

Supersaturated magma may be significant for granite formation

I am writing about the article: Granite formation: Catastrophic in its suddenness.¹ I really liked the article, but was surprised that it did not mention the tendency for supersaturated solutions not to crystallize out even though at their temperature and saturation they would be expected to. They wait, and continue cooling until they have something to crystallize on, then the whole mass crystallizes more or less all at once.

I think this phenomena would be important to many things in geology, and in the case of granite it may explain how radiohalos, formed by the breakdown of short lived isotopes, can be captured in the rock. Even this may not explain the formation of halos caused by isotopes which break down in a fraction of a second, but it seems to me that it would be a plausible explanation for how isotopes that break down quite rapidly can accumulate at the centre of the halo. A few seconds perhaps?

Rapid crystallization of a supersaturated magma would seem to me to be a better explanation for granite formation than the rapid cooling of molten granite by fluids. Crystallization of granite from a supersaturated solution could effect the change from liquid to solid in a much shorter time than by the gradual cooling of the whole magma body.

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References

1. Walker, T., Granite formation: Catastrophic in its suddenness, *Journal of Creation* 21(2):13–15, 2007.

Tas Walker replies:

A good point. It is unlikely that uniformitarian geologists would ever entertain such an idea because, even with what they consider rapid crystallization, they would envisage cooling taking place over months or years. Under

these conditions where temperature changes so slowly, it is unlikely that a magma chamber could achieve a supersaturated condition, let alone maintain a supersaturated state for such a long time. But when we consider the sort of catastrophic changes that occurred during the global Flood, it is likely that changes in the properties of the magma, especially water content and pressure, could occur within minutes. Thus supersaturation would be a significant phenomenon in such a dynamic system.

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Volcanoes during Creation Week

In his paper about Lower Archaean stromatolites in Western Australia, Tas Walker comments on an article by Allwood *et al.*,¹ who describe the occurrence of stromatolites in the Strelly Pool Chert formation, a 23–102 m thick sequence of conglomerate, siliciclastic and tuff layers. Material from volcanic eruptions abounds in the lower and upper parts of the section, with stromatolites in between. Tas Walker argues for a nonbiological origin of the stromatolite structures and states,

‘From a biblical perspective, it is *inconceivable* that volcanoes would be active during Creation Week, depositing volcanoclastics and tuff such as comprise parts of the stratigraphic sections. These sections show abundant signs of catastrophe that point to large-scale watery and volcanic processes, so it is doubtful the material was deposited in the pre-Flood era [emphasis added].’²

Young-earth creationists have assumed that no volcanic activity occurred before the biblical Flood, and therefore, volcanic deposits must have been deposited either during or after the Flood. However, there is no need to assume that volcanic

activity, earthquakes and other geologic processes did not occur *during* the Creation Week. The biblical creation story does not preclude this possibility and we must be careful not to read our own ideas into the Genesis text.

The creation story indicates that during Days 2 and 3 the planet underwent a comprehensive reorganization from an unformed and chaotic state to an appropriate environment for life. In Days 2 and 3 of the Creation Week, God rearranges the water on the surface of the planet, placing some water in the atmosphere, and confining the water below into what we call oceans, leaving dry land suitable for the terrestrial organisms. In Day 3, God must have rearranged the continental rocks in order to provide topographic relief and land surface. We do not know how God carried out this job, and we can only speculate, God might have done it instantaneously without alteration of the earth’s surface, other than the drying up of the land. However, the movement of water entailed a major reorganization of the planet and its physical constituents, which likely involved considerable geologic activity. Whitcomb and Morris assert that ‘on the third day [of creation] was a tremendous amount of geological work accomplished.’³ They also suggest that Proterozoic rocks may have been formed as a result of the geologic activity on Day 3.⁴ Most likely all this geologic work required considerable tectonic activity, although the amount of tectonics that can fit into one single day remains unknown and is debatable.

I suggest that God might have used some of the geological processes that are known to operate today, including earthquakes, volcanoes, flooding and fluvial activity. Volcanoes might have been active during the separation of the water from the dry land on Day 3, so that in some parts thick, multiple layers of volcanoclastic material formed, and became part of the pre-Flood soil or underground. This possibility is not *inconceivable* as Tas Walker states in his article. Following the

same reasoning, the occurrence of conglomerates is also compatible with a Creation scenario. Layers of conglomerates containing clasts of different sizes could have been formed during the movement of the water from one area to another.

It is also possible that volcanic activity occurred after the Fall and before the Flood.⁵ Again, the biblical text does not preclude that possibility. This idea has long been resisted by young-earth creationists who commonly assumed that nature and the earth followed a progressive biological degradation after the Fall, without much alteration of the physical environment.⁶ But does the Bible say so? The Bible only says that ‘the LORD God had not caused it to rain upon the earth’ (Gen. 2:5), which has led many Christians to assume that the earth was a stable, near-paradisiacal place even after the Fall, excluding most kinds of geologic activity that we see today. I believe that this is an unproven assumption that perhaps will only be solved by revelation.

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References

1. Allwood, A.C., Walter, M.R., Kamber, B.S., Marshall, C.P. and Burch I.W., Stromatolite reef from the Early Archaean era of Australia, *Nature* **441**:714–718, 2006.
2. Walker, T., Controversial claim for earliest life on Earth. *Journal of Creation* **21**:11–13, 2007.
3. Whitcomb Jr, J.C. and Morris, H.M., *The Genesis Flood*, Philadelphia: The Presbyterian and Reformed Publishing Company, PA, p. 214, 1961.
4. Whitcomb and Morris, ref. 3, p. 230.
5. For a more in-depth discussion of this possibility, see Brand, L., Wholistic geology: geology before, during, and after the biblical Flood, *Origins* **61**:7–34, 2007.
6. Whitcomb and Morris, ref. 3, pp. 242–243.

Tas Walker replies:

Raul Esperante raises two questions crucial to a biblical understanding of geology, namely the sorts of geological

processes that occurred 1) during Creation Week and 2) between the Fall and the Flood.

In the case of the latter, we could start with the assumption that geologic processes and environments were similar in the pre-Flood era to what happens today. That would include familiar things like landscape erosion, sedimentation, earthquakes, tsunamis, swamps and volcanoes. The fact that the planet was inhabited (by people, animals and plants) presumably limited the scale of the processes (and hence their destructiveness) to what we see today. We need not insist that things were exactly the same—the climate may have been more equable, the oceans smaller, volcanoes hotter and environments different. As Raul points out, we do not know the answers to these questions because we were not there, but many creationists have speculated. Time, however, is a key factor because just 1,700 years elapsed between the Fall and the Flood. This means that the quantity of geological product would have been relatively small.^{1,2}

For the Creation Week there are additional constraints on our thinking: 1) the time scales were incredibly short (6 days total), the quantity of geological material produced was incredibly large (the whole planet), God acted supernaturally, there was a fully functioning biosphere at the end of the Week, and the completed creation was ‘very good’. Like Raul, I and others have considered how the events described in Genesis 1 could have impacted geology. If we are to link the biblical record to rocks in the field we need models with sufficient detail. But as Raul says, we lack the information to construct such models, and so all our conclusions will remain speculative.

When I developed my biblical geological model, I envisaged that Creation Week divided logically into two distinct geological stages: a) a Foundational stage commencing with the original creation of the earth (Days 1 and 2); and b) a Gathering stage commencing with the appearance of dry land (Days 3 to 6).^{1,2} Some of the

events described in Genesis could well have involved earthquakes, tectonics, hydraulics and the like, and still be consistent with a ‘very good’ world. Presumably the geological processes operating, like tsunamis, floods, earthquakes, volcanoes and landslides, all of which are destructive today, would need to have been completed before the creation of plants, animals and mankind. It does not make sense that God would create plants, for example, and bury some of them under a landslide a day or so later.

The same thought can be explored with volcanic eruptions. Would it be consistent with a ‘very good’ creation for the atmosphere to be filled during Creation Week with tonnes of glowing ash and dust, for it to accumulate on landscape to a depth of hundreds of metres, and to be so hot that it welds into tuff? Such a scenario is consistent with the *judgment* of the Flood, but hard to reconcile with a good creation. The material would all have to be cleared from the sky and cooled before anything was created to which it could prove harmful.

So which rocks can we point to as being formed during Creation Week? Creationist geologists have published much about the location of the pre-Flood/Flood boundary. Researchers have put it at the base of the Cambrian,³ in the Upper Precambrian,⁴ at the Archean-Proterozoic boundary⁵ and at the base of the transition zone in the earth’s mantle.⁶ Most suggest that the location on the geologic column will vary from place to place on the earth. Early on I envisaged that the boundary would likely be somewhere in the Precambrian. When I examined the basement rocks of the Brisbane area I considered the possibility that the pre-Flood boundary in that particular instance could have been in the Carboniferous, because of the lack of fossils within the rocks in question.² At present I lean toward the view that there are no Creation Week rocks exposed on the earth, that they were all destroyed or buried during the Flood catastrophe.⁶

I'm glad that Raul raised this issue because it is important to our understanding of biblical geology.

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References

1. Walker, T.B., A biblical geologic model; in: Walsh, R.E. (Ed.), *Proceedings of the Third International Conference on Creationism*, Creation Science Fellowship, Pittsburgh, Pennsylvania, pp. 581–592, 1994.
2. Walker, T.B., The basement rocks of Brisbane, Australia: Where do they fit the creation model? *Journal of Creation* 10(2):241–257, 1996.
3. Austin, S.A. (Ed.), *Grand Canyon: Monument to Catastrophe*, ICR, North Santee, CA, pp. 58–82, 1994.
4. Austin, S.A. and Wise, K.P., The pre-Flood/Flood boundary: As defined in Grand Canyon, Arizona and eastern Mojave Desert, California; in: Walsh, R.E. (Ed.), *Proceedings of the Third International Conference on Creationism*, Creation Science Fellowship, Pittsburgh, PA, pp. 37–47, 1994.
5. Morris, H.M., *Scientific Creationism*, Master Books, El Cajon, CA, p. 129, 1991.
6. Hunter, M.J., The pre-Flood/Flood boundary at the base of the earth's transition zone, *Journal of Creation* 14(1):60–74, 2000.

Time and infinity

In a recent article Andrew Kulikovsky published a critique of the book *Creation out of Nothing*, a defence of the Kalam argument written by William Lane Craig and Paul Copan.¹ While he offers some piercing insights into their work, I believe that some personal preferences have distorted his critique.

Firstly, it is disheartening that Mr Kulikovsky feels compelled to demean the formal approach of Copan and Craig, saying 'They go to great effort ... to demonstrate something that is intuitively obvious' (p. 21). Intuitive obviousness is irrelevant—formalism is merely the proper nature of academic work. The creationist intention to popularize scientific topics too often leads to an outright aversion of formalism. Such an attitude is counterproductive to a group of academicians looking to advance professional behaviour.

Tensed and tenseless

Mr Kulikovsky begins his analysis by disagreeing with the authors on the implications of the tenseless view, 'B-theory', stating 'the absence of time does not imply that everything will happen at the same time' (p. 21). He calls this belief 'nonsense', yet suggests no other means of temporal comparison—perhaps because it cannot be done.

In a timeless reference frame there is no alternate point against which to contrast temporally different events in another frame. For example (figure 1), we will place marker events in two temporal reference frames (*P* and *Q*), with clocks running differently to demonstrate the irrelevancy of varying rates of change. We will also have frame *R*, in which time does not progress—thus allowing only a single distinguishable state.

The two states for frame *P* have temporal markers in frame *Q*; the order of events in frame *P* can be tracked by following progressing events in frame *Q* (defining a forward direction).

They may be clocked differently, but a tenseless condition is avoided. Reference frame *R*, however, has no distinguishable temporal markers with which to dissociate events in frame *P*, and is thus tenseless. The ensuing

Frame P	Frame Q	Frame R
Event 1.P. - 12:00	Event 1.Q. - 12:00	State 1
Event 2.P. - 12:30	Event 2.Q. - 12:15	State 1

Figure 1. A series of states in different tensed and tenseless reference frames.

difficulties are demonstrated if we add a third event in frame *P*—we have no idea if it is occurring after, before or between the other two events, because we cannot apply markers in frame *R*. Thus Mr Kulikovsky's statement that a 'B-theorist can simply say that God is ontologically prior to creation' (p. 21) is meaningless with respect to a tenseless frame.

Furthermore, if we call the single state in frame *R* 'now', then all of the events occurring in other frames coincide with 'now', just as Copan and

Craig said—all events actually 'coexist timelessly with him'. Apparently Mr Kulikovsky still believes it to be possible to speak of an *ex nihilo* event with respect to this system. If we accept B-theory, this would only be possible with respect to the existence or nonexistence of the frame actually coming into existence (the one experiencing tenses)—but it would be meaningless to speak of 'before' the frame came into existence.

The claim that the tensed view, 'A-theory', cannot appeal to God's omniscience is without foundation. The non-existence of future events in no way prevents their certainty from being knowable. Rather than suggest the co-existence of all events (as implied for frame *R* by B-theory), one might simply suggest rigid physical causality; when combined with a full knowledge of starting conditions for the universe, all future physical events are rendered knowable (ignoring human constraints such as quantum resolution limits). Ensuing theological questions regarding free will and determinism are of course inherent with either model, and are beyond the scope of this paper.

It might also be noted that thought, emotion and other personal characteristics are state changes and thus automatically provide a metric

for time. A timeless view is thus problematic for the personal deity of the Bible.

Infinity

The critique of Craig's discussion on 'the formation of an actual infinite by successive addition' is critical in the correction of the breakdown in his reasoning. Kulikovsky has done a good job in identifying it, but the matter is deserving of some expansion.

Kulikovsky states that 'an actually infinite collection does not need to be