

Catastrophic plate tectonics and plate tectonics—a comparison of two theories

I feel some clarification is in order after reading Mark McGuire's recent article entitled "Catastrophic plate tectonics and plate tectonics—a comparison of two theories".¹

First, his article seems to follow the same format of most anti-catastrophic plate tectonics (CPT) articles, pointing out minor, unresolved issues in the overall theory, yet offering little in a viable alternative.¹ Many of these articles merely proceed with criticism of CPT as if little data in support of CPT actually exists.

Since the 1960s, the geologic literature has been filled with data supporting horizontal movement of lithospheric plates, some obviously more valid than others. In contrast, there is a despairingly obvious lack of published alternative (non-CPT) explanations for: (1) the mantle tomography showing clear and continuous oceanic lithosphere subducted beneath trenches (figure 1)²; (2) the heat flux pattern across ocean ridges that supports sea-floor spreading; (3) the differences in magma chemistry observed at volcanoes in locations like Hawaii, Italy and the USA West Coast that can be best understood using the CPT model; and (4) the linear patterns of earthquakes, volcanoes and mountain ranges that are so readily explained by plate boundaries. Just how do the alternative hypotheses explain these empirical data?

Criticism of CPT is fine. It is a theory. It does not have the answers to every issue, and likely never will.

However, creation scientists should examine all the relevant data and choose the best explanations that follow the truth of Scripture. I personally believe CPT offers the best biblically based explanation for the entire spectrum of observable geologic data. Other authors may disagree, but they cannot disregard empirical data. We cannot reach any sort of Flood model consensus if we exclude available data from our thinking.

One final thing I would like to clarify was discussed by McGuire on page 106 and in endnote number 32 on page 112.¹ It seems that McGuire, and possibly others, believe that CPT involves two complete subduction cycles which consumed the entire oceanic lithosphere twice. I believe this is incorrect. Yes, John Baumgardner has previously pointed out that there is a lack of so-called Paleozoic-age oceanic lithosphere in existence today. However, his unpublished computer model suggests only a minimal amount of Paleozoic oceanic lithosphere was created during the Flood, mostly in the South Pacific.³ He also found that subduction

in the South Pacific seemed to cease at the end of the Paleozoic. My own unpublished research fits this interpretation also. I find minimal coverage of the continents with Flood sediments during the Paleozoic megasequences. It is not until the latest Paleozoic and into the Mesozoic that I find the most extensive sedimentary coverage of the continents. This implies a greater amount of ocean crust was being produced in the Mesozoic and, likewise, less during the Paleozoic.

All this to say that most supporters of CPT do not advocate the subduction of two complete ocean surfaces between days 40–150 as McGuire assumes.¹ I don't think there ever was a claim in CPT to subduct 669 million km² of ocean surface into the mantle during the Flood. The amount subducted was more likely not appreciably greater than the original, pre-Flood ocean surface, or closer to 360–400 million km². Finally, there was not only subduction activity during the Flood around the ring of fire (40,000 km), there was subduction along southern Europe,

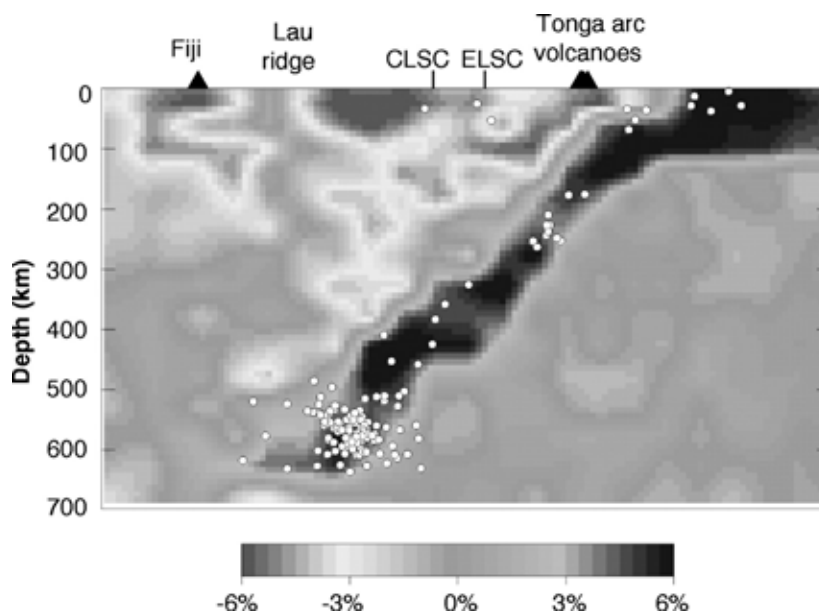


Figure 1. East-west profile of P-wave velocity across the subduction zone beneath the Tonga island arc volcanoes, Pacific Ocean. Earthquakes caused by subducting slab shown with small circles. Velocity perturbation scale shown at bottom. (From Zhao *et al.*², figure 2.)

the Middle East and even northern India that McGuire didn't include in his estimate.¹ These locations add another 15,000–20,000 km to the length of worldwide subduction during the Flood event. When you add in the proper numbers, the result does fit inside the mantle.

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» Mark McGuire replies:

First of all, I would like to thank the editors of *Journal of Creation* (*JoC*) for publishing the two articles on uniformitarian plate tectonics (UPT) and catastrophic plate tectonics (CPT). *JoC* has presented ideas like this in the past (whether they agree with the author's position or not) which promotes healthy debate. Second, when I read the book *The Genesis Flood*¹ in 1980, I was convinced that Whitcomb and Morris presented a valid Flood model which included vertical tectonics (VT) based on the Bible verse “The mountains rose; the valleys sank down ...” (Psalm 104:8). The UPT/CPT model may explain oceanic crust better than VT, but the VT model explains mountains better than the UPT/CPT model. This is a matter for debate. Also, it was the study of oceanic crust which elevated the plate tectonics (PT) model to its dominance today.²

Next, concerning topics in the letter to the editor, the intent of the two previous articles^{3,4} was to point out problems in the UPT/CPT models which need to be addressed. I started

researching this topic in 2012 and I discovered in almost every area there is some issue that needs explanation. A paper of this size limits what can be discussed so several of the major ‘icons’ of the PT model—subduction zones and the bending of plates, the San Andreas Fault, and magnetic striping—were highlighted. But, many other areas could have been chosen such as intra-plate tectonics (the New Madrid Fault) or mountain building⁵ (the Alpine system in Europe and Africa was only briefly mentioned in these articles) or hot spot tracks (how the Hawaiian-Emperor island chain ‘jumped’ from one direction to another).

As for empirical data, we all have the same data but that data must be interpreted. Mantle tomography is subject to interpretation. There are at least three different interpretations that cause the relative velocity variation:

1. thermal differences between hot and cold slabs,
2. density differences between lithosphere,⁶ and
3. chemical depletion rather than temperature variation.^{7,8}

Moreover, on examining the Tonga Trench and Tonga and Fiji island tomographic section (assuming thermal differences), it appears that the main heat flow from the subducting slab is between the Tonga and Fiji

islands yet there are no volcanic islands at that location. Also, there appears to be a heat-flow connection to the Tonga islands but not Fiji. How did the Fiji islands form without a connection to the subduction zone, and why are there no island arcs over the main heat source? As far as subduction (subsidence) zones are concerned, they could be explained in the VT model as a semi-infinite beam loaded at its edge (figure 1).

Also, I would like to clarify that the calculation used to determine the length of the subducting slab was based solely on the Pacific Ocean. The area for the Pacific Ocean is 166,242,000 km². The subduction zones in the Pacific ring of fire is 40,000 km. These were the numbers used to calculate the 4,160 km length. I apologise for the confusion.

Furthermore, one of the problems of writing these articles was where UPT/CPT models differ. In the UPT model, plate movement has been going on since at least the Cryogenian Period which is approximately 650 Ma in the uniformitarian model.⁹ It should be noted that one of the problems with any period prior to the Cambrian is the lack of fossils, and without fossils it is almost impossible to date the time period. The final breakup of Pangea took place around 200 Ma. Whether CPT follows this reasoning was not clear and I assumed that it would.

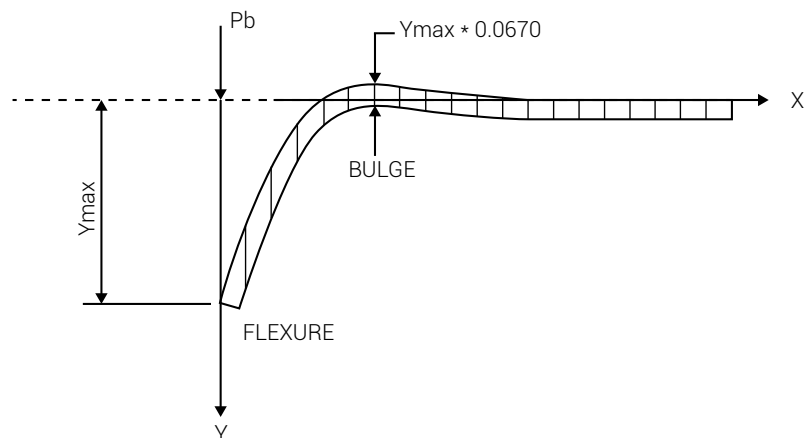


Figure 1. Flexure of a semi-infinite beam based on the equation $Y = (Y_{\max})e^{-\lambda x} \cos \lambda x$ (after Watts¹⁰)

In any model there is going to be a question as to what the pre-Flood earth looked like. However, if it does not follow the UPT model then that distinction needs to be made.

Finally, I would like to say I commend the work of John Baumgartner and his colleagues and I pray for him and many other creation scientists and the organisation they represent on a daily basis. I do not agree with the CPT position but I certainly think that the creationist community has benefitted from his work as a counter argument to the UPT model.

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