The Navajo Sandstone

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The Navajo Sandstone of the southwest United States was the subject of an article by Carl Froede in TJ.[1] This sandstone is becoming a more well-known issue for creationism, as it presents many insurmountable obstacles to young earth creation science belief. At issue is the formation of this sandstone. Geologists recognize it as a wind-blown, desert sandstone. This presents a problem for the young earth believer, because a wind-blown sandstone right in the middle of Noah's Flood cannot be explained by creation science.

Over the years, much attention has been focused on another desert sandstone, the Coconino. The Coconino is in the rocks of the Grand Canyon, which young earth creationists attribute to being flood-deposited. Long recognized by YECs as a threat to their system, it has been attacked by many, most notably by Andrew Snelling and Steve Austin of the Institute for Creation Research.[2] However, despite their best attempts at claiming the Coconino was water deposited, belief in its desert formation remain unshaken. This is mainly due to two reasons...their criticisms of the footprints in the Coconino do not stand up to scrutiny, and the unworkable model they have proposed for the Coconino's formation (see Coconino Sandstone). (It is interesting to note that in the book Grand Canyon: Monument to Catastrophe, the same authors use the grain particle studies from the Navajo (a supposed wind-blown desert) to argue that the Coconino is not a wind-blown desert…now, they are changing their minds about the Navajo! For more, see Desert Problem.)

The article in question concerning the Navajo presents even less of a case for young earth creation science than the Coconino. The author starts out by saying the Navajo is best interpreted within the context of the Flood (a statement which he fails to provide proof for…it is left for the reader to accept).

He presents ideas from secular research, saying it is interesting, and even possible, but he is non-commital to their conclusions. The main focus of the article is on the source material being from the Appalachian mountains. The proof of this, in secular journals, is radiometric data from zircon crystals. While interesting, the zircons are not the focus of this rebuttal. Rather, we shall focus on the problem of fossils in and above the Navajo, and upon the forces that moved the sand (from Froede's viewpoint, a worldwide flood).

The Dinosaur Problem

In his introductory statement, he says that it was "sorted and deposited in massive sandstone layers during the Middle Flood Division of the Flood Event Timeframe. We are not told, but from other creation science models, the middle flood portion is the time that the waters prevailed on the earth 150 days, from the end of the rain (Day 40), until the time the waters began to recede (Day 190). Placing the Navajo in the middle of the flood creates many problems for the young earth model.

The Navajo is lower Jurassic in age, or about 190 million years ago. This places it firmly within the Mesozoic Era, the time on the geologic time scale that the dinosaurs roamed the earth. Unfortunately for the young earth creationist, they were roaming over the Navajo Sandstone. Footprints of theropod dinosaurs are found within the Navajo,[3, 4] showing that air-breathing, living dinosaurs were walking around on land, right in the middle of Noah's Flood!

If you look further up the geologic column, it gets even worse. The Morrison Formation is above the Navajo, meaning it was deposited after the Navajo. The Morrison is one of the most famous of the dinosaur-bearing rock layers, with many footprints, fossils, and coprolites. Somehow, the dinosaurs lived past the 40-day point in the flood, when the rains stopped.

Having dinosaurs alive after Day 40 contradicts the Bible's account of the flood. We see this in Genesis 7:17-23, which states,

[17]And the flood was forty days upon the earth; and the waters increased, and bare up the ark, and it was lift up above the earth. [18]And the waters prevailed, and were increased

greatly upon the earth; and the ark went upon the face of the waters. [19]*And the waters prevailed exceedingly upon the earth; and all the high hills, that were under the whole heaven, were covered.* [20]*Fifteen cubits upward did the waters prevail; and the mountains were covered.* [21]*And all flesh died that moved upon the earth, both of fowl, and of cattle, and of beast, and of every creeping thing that creepeth upon the earth, and every man;* [22]*All in whose nostrils was the breath of life, of all that was in the dry land, died.* [23]*And every living substance was destroyed which was upon the face of the ground, both man, and cattle, and the creeping things, and the fowl of the heaven; and they were destroyed from the earth; and Noah only remained alive, and they that were with him in the ark.*

It is obvious that all animals were dead at the end of the forty days of rain. However, the evidence we have of the dinosaurs indicates that they were alive and well when the Navajo was deposited, along with the rocks even younger than the Navajo. Thus this young earth creation science theory completely contradicts the Bible.

Furthermore, Genesis 7:24 states,

"And the waters prevailed upon the earth an hundred and fifty days."

During this prevailing period, no land based animals should have been alive. But we have much evidence that they were alive and well…in essence, they were walking all over the young earth model for creation.

The Sediment Transportation Problem

Froede goes on to state that geologists now believe the source material for the Navajo to be the Appalachian range. In this matter he is correct. He proceeds to tie this into his creation flood model, showing how this could work in a worldwide flood. He references the study of Baumgardner and Barnette[5] to support the idea that sufficient forces existed to move such a vast body of material over a thousand miles. I agree, the study by these two scientists contains plenty of energy to move the material…too much energy, in fact.

In the study, it was shown that water currents in a worldwide globe of water would be 40-80 meters per second, and peak at 87 meters per second (or, 194 miles per hour). This

strong current is centered over the continental land masses in gyres. So, how does sand get moved?

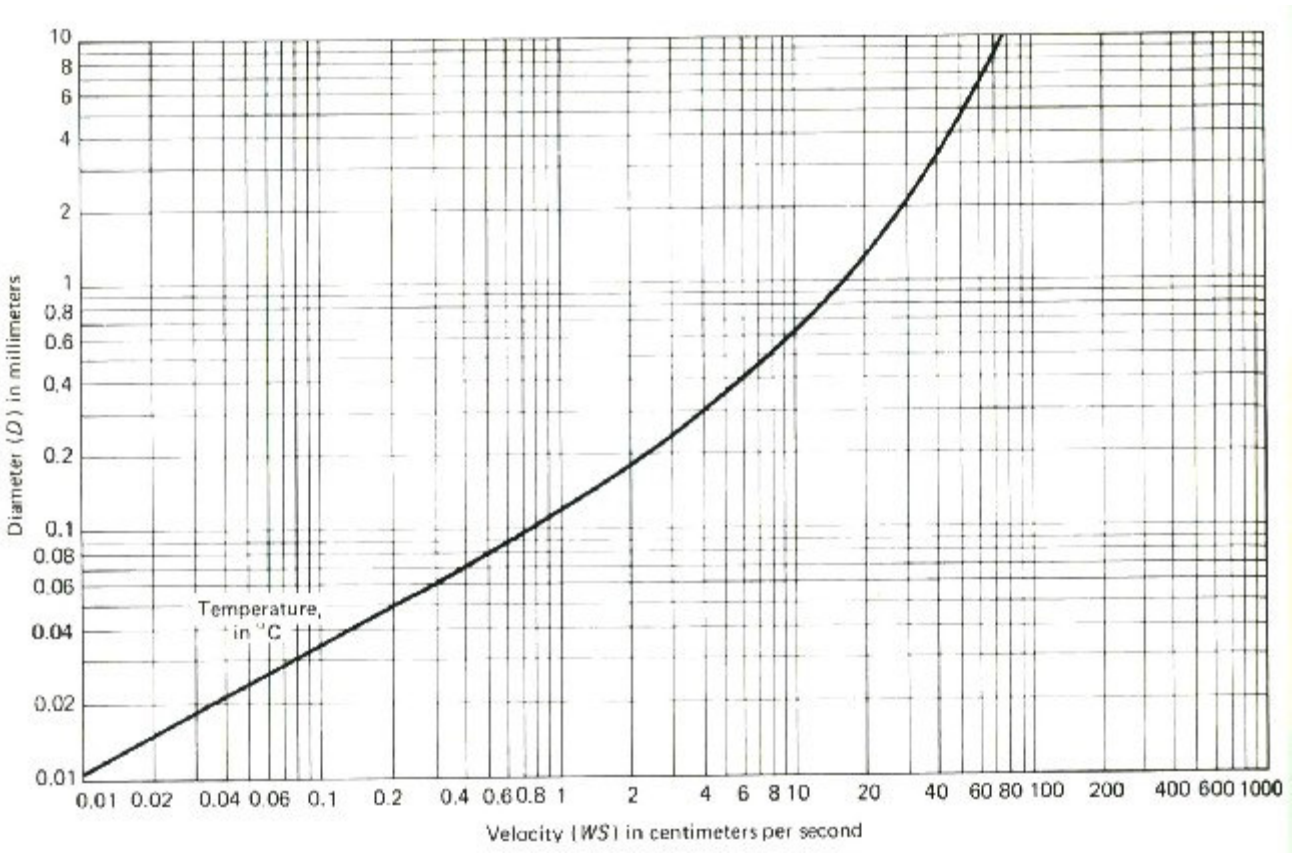
The suspension of particles within a fluid is governed by Stokes Law. Sand varies from fine sand (.05 to .5 mm) to normal sand (up to 2 mm). Given that the larger sizes benefit the young earth model, let's examine 2 mm sand particles.

Stokes Law is:

$$Ws = \left[\frac{(Ps - P)\, g}{18\mu} \right] d^2$$

where *Ws* is the settling velocity, *d* is the particle diameter, *Ps - P* the density difference between the particle and the field, and μ the viscosity of the fluid. In other words, Stokes Law calculates the velocity of the water current necessary to carry a sand grain in suspension. The grain will stay in suspension, moving along with the current, until the water velocity drops below the threshold.

To simplify matters, here is a plot of Stokes Law, showing the current at which particles settle out of suspension.



Looking at the largest sand grains, which are 2 mm, they require a current of 30 cm per second to remain in suspension. This equates to a current of .67 miles per hour, or 2/3 of a mile per hour. This is not even 1 mile per hour current. Looking back at Baumgardner and Barnette, their minimum ocean current velocity is 40 meters per second, which equates to 89 miles per hour.

Therefore yes, the young earth model has plenty of power to carry the sand in suspension from the Appalachians to the deposition area in the southwest United States. However, it does not provide a mechanism for settling the sand. Since these currents prevailed over the continents for 150 days (Genesis 7:24), the sand from the Appalachians would have been dispersed over the globe. Unfortunately, the study omits the speed of the water in the open ocean, away from the continental land masses. We cannot be certain, but this omission is probably because it is above the minimum velocity for Stokes law for particles to fall out of suspension, thus deposition would never occur. Because of this, the sand would have been mixed with many other sands, so that when the ocean currents decreased, the sand would fall out of suspension all over the world, and all the world's sandstones from the Flood would look alike. However, they do not.

Sandstones are very different from each other. Thus, while Froede very eagerly points to Baumgardner and Barnette as proof that the forces to move the sand existed, he fails to address the problems this introduces to the young earth theory.

With such problems, you would think that YECs would have abandoned the Baumgardner and Barnette study. However, they cannot, because it appears to be a valid study of what would happen with a globe full of water. Deny it, and they deny the Flood! In essence they have backed themselves into a corner with no way out.

Conclusion

The possibilities presented by Froede are inadequate to provide a working young earth model for the flood, and for the deposition of the Navajo Sandstone. His proposition has introduced critical errors into the young earth creation science model for the flood.

On the other hand, the old earth creationist model for the flood, with a local flood event, has no problem explaining the Navajo Sandstone. It is a desert, wind-blown deposit of sand that formed 190 million years ago.

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[1] Froede, Carl R. Jr., Eroded Appalachian Mountain siliciclastics as a source for the Navajo Sandstone, TJ 18(2): August 2004. Available online at www.answersingenesis.org/tj/v18/i2/sandstone.asp

[2] Austin, Steven, and Snelling, Andrew, Startling Evidence for Noah's Flood, Creation Magazine, Dec 1992. pp. 46-50. Available online at www.answersingenesis.org/home/area/magazines/docs/v15n1_grandcanyon.asp

[3] Jurassic - Cenozoic Strata of the Colorado Plateau - http://www.geocities.com/pgspears/grand2b.htm

[4] Navajo Sandstone Tracks and Burrows

[5] John Baumgardner and Daniel Barnette, "Patterns of Ocean Circulation Over the Continents During Noah's Flood,"