Solar system formation by accretion has no observational evidence

I would like to comment on Jonathan Henry's recent report on the subject of accretion disks in issue **24**(2).[1]

It was most illuminating to see that computer models used to simulate planet origins in dust disks or accretion disks have all sorts of problems growing from dust grains to objects larger than 1 meter in size. The report does raise the question how astronomy committed to the big bang and accretion disk theory can explain the presence of more than 470 exoplanets documented now. If accretion of dust disk around stars does not form planets, it would seem the answer(s) are in vain.

In the PDF attachment supplied, five exoplanets show observational evidence of orbiting their host stars in dust disks. Evolutionists would claim this is observational evidence for the accretion disk theory.

Q: Do these exoplanet observations in dust disks pose a challenge to the conclusion reached in this report, namely that the heavenly bodies must be explained by a supernatural event vs that these exoplanet observations support the accretion disk theory?

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Jonathan Henry replies:

Mr Bernitt has raised a good question but it is one already answered in the accretion paper to which he refers. Exoplanets need not have formed by accretion any more than planets within our solar system. The fallacies with accretion discussed in the accretion paper are general and are not confined to alleged planetary formation in only our solar system.

Citing the existence of exoplanets as confirmation of accretion is a mistake. Exoplanets exist, but their mode of formation is an inference. Existence neither confirms nor denies an inference about past formation.

So how do we arrive at whether a formation inference is valid? As the accretion paper discusses, the solar system and the larger universe show definite symptoms of material dissolution rather than coalescence. Therefore, the existence of exoplanets in dust around stars can logically be taken as consistent with the dust forming as a dissolution product. This is discussed in the original paper.

If one wishes to continue to *see* the accretion of exoplanets in the dust around stars, he of course can do so, but he should not confuse this inference with observation. As the original paper documents, there are no observations of actual contraction or accretion of matter into celestial bodies.

As a recent *fiat* creationist, I realize that from a scientific point of view, the claim that God spoke celestial bodies into existence—including exoplanets—is also an inference which I choose to make. But the facts that (1) the universe exhibits signs of dissolution, (2) there are no actual observations of contraction or accretion into larger bodies, and (3) in the Bible the original Hebrew signifies *fiat* creation rather than a process of God's having 'used' a suite of 'natural processes' to accomplish the creation, all combine to make the inference of recent *fiat* creation a reasonable one.

As the original paper discusses, though science cannot absolutely confirm or deny any inference, biblical revelation can. By asserting a recent *fiat* creation, a long, gradual formation of celestial bodies is denied and *fiat* creation remains as the only viable alternative. Reading-in other views into Genesis is eisegesis and while it may ostensibly allow one to be a 'Bible-believing' Christian and an evolutionist simultaneously, such a position is not a valid hermeneutic based on the original Hebrew wording in Genesis.

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CPT explains the rapid sea level drop in the latter portion of the Flood

In his article in *Journal of Creation* **25**(1) dealing with the proper location of the Flood/post-Flood boundary, Michael Oard raises the extremely important issue of cause for the rapid sea level drop during the latter portion of the Flood. He correctly observes that the massive apron of sediment, mostly below sea level today, on the margins of all the continents, otherwise known as the continental shelf, represents sediment stripped from the continent interiors during the runoff stage of the Flood. I am persuaded that Oard is correct in concluding that the vast majority of the erosion and deposition of the continental shelf sediments occurred during the year of the Flood and not afterward. I concur with him that this implies a dramatic and rapid reduction in the global sea level relative to the mean height of the continental surface to allow such rapid runoff to occur. A crucial issue, of course, is the mechanism responsible for such a rapid reduction in sea level. Oard claims that catastrophic plate tectonics (CPT) offers only the cooling and thermal contraction of 2 km of seafloor basalt to account for this reduction in sea level, which, of course is woefully insufficient. Is this an accurate representation of the CPT understanding of these events?

A crucial issue: how and when today's ocean lithosphere formed

The short answer to the question above is no. A centerpiece of CPT is that all of the present-day ocean lithosphere was generated by seafloor spreading after the sediments and fossils designated as Paleozoic had already been deposited on the continents by the Flood. This means that all the present ocean lithosphere, on average some 50-70 km thick (not just its topmost 2-km), with all the cooling and thermal contraction that this implies, began at a mid-ocean ridge and has cooled to its present state after all the Paleozoic continental sediments were in place. This conclusion regarding the age and history of the ocean lithosphere is based on many interlocking lines of observational evidence. One of the least controversial lines of evidence involves the relative radioisotope ages of seafloor basaltic rocks. The research of the RATE team demonstrated that radioisotope methods do indeed provide a powerful means for obtaining relative ages of igneous rocks. When identical methods are applied to rocks from the ocean floor and also to basalts erupted during the Flood in continental environments, the results, with considerable consistency, reveal that the basaltic rock of the ocean floor is all younger than the Paleozoic portion of the continental rock record. Moreover, by comparing the radioisotope levels in rocks located progressively closer to the adjacent mid-ocean ridge, one finds younger and younger relative ages, implying that the seafloor spreading process is indeed genuine.

Evidences that ocean lithosphere forms at mid-ocean ridges and subducts at trenches today

Other prominent lines of evidence supporting the CPT interpretation for the age and character of today's ocean floor include its large-scale topography, with higher elevations near the ridges and lower elevations as one moves away from them; its heat flow distribution, with a spike in heat flow along the ridges and decreasing heat flow as one moves away; its sediment distribution, with almost no sediment along the ridge system and increasing thickness of sediment as one moves away; its seismicity pattern, with tensional seismicity localized along the ridge axes and strike-slip earthquakes localized along fracture zones that offset segments of ridge axis; as well as the presence of ocean island chains, such as the Hawaiian-Emperor chain, which indicate motion of oceanic lithosphere over more or less fixed locations of melting in the upper mantle. There are also multiple lines of evidence that oceanic lithosphere is plunging into the mantle along the deep ocean trenches, including the trenches themselves, the inclined zones of seismicity inboard of the trenches, the zone of volcanism inboard of, and parallel to, the trenches, and seismic images of subducted lithosphere in the mantle adjacent to trenches. In addition there is now a vast database of GPS measurements of current plate motions. These GPS measurements document plate divergence at the mid-ocean ridges and plate convergence at deep ocean trenches with little room for uncertainty. The point here is that the CPT interpretation of the character of today's ocean floor is anchored in a vast array of observations from the earth as it exists today.

What primarily determines seafloor depth today?

Highly relevant to the issue of the mechanism responsible for the rapid decrease in global sea level during the latter portion of the Flood is the physics

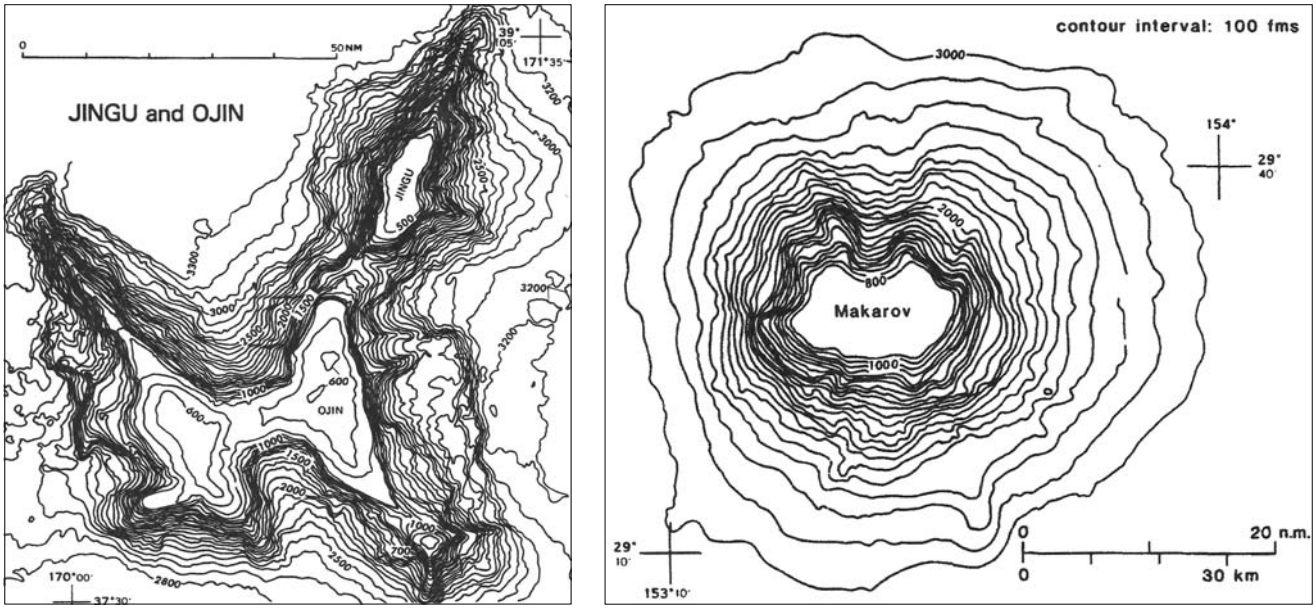

Figure 1. Topography of the Jingu and Ojin guyots in the Emperor Inland chain (left) and the Makarov guyot in the Japanese Seamount Province (right). Depth contour interval is 100 fathoms (600 ft or 183 m). Lateral distance unit is nautical miles (6,080 ft or 1,853 m). The plateau areas are 312 km^2 for the Jingu guyot, 2,180 km^2 for the Ojin guyot, and 247 km^2 for the Makarov guyot. (From Smoot, ref. 1.)

responsible for variation in seafloor depth today. Modern seismology reveals that, apart from the extra thicknesses of basalt in oceanic volcanoes and volcanic plateaus, the vertical structure of the world's ocean floor is amazingly uniform. The main cause for variations in the seafloor height is therefore not lateral variations in rock type but rather lateral variations in the average temperature of the uppermost 80–100 km of rock. A prominent example is the mid-ocean ridge system, which stands about 2,000 m higher, relative to ocean floor far removed from ridges. Just how much warmer must the rock beneath the ridge be to account for its higher elevation? The volume coefficient of thermal expansion α of mantle rock is about 3×10^{-5}/°C. The average change in temperature ΔT through a layer of thickness $d = 100$ km needed to yield $\Delta h = 2{,}000$ m of higher topography is given by $\Delta T = (\Delta h/d)/\alpha = (2{,}000/100{,}000)/3 \times 10^{-5} = 667$°C. This means that the average temperature of a 100-km-high column of rock beneath a typical mid-ocean ridge is about 700°C warmer than a column of equal weight beneath ocean bottom far removed from a ridge. In other words, apart from oceanic islands, plateaus, and trenches, it is the thermal structure of the ocean lithosphere that primarily determines ocean depth.

Guyots testify to rapid seafloor subsidence toward the end of the Flood

So how does this help us to understand why and how the sea level dropped so quickly in the latter portion of the Flood? Consistent with this inference that ocean depth is related to the average temperature of the upper 80–100 km of rock beneath the ocean bottom, one possible, or even likely, cause for a rapid drop in the global sea level would be the rapid cooling and consequent subsidence of the ocean lithosphere. Is there any observational evidence for such a rapid subsidence of the ocean floor during the Flood? In my opinion, the submerged flat-topped seamounts known as guyots in the world's oceans represent precisely such evidence. A technical note published in 1991 entitled 'North Pacific Guyots', by N. Christian Smoot, then with the Naval Oceanographic Office at the Stennis Space Center, provides well-resolved topographic maps obtained by multibeam sonar scans performed by the U.S. Navy of 46 guyots in the North Pacific.[1] These guyots include 4 in the Gulf of Alaska, 14 in the Emperor Island chain, and 28 in the Northeast Pacific Basin southeast of Japan. The topography of three of these guyots is displayed in Fig. 1, on the preceding page.

The mean depth to the summit of these 46 guyots in Smoot's report is 653 fathoms (3,918 ft or 1,194 m). The relative age of the seafloor surrounding the Emperor Island guyots is early Cretaceous, and the relative age of the Northwest Pacific Basin seafloor is Jurassic. The most straightforward interpretation of these features is that both this seafloor and these volcanic islands were generated during the main stage of the Flood. The extreme erosive wave activity of the Flood beveled flat the tops of these volcanic islands, which originally had been significantly above the ocean surface. Sometime since then, the ocean floor of this entire North Pacific region has subsided by more than a kilometer. In the context of the Flood, the most logical time interval for this subsidence corresponds to when the Flood waters were rapidly receding from the continent interiors; in other words, during the runoff stage of the Flood.

All of the papers on CPT that I have authored over the past 25 years have explicitly emphasized the formation of all of today' ocean lithosphere by the process of seafloor spreading during the Flood and its subsequent cooling to its present thermal state.[2-5] This translates to about two kilometers of subsidence for most of today's ocean floor via thermal contraction since that seafloor formed at a mid-ocean ridge during the Flood. The guyots in all the world's ocean basins, not just in the Pacific, testify earnestly that this vast amount of subsidence is real.

Nowhere have I *ever* suggested that the cooling of today's ocean lithosphere involved merely the topmost 2 km of the ocean floor basalt, as Oard seems to imply. Oard has discussed these guyots in connection with the layer of carbonate found on many of them.[6] These guyots are evidence for a large amount of seafloor subsidence, and they illustrate how the the erosion of their flat tops and their subsequent sinking, typically by more than a kilometer, relates to the runoff of the floodwaters from the continents.

The cause for rapid seafloor subsidence during the Flood

Finally, the question of how the rapid cooling of the ocean lithosphere occurred during the Flood is an extremely important one, one I have stressed for some 25 years. I addressed this issue in my 1986 ICC paper, which first introduced the idea of CPT.[2] In this paper I stated that it was my conclusion that it was impossible to account for the cooling of the ocean lithosphere in terms of time-invariant natural law. I emphasized this point again in 1990 in a contribution to the CRS Minisymposium on Variable Constants entitled, 'The imperative of non-stationary natural law in relation to Noah's Flood'.[7] It has been my earnest conviction for these many years that the rapid cooling of the newly forming ocean lithosphere during the Flood must have involved God's supernatural intervention. I can identify no other logical possibility. All of the 3D numerical models of the Flood cataclysm I have published since 1990 have therefore included an accelerated rate of cooling of the ocean lithosphere; cooling that occurs during the Flood itself, which allows rapid drainage of water from the continents during the year of the Flood.[3-5] As I mention in those papers, this was achieved numerically by choosing an increased value for thermal conductivity. One wonders what mechanism Oard has in view as an alternative for explaining the rapid runoff.

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Michael Oard replies:

I agree with Dr. Baumgardner that: (1) continental margin sedimentary rocks were deposited during late Flood runoff, (2) guyots were planed at sea level before subsiding late in the Flood, (3) present topography and geography are largely due to late Flood processes, and (4) the Flood/post-Flood boundary is generally in the late Cenozoic,[1] as I have previously noted.[2]

However, we differ as to the mechanism(s) for continental uplift and/or sea level drop during the Retreating Stage. Earlier, Baumgardner asserted that differential vertical tectonics occurred after the Flood by the slow cooling of the ocean lithosphere: "… the present oceanic lithosphere must have cooled from near the molten state to its current temperature distribution in only a few thousand years."[3] But slow vertical changes do not fit clear Flood-caused phenomena. So, Baumgardner now sees these differential tectonics as late Flood, unlike other CPT proponents who still hold to the slow: (1) cooling of the ocean lithosphere, (2) subsidence of the ocean bottom, and (3) rise of the continents for centuries after the Flood, as I noted.[4]

2 km or 50 km?

I mistakenly interpreted Baumgardner's model as restricting cooling from the molten state to the top 2 km of basalt and sheeted dikes, rather than the entire 50–100-km lithosphere, and appreciate his clarification that the upper mantle peridotite and lower crustal gabbro were also generated from a melt at the mid-ocean ridges (MORs), before drifting thousands of kilometers.

But it seems that cooling that much material—~1.8–3.6 x10^{10} km^3—is a bigger problem for CPT. Even the basalt and sheeted dikes—~7.2 x 10^8 km^3—would likely take thousands to tens of thousands of years to cool, while the larger volume might take millions of years! My point in the original article was that it would take too much time to cool the top 2 km, thus the Cenozoic could not have been a time of post-Flood catastrophism.

I agree that if 50 to 100 km of lithosphere cooled by about 700°C from a molten state, the sea floor would sink more than 1 km. But what evidence is there that this actually happened? Is there evidence that this lithosphere was this hot and that it cooled 700°C while moving away from the mid-ocean ridges (MORs), causing 2 km of sinking? What caused the continents to rise? Or was all the motion from sea floor subsidence?

How does 50 to 100 km of hot lithosphere cool?

If up to 3.6 x 10^{10} km^3 of lithosphere cooled within a very short time, then Baumgardner rightly attributes it to a direct divine act. I applaud this perspective of divine involvement in every detail of the Flood, but wonder how we are to distinguish between mediate and immediate divine actions? But I find it ironic that Baumgardner criticizes my Flood model for similarly requiring divine protection of Earth during the impact stage early in the Flood.[5] I am sure we both agree that 'god-of-the-gaps' accusations are fallacious because they presuppose a deistic or atheistic view of reality.[6]

Numerous questions on the new ocean floor

Although Baumgardner's computational models are quite interesting, his work lacks significant detail regarding submarine geology. How was new lithosphere formed at the MORs? Did magma differentiate as it was upwelling? How and where did the new lithosphere originate? If molten, what is the origin of sheeted dikes? How did distinct layers of upper mantle peridotite, lower crust gabbro, and sheeted dikes move laterally and simultaneously?

Was the new lithosphere sufficiently strong to 'push' the leading plates thousands of kilometers? Or was motion caused by 'pull' at subduction zones? If so what role did phase conversion play? Since forces in rock are typically rapidly dissipated, how were the large lithospheric plates, such as the hemispheric-sized Pacific plate, moved? Abundant secular literature exists documenting the inadequacy of these forces for plate tectonics.[7]

CPT models show rapid subduction and plate motion, but as with any sophisticated computational model,

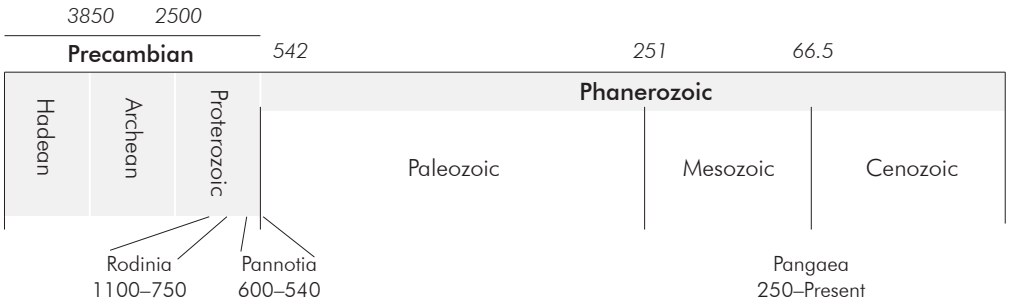

Figure 1. The last three supercontinents in relation to the uniformitarian geological timescale and age (note time is on a logarithmic scale).

they output results based on the input parameters. In my long experience with weather and climate models, I have seen little reason to accept them at face value, having seen many problems with complex models. We need to know not only the physics of the variables but how they interact, non-linearly. The model also needs a proper initial condition (more on this below).

Which splitting continent started the Flood?

Many questions have been asked of CPT for many years, but remain unanswered.[8] Several of these could be answered if Baumgardner would provide a detailed timeline matching the days of the Flood, the geological time scale (which he affirms in its chronostratigraphic sense), and the events of CPT. For example, he states that Pangea did not break apart until after the continental Paleozoic section had been deposited, given sea floor dates of mid Mesozoic to Cenozoic. That would be around the middle of the Flood; thus, if CPT were the mechanism initiating the Flood, why is there no scientific evidence of that event? Snelling has suggested that the initial Flood CPT event was the breakup of Rodinia.[9] But what of Pannotia, which is between Rodinia and Pangea?[10] What of the pre-Rodinia supercontinents? How can one episode of runaway subduction explain numerous complex reversed-plate motions?

A more basic question is the extent to which we accept secular geological interpretations based on propositions antithetical to the Bible? If, for example, the chronostratigraphy of the time scale is valid history, then how are each of the stages related to the Flood year … specifically? Here is another instance where a detailed timeline would benefit everyone. A template is provided in figure 1. Drawing lines connecting the events of CPT and the eras of the time scale would be a good start. I await it with interest.

Can relative secular dates be used in dating biblical Earth history?

Baumgardner's theory requires the relative accuracy of radiometric and biostratigraphic dates, particularly in validating the age distribution of the sea floor. Can we trust these secular dates? Evidence has shown that many 'basement' dates from the ocean drilling projects did not reach true basement.[11] His assertion of both biostratigraphic and radiometric reliability seems counter to much published creationist research. If Baumgardner proposes a functional equivalency between old results and young ages, then I would appreciate his providing the algorithm that would demonstrate it. Our stratigraphic research would be much enhanced were such conversions feasible.

However, I believe the case for relative dates is only a theoretical possibility at this point, not a demonstrated technique. Baumgardner claims that RATE did so, but the only published information is the work of Humphreys[12] (figure 2), which, in turn, is based on Woodmorappe's statistical analysis of anomalous radiometric dates.[13] The idea of absolute relative dating also has been propounded to lay audiences by Andrew Snelling in *Answers*.[14]

Examining figure 2, I see several problems for relative dating. First, and most obvious, there are a small number of statistically distant outliers: dates returned are billions of years, dates expected were a few hundred million. Second, this study cannot include the population of dates rejected by secular researchers, which would increase the sample of outliers. Woodmorappe noted that: "Over 300 serious discrepancies are tabulated. It is, however, demonstrated that most discrepant results are not published."[15] Third, although many radiometric dates on figure 2 correlate to the

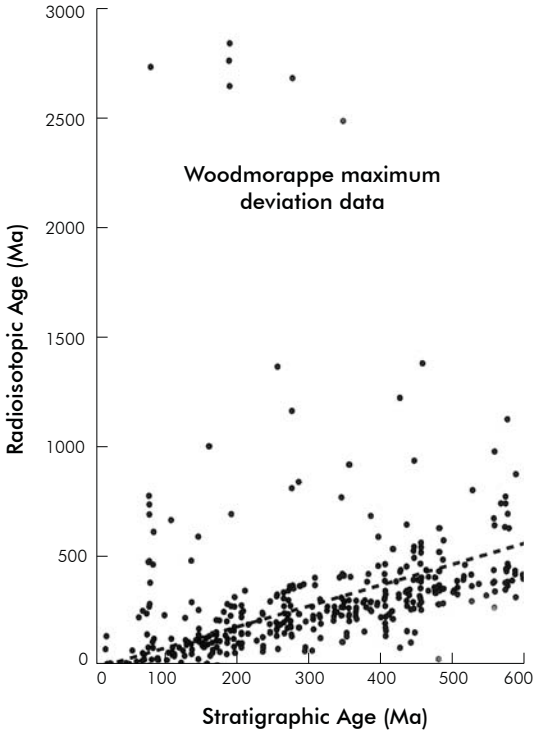

Figure 2. Published radioisotopic ages of geological layers compared with their expected age shown by the dashed line (refs. 12 and 13).

geological column, this is partly due to circular reasoning. Radiometric dates are believed to be 'good' if they are close to what is expected.[16] Dates not consistent with the column would likely be rejected by geologists and not published. If this is not a problem, then why do virtually all labs ask for the expected date range of the sample? I believe that if a random sample of *all* laboratory results was plotted, it would be quite different from figure 2.

The dependence of this picking and choosing of dates, even from diverse 'independent' dating methods, on preconceived ideas was brilliantly shown in the appendix of Lubenow's *Bones of Contention*.[17] He demonstrated how results from different methods converged on a desired date for a particular fossil, and then re-converged on a new desired date from paleontologists.

Other evidence for CPT?

Baumgardner once again claimsmultiple solid 'observational evidences' for sea floor spreading, but the details do not bear out his assertion (for example, the trend in dates in the Hawaiian-Emperor chains, more commonly explained today by moving hotspots, not moving plates). This is supported by date 'trends' opposing the Pacific plate motion.[8] His apparent unwillingness to admit different possible interpretations for data is seen in his claim of GPS measurements and Wadati-Benioff zones, both of which admit other, non-PT, explanations. Furthermore, when we read Smoot's work carefully, we see that Smoot interpreted the evidence of the geomorphology and geology of the Pacific Ocean basin in opposition to plate tectonics. Since most ocean bottom sediment originated on the continents, then it only makes sense that it would thin away from the MORs. It is important in forensic investigations to contemplate the variety of explanations possible and not become driven by one particular theory. Otherwise we will ignore other good explanations and contrary data, as I have explained regarding trench zones, such as extensional features being increasingly found along forearcs.[8]

Best in the field?

Baumgardner ends his letter by stating:

> "As I mention in those papers, this was achieved numerically by choosing an increased value for thermal conductivity. One wonders what mechanism Oard has in view as an alternative for explaining the rapid runoff."

This quote reads quite differently when we remember the introduction of an arbitary initial condition (unstable lithosphere) in his model, which leads to subduction. It is a fallacy to chide me for not having a better explanation, implying that my criticisms are wrong if I do not present a better idea—a good example of the 'best in the field fallacy'.[18]

In conclusion

I look forward to CPT being developed with regard to geological details, showing that it can be a fruitful model. If it cannot, then we must draw the opposite conclusion. As with any speculative idea, it would also benefit from a less emotive and acerbic presentation.

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