioning system, *Physics Today* **55**(5):41–47, 2002.
- Robertson, H.P. and Noonan, T.W., *Relativity and Cosmology*, W. B. Saunders Company, Philadelphia, 1968. See pp. 355–356, 'Therefore, the radiation energy which is lost in an expanding universe is used up as work in aiding the expansion.' When we take account of the resulting increased kinetic energy of the 'fabric' of space, total energy is conserved.

13. Humphreys, D.R., Accelerated nuclear decay: a viable hypothesis?; in: Vardiman, L., Snelling, A.A. and Chaffin, E. (Eds), *Radioisotopes and the Age of the Earth*, Institute for Creation Research and Creation Research Society, Chapter 7, pp. 333–379, 2000. See pp. 370–371 for discussion of energy loss from red-shifted photons.
14. I am assuming that the ‘premises’ to which AK objects are those which all relativistic cosmologies have in common. It is unlikely he meant the premises unique to my cosmology, because it would not make sense for him to consider building his own cosmology on premises he could easily replace with others more to his taste.

Was Mount Ararat a submarine stratovolcano?

I refer to Bill Crouse’s reply¹ to my Letter to the Editor, *Cudi Dagh not high enough?*,² in which he suggests that my arguments about altitudes and water levels are of no avail in supporting my case that the Ark rested on Mount Ararat, unless there is supporting geological evidence.

Crouse is correct in suggesting that if Mount Ararat was formed under the Flood waters then there should be some supporting geological evidence, somewhere on the mountain, of a submarine origin. He suggests that if Mount Ararat was thus formed then there would be some remaining ‘diluvium’, and notes that there are no recorded sedimentary rocks or fossils resulting from water action on Mount Ararat. He goes on to imply that he agrees with John Baumgardner’s opinion¹ that Mount Ararat rose after the Flood.

Now, some secular writers have concluded that Mount Ararat is a stratovolcano,^{3,4} and this would seem to be confirmed by ‘outward’ dipping (? volcanic) stratification in the western wall of the Ahora Gorge, on the northern side of the mountain, as shown in Crouse’s photograph on the front cover of *TJ* 15(3), 2001. (The stratification is also visible in the photo included here

with this letter.) Crouse also notes that volcanic stratification occurs in a canyon on the southern side of the mountain.

If Mount Ararat was erected as a submarine stratovolcano then it would be highly unlikely that conditions on the sloping sides of the active volcano would have been conducive to the preservation of ‘diluvium’¹ (‘coarse superficial accumulations ... glacial and fluvio-glacial deposits of the Ice age’⁵) or fossils. It is more likely that the required geological evidence of a submarine origin for the mountain would comprise volcanic textures and lithologies indicative of a sub-aqueous origin for the volcanic lavas,^{6–8} interbedded volcanoclastics,⁹ pyroclastics¹⁰ and possible (minor) sedimentary strata¹¹ of which the whole mountain is comprised. Such textural and lithological evidence may only be obvious to an expert in this field.

The Geological Map of Turkey (Van 1:500,000)¹² shows that the whole of the Mount Ararat area is, as Crouse has noted, composed of (‘igneous’) volcanic rocks, comprising dominantly basalts, with subordinate spilites, porphyrites and dolerites. Numerous small volcanic cones occur in the area, all of which probably formed during historically recorded post-Flood seismic and volcanic activity.³ Interestingly, what looks very much like one of these small volcanic cones can be seen in Crouse’s photograph on the front cover of *TJ* 15(3), 2001, just to the left of the horse rider’s left elbow. The photo with this letter shows the cone more clearly.

Submarine volcanic lavas, volcanoclastics and pyroclastics are common throughout the geological record,^{6,13,14} and basaltic lavas, the most common lithology in the Ararat area, commonly occur in sub-aqueous environments, from the Archean to the present day ocean floor.^{15–19} Dolerites commonly occur in these subaqueous environments as syn-volcanic sheeted dykes.²⁰

Spilites,²¹ which occur in the Mount Ararat area,¹² are soda enriched ophiolites,^{22,23} which are; ‘albite basalt

lavas of subcalic affinity ... **generally of submarine eruption**, showing “pillow” and allied structures’.²⁴

‘Porphyrites’, which also occur in the Mount Ararat area,¹² are felsic lavas such as trachytes, dacites and andesites, which can also occur as sub-aqueous flows.^{25,26}

McPhie *et al.*⁶ (quotes in quotation marks below, emphases added), and others, document the volcanic textures which characterise sub-aqueous volcanics. Very briefly, these textures include, but are not restricted to ‘pillow’ lavas^{27,28} which ‘... are diagnostic of the **subaqueous** emplacement of lavas, especially those of basaltic composition’; hyaloclastite/quench fragmentation²⁹ i.e. ‘... clastic fragments formed by non-explosive fracturing and disintegration of quenched lavas ... occurs on modern ocean floors ... ;’ and ‘... is a valuable indicator of the emplacement of lava into **subaqueous** settings ... ; and peperite³⁰

‘... a rock generated by mixing of coherent lava ... with unconsolidated wet sediment ... occurs ... along basal contacts of lava flows that override or burrow into unconsolidated sediments ... an important component of mixed sedimentary-volcanic sequences, especially those in **subaqueous** settings.’

A literature search should be undertaken to determine whether the detailed geology of Mount Ararat has been documented (? by Turkish workers) and if so, whether lithologies and textures indicative of a submarine origin of the volcanic rocks are present, and whether the mountain is interpreted as a submarine stratovolcano.

If the geology has not been so documented, then the volcanic strata of the mountain should be examined in detail, and the mountain should not be discounted as a submarine volcanic construct, formed beneath the waters of the Genesis Flood, unless it can be proven that none of those volcanic textures that are indicative of a subaqueous origin of lavas, volcanoclastics and pyroclastics, or interstratified sediments, exist.