Egypt was their place of habitation at the time of the Exodus.

3. The term 'children of Israel', in its Semantic use / shade of meaning, does not always refer to Jacob and his children as the only exclusive ones to be included in that term. Strong on 'children' or 'son' (Hebrew #1121), says its widest sense includes 'grandson, subject, *nation*, quality or condition, etc'. It is understood that Israel is referred to as a nation in Genesis 47:27, 'And Israel [singular] dwelt in the land of Egypt … and *they* [plural] had possessions therein and grew and multiplied exceedingly [emphasis mine].'
4. An attempt is made by Brenton to find a 'plural' and a 'chain' of promises relating to the start of the 430 years. Each of these, he says, 'denotes a chain of promises to Abraham, Isaac and Jacob' in such a way that Abraham and Isaac are not included in the term 'children of Israel'. The *critical problem* is that the 430 years of Galatians 3:17 does not start with a promise or a 'chain' of promises but with the special *confirmation* (or ratification; see Genesis 15:8–21) of that promise already given before in Mesopotamia (Acts 7:2). Remember Abram had spent some time in Haran—'and the souls they had gotten' (Genesis12:5)—so the 430 years could not start from the Ur of the Chaldees. This confirmation was given to Abraham soon after he entered Canaan at the age of 75, so that he would '*know* [be certain; emphasis mine] that I shall inherit it' (Gen 15:8).

   Twelve different Hebrew or Greek words were found to define 'confirm'. Only 3 times ('*kupow*' twice, '*prokupow*' once; 2 Corinthians 2:8, Galatians 3:15, Galatians 3:17) are these words used in a legal sense. Philip Hughes[7] says on 2 Corinthians 2:8:

   'The verb *kupow*, "ratify" or "confirm", was commonly used with a legal connotation, as is clear from Galatians 3:15 (the only other place in which it occurs in the N.T.) where Paul points out that a will which has been ratified … can be neither set aside nor added to. Hence the likelihood that the use of this term here implies an official or formal ratification of the Corinthian's love by resolution of the congregation or church to re-admit the repentant offender to their fellowship.'[8]

   In Galatians 3:17, the legal ratification of the promise(s) was made 'before' The Law, which came 430 years 'afterwards', and which cannot disannul (invalidate) the confirmation of the promise. John Brown[9] says,

   '… to "confirm" is to sanction, ratify, make or declare valid. Such a transaction is confirmed when it is fully settled, and the appropriate evidence given that it is settled. The royal assent confirms or ratifies a law in this country, after it has received the approbation of the other branches of the legislature'.

   There is only one time in the whole of Scripture, i.e. Genesis 15:8–21, where such a special confirmation occurred, where God, anthropomorphically, would bring the judgement of dismemberment upon Himself if He did not fulfil His covenant. This is the 'confirmation' referred to in Galatians 3:17.
5. Please check the AM dates of the article, 'Chronology of the 430 years of Exodus12:40',7 which come not from secular dates, but from adding up the chronology in Scripture starting with Adam, and it will be found that if Israel 'lasted' 430 years in Egypt, then there would be 645 years between the confirmation of the promise and the giving of the Law. Therefore, we cannot start with Jacob or Isaac nor with 430 'lasting' years in Egypt. In Galatians chapter 3, neither Isaac nor Jacob get a 'starting' mention, only Abram.

I am happy to discuss with Brenton other matters not dealt with here.

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Pioneer anomaly: still unsolved?

I was initially excited to read Humphreys' paper on how creationist cosmologies can explain the anomalous acceleration of the Pioneer spacecraft.[1] However, after some reflection, it appears to me that the paper is fundamentally flawed.

The paper is essentially a tale of two coordinate systems, their physical interpretations and how they relate to each other. These two coordinate systems are (1) 'coordinate' time and

distance (t and r respectively), and (2) 'proper' time and distance (τ and ℓ respectively). Humphreys presents the metric in 'coordinate' and 'proper' time and distance in his equations (9) and (10). (Note the care with which Humphreys describes the second version of the metric, saying 'I define the symbols $d\tau$ and $d\ell$ as …'. However, it is clear from what follows that he expects the reader to understand these symbols as infinitesimal changes in τ and ℓ respectively, so the careful wording is irrelevant.)

In General Relativity, as elsewhere, one set of four coordinates, in this case (τ, ℓ, θ, φ), is related to another set of coordinates, in this case (t, r, θ, φ), by four different functions. However, θ and φ are identical in these two coordinate systems, and we are considering a spherically symmetric configuration, so only two functions need to be considered: those relating the time and distance coordinates. In general these will take the form:

$$t = t(\tau, \ell) \quad (1)$$

$$r = r(\tau, \ell) \quad (2)$$

This gives:

$$dt = \frac{\partial t}{\partial \tau} d\tau + \frac{\partial t}{\partial \ell} d\ell \quad (3)$$

$$dr = \frac{\partial r}{\partial \tau} d\tau + \frac{\partial r}{\partial \ell} d\ell \quad (4)$$

Humphreys' equations (11) and (12) can be rearranged to give:

$$dt = \left(1 + \frac{2\Phi}{c^2}\right)^{-\frac{1}{2}} d\tau \quad (5)$$

$$dr = \left(1 + \frac{2\Phi}{c^2}\right)^{\frac{1}{2}} d\ell \quad (6)$$

where Φ is the potential. Comparing these with equations (3) and (4), we find that $\partial t/\partial \ell = 0$ and $\partial r/\partial \tau = 0$, implying that:

$$t = t(\tau) \quad (7)$$

$$r = r(\ell) \quad (8)$$

Considering the time coordinates, it follows that:

$$\frac{dt}{d\tau} = \frac{\partial t}{\partial \tau} = \left(1 + \frac{2\Phi}{c^2}\right)^{-\frac{1}{2}} \quad (9)$$

This is necessarily either a constant or a function of τ only; if it were a function of ℓ then $\partial t/\partial \ell$ would not be zero. This implies that Φ is either a constant or a function of τ only.

Similarly, for the distance coordinates:

$$\frac{dr}{d\ell} = \frac{\partial r}{\partial \ell} = \left(1 + \frac{2\Phi}{c^2}\right)^{\frac{1}{2}} \quad (10)$$

This is necessarily either a constant or a function of ℓ only; if it were a function of τ then $\partial r/\partial \tau$ would not be zero. But this implies that Φ is either a constant or a function of ℓ only, i.e. Φ *is not a function of time*. But from the above, Φ is not a function of ℓ either. So it follows logically from Humphreys' equations (11) and (12) that Φ *must be constant*.

Where does this leave the rest of the paper? The whole point of the paper is that Φ is *not* constant! This is a major problem. But what if Φ, in fact, does vary with time? Then at least one of the paper's equations (9) to (12) must be incorrect. But the remainder of the paper is built firmly on these four equations: change one of these, and the rest of the paper falls to pieces.

(Specifically, if Φ were a function of time, and dr dependent on Φ, then $\partial r/\partial \tau$ would be non-zero, and hence the metric in 'proper' coordinates would have a cross-term in $d\ell.d\tau$, which would render Humphreys' equation (13) incorrect.)

I stress that this point is absolutely foundational to Humphreys' argument, which is about how 'coordinate' time and distance are related to 'proper' time and distance. This is not a minor criticism. If my reasoning is correct, I have shown that either (1) the two coordinate systems are not related to each other in the way described in the paper, or (2) the equations relating the two coordinate systems are valid, but the potential Φ does not vary with time. Either way, the argument of the paper falls flat. Creationist cosmologies have not (yet) solved the Pioneer anomaly.

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Russell Humphreys replies:

I appreciate Mr. Upton's thoughtful critique of my article. After many years, I've realized that such critiques, even if erroneous, help readers evaluate the validity of my papers. One thing to notice is what the critics do *not* criticize. In this case, I was delighted to see that Mr Upton, who appears to have some training in general relativity, did not criticize the Appendix of my paper. That suggests he saw no glaring error in my derivation of a new solution of Einstein's gravitational field equations.

Mr. Upton's criticism has to do with whether the new solution can account for the Pioneer anomaly. He bases his entire line of reasoning on a logical error: he has confused a quantity in general relativity with a different quantity in calculus. His eq (4) correctly specifies a calculus quantity, the 'total differential' of the coordinate distance r:

$$\delta r = \frac{\partial r}{\partial \tau} d\tau + \frac{\partial r}{\partial \ell} d\ell \quad (i)$$

Here I have changed his notation for the total differential from 'dr' to 'δr' (with a delta) to make an important distinction below. Fleshing out eq (i) with a legitimate application related to my paper, his equation would give the total change δr in the coordinate distance r from Earth to a photon (in a radar pulse) due to the effect of two terms on the right-hand side of eq (i).

The first term is the contribution to δr due to the photon's motion during an interval of proper time. So the partial derivative in the first term is simply the photon's speed c in those coordinates:

$$\frac{\partial r}{\partial \tau} = c \qquad (ii)$$

The second term in eq (*i*) is the instantaneous (because τ has to be held constant in the second term) contribution to δr corresponding to an instantaneous change of proper distance $d\ell$ that would, for example in my paper, be induced by an instantaneous (if such were possible) change of gravitational potential. Put eq (*ii*) into eq (*i*) to get:

$$\delta r = c\,d\tau + \frac{\partial r}{\partial \ell} d\ell \qquad (iii)$$

Mr. Upton then turns my eq (12) around to get his eq (6), which I reproduce here:

$$dr = \left(1 + \frac{2\Phi}{c^2}\right)^{1/2} d\ell \qquad (iv)$$

Right after his eq (6), he makes the mistake, not in an explicit equation, but implicitly in his words [italics mine]:

> '*Comparing* these [eqs (5) and (6)] with equations (3) and (4), we find ...'

To make the comparison, he assumes that the *dr*'s of his eqs (4) and (6) represent the same quantity. Using my symbols, he was comparing my eqs (iii) and (iv) and *assuming* that

$$\boxed{\delta r = dr \ (???)} \qquad (v)$$

He doesn't justify this assumption. If it were correct, it would require the $d\ell$ terms in eqs (*iii*) and (*iv*) be equal, getting his eq (10). It would also require that the photon speed c in eq (*iii*) be zero. That is clearly incorrect, because in relativity, photons can't have zero speed in any frame of reference. So his key assumption, spelled out by my eq (*v*) above, is wrong. If you correct the wrong assumption and follow the effect through the remainder of his letter, you will see that it derails his train of thought and wrecks his conclusions.

Why did Mr. Upton make this mistake? I think he was misled by similar notations in different fields. Calculus textbooks use symbols like '*dr*' to represent total differentials, so he naturally chose that to represent the total derivative in his eq (6). Then it was very natural to slip into thinking of the common general relativity symbol '*dr*' in my equations as being the same thing.

To sum up, Mr. Upton misidentifies my quantity *dr* as a total differential and then shows contradictions that stem only from his misidentification. Knowing my own proneness to error, I'm glad that he did not find a real problem with my math.

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Tidal considerations

In contemplating the flood of Noah's day one has to consider the effects of tidal considerations. Not having seen any articles concerning this topic in creationist literature over the years is it possible that anything relating to this topic has been published?

The following questions come to mind:

1. Would there even have been a tidal surge? Presumably, since the moon and sun were in existence.
2. How large would this tidal surge be (depth)? What would be the depth differentials and the resultant bottom pressure?
3. Would the tide have a diurnal cycle of reversal or continue around the globe since there was no landmass to prevent it? If it continued unabated would there be a continuous shallow/deep area?
4. If it continued around the globe would vortices form at the polar regions? Would these vortices pull debris from the water toward the bottom?
5. Would severe waves (breakers) be formed when the tides passed over shallower areas?
6. Could tides account for the deposition of sedimentary rock layers?
7. What might be the scouring effect of such tides?
8. Could these tides affect the earth's rotation?

These are just a few of the considerations that might be addressed. You probably can either dismiss most of these as not worthy of consideration or find more significant issues. Since my field of expertise is medical physics it is be beyond my purview to investigate these questions. Hopefully your experts in hydrology and geology can add to our understanding in this regard.

Thanks for a great journal. It is a wonderful source of information to me even after 40 years of creationist studies.

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Editors reply:

Clark and Voss[1,2] have published papers at the International Conference on Creationism about possible tidal oscillations during the Flood. However, not all of your questions have been addressed, and they would form the basis for worthwhile research projects.

Journal of Creation Editors
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