Biblically-based cratering theory

Danny Faulkner, in his original article,[1] suggests that planetary and moon cratering may have been caused by many meteors and whatnot appearing at the time of the Genesis Flood, and which may have precipitated the Flood events. His conclusion however, seems to be leaning toward a theory that most heavy cratering took place during the Creation Week.

Wayne Spencer challenges[2] the article's conclusion that some cratering may be caused by accretion of matter created on the fourth day. Spencer seems to think that these impacts can be dated at different times. I don't know how one can determine this with any confidence. To be sure, smaller craters appear to sit on top of other large craters; therefore they must be younger than the large craters. Spencer feels that large impacts during the first cataclysmic event (the Fall) would have been obliterated on Earth by the Genesis Flood, but not on the planets and moons. Both Faulkner and Spencer suggest that a cloud of debris passing through our solar system could have caused all the cratering, perhaps in two stages: heavy accretion before the Fall and multiple small meteor clouds at the time of the Flood.

This is the same kind of thinking that suggests passing stars may perturb our solar system to cause meteor and comet activity. But when, in biblical terms, did any star pass nearby? Certainly not within the last 5,000 years! Our stellar neighbours are going in the same general direction as our sun. How much time is necessary for a close encounter? Are 1,000 to 6,000 years enough time? I think not.

This thinking implies that the universe was slightly flawed immediately after Creation and the Fall, but Genesis 3:16–19 and Romans 8:20–21 do not mention anything like this. As I read these verses, a curse was placed on the earth (its yield would never be 100 %, and thorns and thistles would invade everywhere, etc.) and on man. The Genesis account concerning the curse due to the fall of man does not lead us to think that anything occurred on a universal scale except the Second Law of Thermodynamics (the law of decay). Nor is there anything to suggest that damage to planets and moons occurred during the Creation Week. However, there is sufficient cause to think that cataclysmic effects took place at the beginning of, during, and after the Genesis Flood, which could have affected the entire cosmos.

I think Faulkner's proposal that a multiple comet (swarm) impact on the earth may have led to the Genesis Flood is not feasible, since comets are mostly dirt and ice with a small nucleus that may, or may not, be porous iron. These would be of insufficient mass to cause the Flood. However, Faulkner seems to be proposing that cratering may be mostly primordial and not really associated with the Flood anyway.

Is evolutionary bias present without realising it?

Accretion was mentioned as the mechanism used to form the planets during the Creation Week, but I think that this theory has problems. Accretion is the process proposed by evolutionists as the way the planets were formed, and involves the sticking together of solid particles. Evolutionists believe that the assumed solar nebula collapsed and accreted into the massive cores of planets and moons. Eventually these cores began to rotate as more and more material accreted, resulting in heat build-up, thus requiring a cooling period. A later refinement of the evolutionary theory of planet formation is that the accretion process released a lot of heat, and therefore the Chemical Heat of Formation must be counted. The theory continues with Differentiation, which is the separation by gravity of material of different density.

But why does a biblically-based theory need rapid or otherwise cooling of the earth and the other planets and moons? Were they not made as they are (sans cratering) and already at a temperature similar to what we see today? Why assume that all the planets and satellites were hot after God created them? It seems obvious to me that the earth itself did not need to cool, since life was ready to go on the fifth day. Why does Faulkner say that on the fourth day, God created planets through an accretion process? What is the evidence? We have none. Is it possible that the literal interpretation is correct even though it may sound unusual? Namely, that God made the sun, moon, and all the heavenly bodies (stars and whatnot) and **placed** them in the expanse as it was apparently expanding. Perhaps He called them into being and ordained the physical laws/ordinances as they were set in place.

How was it determined what features on the moon (or anywhere else) were formed at different times? How would we know that a crater is young or old compared to any other feature, aside from overlapping effects? Could not the overlapping take place within the single Flood year? How did Faulkner and Spencer determine that late heavy bombardment affected the earth, but not the entire solar system? I am confused on this point.

A suggestion

I suggest that the cratering and indeed all the lava flows and impact effects are the direct or indirect result of radioactive decay heating, which I suggest may have been the trigger to start the Genesis Flood. Is it consistent for God to pronounce the whole Creation very good when we have the destructive aspect of radioactivity? Could God have 'turned on' radioactivity just as He turned on the mechanism for the refraction/reflection of light in a water droplet to make possible a rainbow? As a result of the catastrophic events affecting the earth for the purpose of destroying all mankind except for eight people, could it be that radioactivity also caused major events on all the planets and their moons?

Models requiring internal heating seem to be necessary to explain the effects that are recorded concerning the Flood and its geological mechanisms. Plate tectonics and such seem to require an internal heat source that was not there prior to the Flood cataclysm. When I compare Deuteronomy 32:22 with Genesis 7:11, it seems to imply that God started the Flood with some mechanism, such as a fire under the foundations of the mountains down to Sheol, that in turn naturally caused the fountains of the great deep to burst open.

Did the Genesis Flood mechanisms affect other planets and the universe?

It would not surprise me if the process of radioactivity not only destroyed the pre-Diluvian world, but also destroyed a planet that was orbiting where we now find the asteroids.[3] The breaking apart of a planet at that location may have produced enough debris to crater everything in our solar system, and possibly could explain the meteors and comets which are short term objects not originally part of the perfectly created universe of the Creation Week.

The objection that this world could not have existed because of the short time in which the fragments dispersed homogeneously, really is not proven. The rings of the jovian planets seemed to have dispersed in much less than 1,000 years (or we have to admit that they were there, as is, from the start). To state that planets do not spontaneously explode is not to say that it couldn't happen if there was a prime cause, namely instant heat stress from the release of radioactivity. This may explain why several jovian planets produce more heat than they absorb from the Sun. Perhaps they are powered by radioactivity, not contraction. What powers Io? We may never find out.

From the Fall to shortly after the Flood

Is it possible that since the end of Creation Week everything has remained essentially as we see it today, except for effects of radioactivity triggering the Flood and other related catastrophic events?

I would argue that when God pronounced the Creation to be 'good', 'good', 'good' and finally 'very good', there were no destructive forces such as radioactivity or radiation decay processes. Nor was there a lot of matter flying around loose in the solar system that kept impacting all the heavenly bodies frequently. I do not agree with the idea of using evolutionary mechanisms as part of our biblical models.

We do not see cratering taking place today the way it must have occurred in the past. There are no records of anybody seeing a crater impact on the Moon that could have caused the features we see now. In 1994 we saw a comet break apart and strike Jupiter, but this is really a rare event. One explanation could be that these craterings took place when man was not looking. I assume that this could only have been during the year of the Flood, when man was bunkered down in the Ark not paying a whole lot of attention as to what was happening in the cosmos.

Conclusion

I am wary of 'borrowing' theory from evolutionists, thinking that it is just good science, when we do not share their underlying objective of explaining origins apart from divine revelation and of discrediting Genesis and the rest of the biblical account. However, we do need to develop a sound explanation for where, how and why cratering occurred on all the heavenly bodies.

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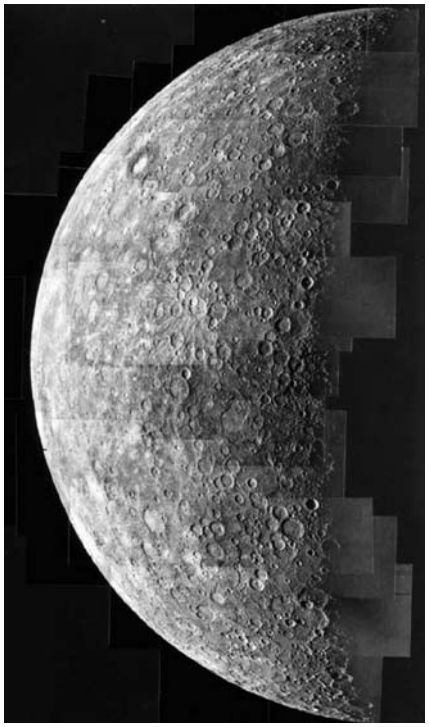

Mercury, the most cratered body in the Solar System.

Photo by NASA

Danny Faulkner and Wayne Spencer reply:

In his letter, Jim Hovis has raised several questions concerning a paper written by one of us, as well as our letters exchanged on the topic of solar system cratering. We thought it best to write a joint letter in response. While we agree with Mr Hovis on several broad concerns, we disagree with him on certain specifics, and we wish to offer some clarifications. Also, we hope to detail some differences of opinion between the two authors of this letter.

We readily agree with Mr Hovis that we cannot determine exactly when particular craters were formed, and that only relative ages can be inferred. This situation gives us much latitude to concoct scenarios whereby the craters formed. As creation scien-

tists, we must find a scenario that best fits the biblical and physical evidence. We expect that nearly every scenario will have some strengths and weaknesses within these constraints. We think that nearly all creationists agree that the surface features of solar system bodies need explanation. Simply postulating that God instantaneously created many of them with craters in place is not a satisfying option. In this context, Mr Hovis' reminder to guard our thinking against evolutionary assumptions is well advised.

Many people have apparently misunderstood the Faulkner proposal that the extraterrestrial planets and satellites of the solar system were accreted on Day Four from material previously created on Day One. The proposal is that the accretion was a rapid (taking less than a day), directed event, so this was hardly an evolutionary or uniformitarian process.

The wording of Genesis 1:14–18 does not give us enough information to determine if the celestial objects were created *ex nihilo* on Day Four or formed from matter created on Day One. The text of the creation account suggests that the Lord often formed things from earlier created material (Genesis 1:11, 20, 24, and Genesis 2:7, 22). In the Faulkner proposal, many of the craters in the solar system would have resulted from this rapid process and so would date from the Creation Week. This could be identified as the early heavy bombardment. This is a term used by evolutionists, but please note that the use here is very different from how evolutionists use the term. In like manner, for communication a creation geologist can use the terms that evolutionary geologists use to describe certain rock strata while meaning something quite different as to how or when the strata formed.

Being a directed process of accretion, the earth would have been spared the early heavy bombardment. The advantage to this suggestion is that it explains why the earth was missed while most other hard-surface objects in the solar system sustained a level of impacts that would have been highly lethal to living things if these impacts occurred just after the Creation Week. Before moving onto other issues, we should emphasize that the authors of this letter are not in agreement on the manner in which the objects on Day Four were made.

Mr Hovis seems to think that we accept the existence of the Oort comet cloud. With no statement in the Faulkner cratering paper concerning the Oort cloud, is that a reasonable inference? Let us be very clear: we do not think that the Oort cloud exists.[1] Unfortunately, as yet there is no creation theory for the origin or purpose of comets.

Both of us have independently concluded that the solar system was visited by a swarm of celestial objects at the time of the Flood. Mr Hovis objected that comet nuclei are not substantial enough to produce significant cratering. This is not true. The important factor in crater formation is the kinetic energy, which goes as $\frac{1}{2}mv^2$. With the high speed that meteoroids possess, the mass is of minor importance. Since all of the meteoroid material is heated to a high temperature upon impact, the exact composition is not important either. Faulkner prefers a comet swarm for several reasons detailed in his paper. Spencer can accept that, but would also entertain more solid objects directed for a one-time pass through the solar system. Spencer also suggests that the impact event at the time of the Flood may have affected much of the solar system. Faulkner, on the other hand, holds that the impacts at the time of the Flood only affected the earth and the moon significantly.

We must emphasize that we think these impact events were not the prime source of the Flood, but that they merely triggered the events that caused the Flood, perhaps by initiating catastrophic plate motion. We find the Catastrophic Plate Tectonics hypothesis very compelling. If all solar system craters date from the time of the Flood, then one could hypothesize that the earth was protected from most, but not all, of the impacts at that time. Spencer rejects this and assumes that the earth was bombarded in the same manner as other objects in the inner solar system, but that the Flood destroyed the evidence of most of those craters. The Faulkner proposal avoids this problem by putting many impacts early on the fourth day of Creation and fewer at the time of the Flood, and suggesting that the earth was protected during the Creation Week.

Many people seem to think that craters imply judgment or imperfection. But is this true? If an impact occurs where creatures live, that could be the result of judgment or at the very least be considered far from a perfect situation. However, if an impact just rearranges the landscape of a sterile surface, is that judgment or imperfection? How would other rearrangements of surfaces be different? If impacts were always the result of judgment or imperfection, then it would seem that even the possibility of impacts (i.e. the existence of meteoroids as comets or asteroids) would signify judgment or imperfection. Mr Hovis seems to have taken this line of reasoning to conclude there were no asteroids or comets before the Fall. We think that this conclusion is incorrect, or at least not the only possibility. We readily acknowledge the theological ramifications and leave this question on the table for discussion. This appears to be the first discussion of this topic, and we thank Mr Hovis for raising it. It certainly requires more thought and discussion.

We completely disagree with Mr Hovis about his suggestion of a planet exploding due to radioactivity. We will detail several objections. First, creationists often view radioactivity as a fault, or imperfection, that could not have existed before the Fall. However, is this correct? Radioactivity is often lumped with the second law of thermodynamics as a ramification of the Fall. We have never seen a physics textbook that discussed radioactivity solely as a manifestation of entropy. Neither is radioactivity something

pasted upon physics that may be turned on and off at will. Instead, the physics that describes the how and why of radioactivity is the same physics in the everyday world. If that part of physics is changed, then all of physics is changed. One can suggest that all of physics changed at the time of the Fall, but this change is not observable or testable, and would pose immense problems for explaining how the pre-Fall world could have functioned.

Second, the products of radioactivity are well known, and the products of such rapid radioactivity are not known in meteorites. Again one could hypothesize that radioactivity was sped up as a result of the Fall or at the time of the Flood and then later returned to normal, but again this seems to be a case of special pleading.

Third, even rapid radioactive heating does not produce instantaneous mechanical stress. One of us has attempted to do a back-of-envelope calculation on how rapid radioactivity could disrupt a planetary body. This does not seem to be possible.

Fourth, it is not possible to clear the solar system of most of the debris from an exploded planet in just a few thousand years. The distances between the planets compared to the sizes of the planets are huge. This is an objection that we have to the Froede and DeYoung suggestion,[2] though we understand that they favoured a fragmentation by collision rather than a single planet explosion.

Overall, we think that the root of Mr Hovis' objections to what we have written is a difference of opinion of the details of what the curse entailed and in how God created in the beginning. Did meteoroids exist before the Fall? Do craters in themselves testify to imperfection? Can the existence of craters be reconciled with a Creation that is 'very good'? Our answers to these questions and those of Mr Hovis would be very different.

The discussion of a cratering history of the solar system from a creation viewpoint is in its infancy. We expect to revisit this issue in the future and encourage others to join us.

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1. See for example, Faulkner, D.F., Comets and the Age of the Solar System, *CEN Tech. J.* **11**(3):264–273, 1997.
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More on mountains

Brenton Minge in his letter '*More on mountains'* [1] argued that today's high mountains did not uplift after the Flood, but are of pre-Flood origin: *'"high mountains", before the flood mean exactly that — "high mountains"'.* [2] He mentions Mount Everest *'with spectacular evidence of parallel sedimentary strata, especially from an elevation of 8,300 m upwards to the summit',* and asks how such parallel layers could be uplifted without distortion. I looked up the reference he gave to this in *Time*.[3] The uppermost 100 m in that picture however, do not look like parallel strata, and neither do the oval formations to the right of Camp V at 7,772 m.

The Himalayas are very similar to the Alps in Europe where I live.[4] The folding of the sediments is extremely chaotic and shows that the Alps were folded while the sediments were still soft, that is toward the end of, or shortly after, the Flood. The same is true for the Himalayas. There is an S-fold in the marine Triassic rocks on the Mount Qomolangma region of Tibet[5] which could have only been made while the sediments were still soft. This pattern is common in today's mountains everywhere. There are many examples of extreme folding of formations in Norway[6] which must also have occurred while the sediments were soft. Another excellent example is the 'Geislerspitzen' in the dolomites of the Alps,[7] which powerfully illustrate the tectonic uplift that occurred toward the end of, or after, the Flood. Some sedimentary layers can be seen to sit at an angle of about 20 degrees to the horizontal, while other layers are inclined at almost 75 degrees. I personally have seen sediments in the southern Alps of Europe, which are uplifted to the vertical.

Thus, the evidence clearly indicates that the highest mountains today could not have existed prior to the Flood, but were uplifted toward the end of, or after, the Flood.

Brenton also indicated that he objected to the idea of an ice age.[8] I would like to advise that we have very powerful evidence here in Switzerland for the ice age.

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