Mount St. Helens Provides an Analog for Polystrate Trees

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Abstract

The floating logs on Spirit Lake from the 1980 eruption of Mount St. Helens are briefly described. Over the years, some sank vertically to the bottom while heavy sedimentation occurred. This provides an analog for the Yellowstone fossil "forests" that has caused some who claimed to be Christians to become agnostics or atheists, such as Ronald Numbers. It also can explain vertical petrified trees at many other locations. The log mat on Spirit Lake provides an analog for log mats formed during the Flood.

Key Words: Log mat, Mount St. Helens, Noah's Flood, Ronald Numbers, Spirit Lake, Yellowstone fossil 'forests'

Introduction

The May 18, 1980, eruption and following eruptions of Mount St. Helens was a boon for creation scientists (Morris and Austin, 2003). It showed how one small eruption could provide insight into Noah's Flood. One of the more surprising aspects of the eruption was the formation of hundreds of thousands of logs floating on Spirit Lake.

The Floating Log Mat on Spirit Lake

Spirit Lake is located about 9 km north of Mount St. Helens. On May 18, 1980, a magnitude 5.1 earthquake cause the failure of the oversteepened north slope of Mount St. Helens causing the eruption (Austin, 1987, pp. 3–9; Morris and Austin, 2003). The northward-orientated blast toppled trees over an area of 380 km^2, and the landslide displaced Spirit Lake causing a huge wave to wash 260 m up the north slope of Spirit Lake. The wave washed hundreds of thousands of trees sheared off from the blast down into the lake. A log mat larger than 5 km^2 ended up floating on top of the lake. Figure 1 shows the log mat in 2005, 25 years after the blast.

As the trees became waterlogged, some began floating in a vertical position as the heavier end sank to the bottom. Sidescan sonar and scuba photography both show that many of the logs settled to the bottom in a vertical (growth-like) position. Extrapolating from a small area of the lake surveyed, Morris and Austin (2003) and Coffin et al. (2005, p. 245) estimated 20,000 upright stumps had been buried in the bottom of the lake in the first five years since the blast. Because significant sedimentation continued largely from heavy rainfall eroding the barren landscape around the mountain, the upright logs became lodged in the sediment at different stratigraphic levels.

Imagine if Mount St. Helens erupted so long ago that Spirit Lake had filled with sediment. If the varying

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levels of upright logs were exposed, how would secular scientists interpret what they find? They would likely be seen as successive forests that grew and became buried by successive debris flows. This could have gone on for many thousands of years. But this would be a wrong interpretation built upon wrong assumptions. Instead, what happened in 1980, provides an alternative for understanding the deposition of vertical trees in multiple layers. For example, this new understanding can be applied to the numerous levels of upright logs discovered in Yellowstone National Park (Oard, 2014) and other places.

Figure 1. Spirit Lake with Mount Rainier in the background as seen from the crater of Mount St. Helens (Matt Logan, USGS photograph).

The Yellowstone Fossil "Forests"

Prior to the eruption at Mount St. Helens, the Yellowstone National Park fossil "forests" were a significant challenge for Flood geology (Sarfati, 1999). The multiple layers of polystrate trees were believed to represent multiple forests that grew, died, were buried by volcanic debris flows, and the next forest established, similar to the conventional story. Each cycle was said to take about 500 years. Since there are a few dozen levels of vertical petrified trees at Specimen Ridge (Figure 2), this would represent about 12,000 years. For the 65 levels at Specimen Creek (Figure 3), the time represented would be approximately 32,500 years assuming the 500-year average. (Specimen Creek is not associated with Specimen Ridge. The former is in the extreme northwest corner of Yellowstone while Specimen Ridge is in northeast Yellowstone National Park.) Obviously, if this model were true, the time necessary would eliminate the young-Earth timeline for Biblical history.

Because of the deep time implied by the successive levels of vertical trees, the Yellowstone fossils forests have been mentioned often by uniformitar-

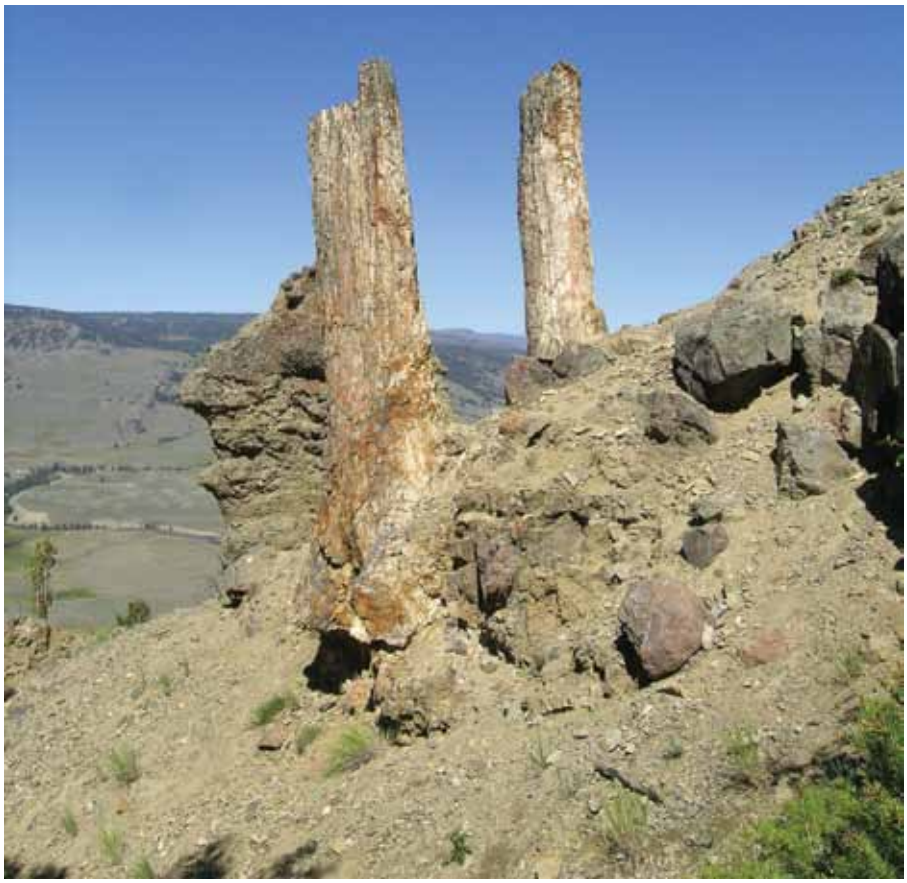

Figure 2. Close up of the volcanic breccia with two petrified trees at the top of Specimen Ridge, Yellowstone National Park, USA.

Figure 3. Absaroka volcanic breccia layers showing many levels of petrified trees at Specimen Creek, Yellowstone National Park, USA.

Figure 4. Horizontal logs in Absaroka Volcanics on Mount Hornaday northeast Yellowstone Park, USA (Dr. Harold Coffin provides scale).

ian scientists as an "insurmountable problem" for Flood geology:

> This site and its long-age interpretation has been one of the most effective arguments which purport to show that the earth is older than biblical chronology will allow. It has convinced many that the Bible cannot be trusted and thus can be disregarded. (Morris and Austin, 2003, p. 100)

Ronald Numbers (2006), in his rather biased history of young-Earth creationism, wrote in *The Creationists*, that the fossil "forests" of Yellowstone persuaded him to discard Biblical Earth history:

> Born and reared in a fundamentalist Seventh-day Adventist family of ministers, I learned [George McCready] Price's version of earth history at my parents' knees. I subsequently attended Adventist church schools from first grade through college, and though I majored in science, I saw no reason to question the claims of strict creationism. In fact, I do not recall ever doubting the recent appearance of life on the earth until the late 1960s, while studying the history of science at the University of California at Berkeley. I vividly remember the evening I attended an illustrated lecture on the famous sequence of fossil forests in Yellowstone National Park and then stayed up much of the night with a biologist friend of like mind, Joe Willey, first agonizing over, then finally accepting, the disturbing likelihood that the earth was at least thirty thousand years old. Having thus decided to follow science rather than Scripture on the subject of origins, I quickly, though not painlessly, slid down the proverbial slippery slope toward unbelief. In 1982, when attorneys for both sides in the Louisiana creation-evolution trial requested my services as a

> possible expert witness, I elected to join the ACLU team in defending the constitutional wall separating church and state. In taking my pretrial deposition, Wendell R. Bird, the creationist lawyer who had tried to recruit me for his side, devoted two lengthy sessions to probing the limits of my historical knowledge and the thinness of my religious beliefs. On the basis of this inquisition, Bird publicly labeled me an "Agnostic." The tag still feels foreign and uncomfortable, but it accurately reflects my theological uncertainty. (Numbers, 2006, p. 13)

Note Numbers' initial reaction to the fossil "forests." He decided to follow "science" and not Scripture. In other words, without really trying

Figure 5. Vertical tree with two short, blunted roots in Absaroka Volcanics on Mount Hornaday northeast Yellowstone Park, USA (David Anderson provides the scale).

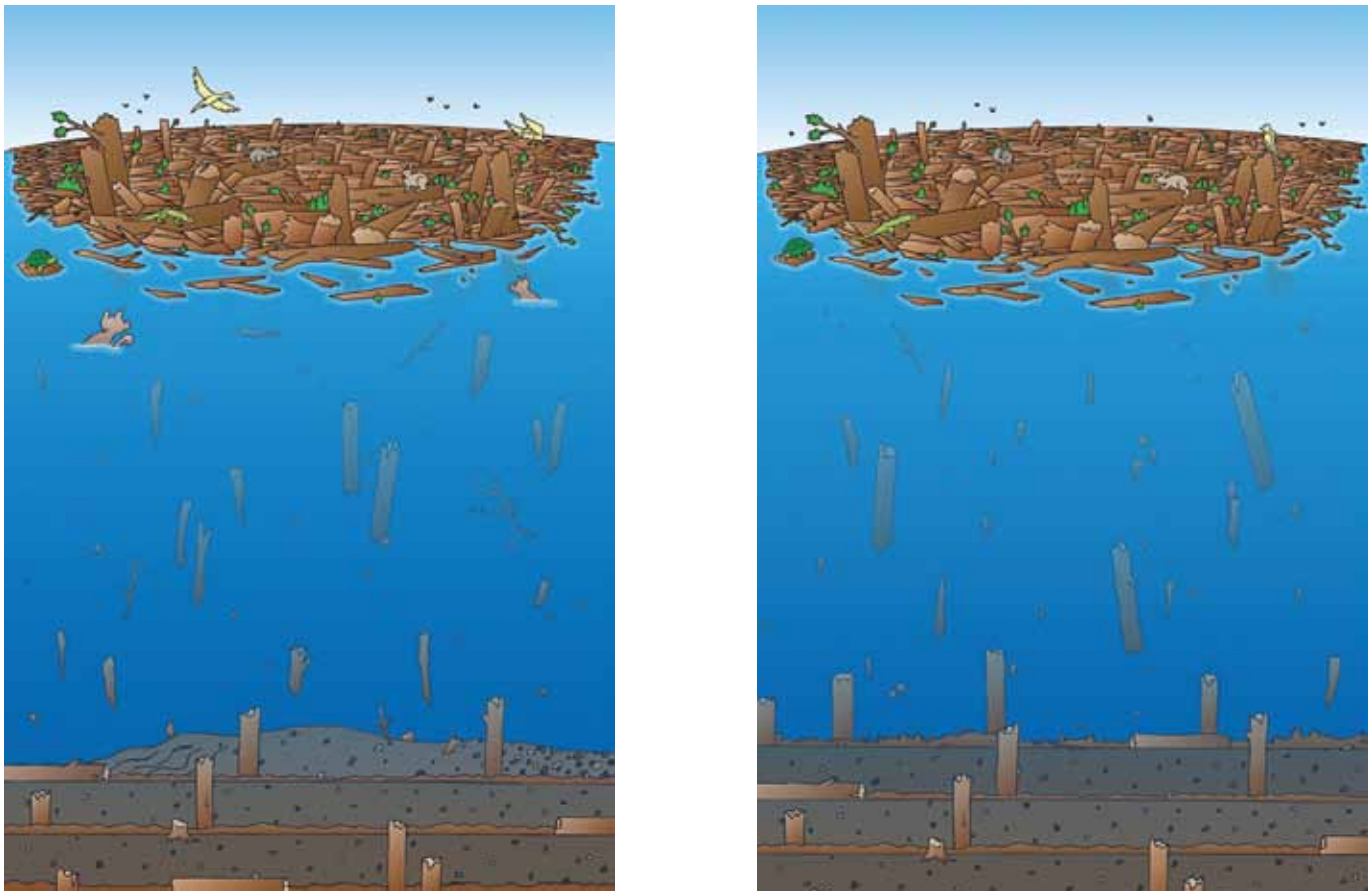

Figure 6. Schematic of a log mat with trees sinking vertically to the bottom, while the bottom is collecting deposits horizontally from volcanic debris flows.

to understand the full nature of the debate, he allowed one example of a phenomenon that he had not fully investigated to be the basis for his rejection of the historical account of Genesis and eventually the entire Bible.

It is worth noting that Numbers was following an *interpretation* of scientific observations that happened in the past (forensic science). He was not using the type of science that deals with present-day observations and repeatability (empirical science). This crucial distinction is poorly understood and seldom made by secular scientists. Unfortunately, many Christians accept their authority as scientists and fail to see the difference between observations we can witness today and interpretations of things that only happened in the past.

Had Numbers been patient and decided to investigate the fossil "forests" more carefully, he might not have jumped to such shaky conclusions. He should have acted like the Bereans in Acts 17:10–15, who checked Scripture to see what Paul said was true, and applied 1 Thessalonians 5:21: "…examine everything *carefully*; hold fast to that which is good" (NASB). If he had done so, he might have retained his faith, if he really wanted to retain it. This example shows us that we need to investigate geological and paleontological challenges *in depth* and not at the superficial level.

Dr. Harold Coffin and his colleagues from the Geoscience Research Institute in Loma Linda, California, did what Numbers should have done—they examined the data in the field to gather the facts (Coffin and Brown, 1983, pp. 134–151; Coffin, 1997; Coffin et al., 2005, p. 245). They spent many years conducting field research, refining a Flood model that explains the data without abandoning Scripture (Figure 6).

It is amazing that Numbers, who took the time to research and write a book about creationists, never mentions the work of Dr. Coffin and his associates. Had he searched the creationist literature, he would have discovered Dr. Coffin's research. This alone casts grave doubt on the scholarship of his book. All of Coffin's research was performed *before* the expanded edition of Numbers' book was published in 2006. Clearly, Numbers prefers the camp of the anti-creationists instead of serious investigation on his own, since the answer to his "insoluble problem" has been readily available in the literature for some time.

Many observations associated with the Yellowstone fossil "forests" are contrary to the idea of successive forests. First, the vertical petrified trees are within the (Middle Eocene) Absaroka Volcanic Supergroup (Figures 4 and 5) and part of the volcanic debris flow breccias in northern and eastern Yellowstone Park and adjacent areas. Breccia is a cemented rock composed of broken angular fragments. The Absaroka Volcanics extend over an area that stretches 250 km in a northwest direction from just north of Dubois, Wyoming, to just southeast of Bozeman, Montana. It covers more than 23,000 km^2 with a thickness that exceeds 1,830 m and a volume of about 30,000 km^3 (Sundell, 1993, pp. 480–506; Feely and Costa, 2003). Moreover, the breccia lacks soil horizons, and tree rings sometimes match across two or more levels, indicating they grew at the same time. In addition, pollen and trees found in the volcanic-rich rocks are from 200 different species ranging from the tropics to the colder temperate climatic zones. Bark and extensive root systems are rare, the wood is often weakly fossilized or unfossilized, the trees are commonly polystrate (crossing multiple layers) and not decayed at the top (as would be expected if exposed for an extended time), and lack animal fossils either within the trees or in the breccia as expected in a forest (Coffin, 1997; Morris and Austin, 2003).

Explains Other Locations with Vertical Trees

With the observational results from Spirit Lake as an example of the behavior of trees and vegetation after floating for many years, we can better address a problem that has long puzzled many scientists. Many areas have fossil trees buried in a vertical or upright position with respect to the sedimentary layers. Sometimes they form polystrate trees, which pass through two or more sedimentary layers, and are often observed in coal mines. This also suggests the rapid formation of coal, as opposed to the uniformitarian model of the slow formation of coal from a "peat swamp." Interestingly, nearly all of these trees are petrified.

Uniformitarian scientists typically assume these trees grew and were fossilized in situ. However, the tops of the trees are not decayed any more than the bases. This suggests that they did not stand exposed for extended periods of time before their complete burial. And most show no root systems as would be found if buried in situ. Nonetheless, they are forced to claim local and rapid burial of the trees, although the strata can often be traced over vast areas, suggestive of a more extensive flooding event. Instead, all of the vertical trees in these many locations are better explained by log mats during Noah's Flood.

Joggins Polystrate Trees

One location where polystrate trees can be observed is the famous Joggins Formation of Nova Scotia where there are numerous vertical trees and casts of trees (Morris, 1999, i.–iv.; Juby, 2006, 2009, pp. 217–230). The site has at least 76 coal seams ranging in thickness from 0.05 to 1.5 m and 63 "forested"

Figure 7. A polystrate tree penetrating more than one layer of sedimentary rock from the Joggins Formation, Nova Scotia (photo courtesy of Ian Juby).

Figure 8. Two polystrate trees, up to 4 m tall, from a coal mine north of Sutton, Alaska.

horizons (defined by the levels where vertical trees are found) as described by Waldron and Rygel (2005). The upright trees include lycopods 5 to 6 m tall. One lycopod cast reaches 12 m. Figure 7 shows one of these fossil trees. Where the base is observed, it appears to have no roots or soil horizon.

Ginkgo Petrified Forest State Park

A spectacular, but less known site of petrified polystrate trees is the Ginkgo Petrified Forest State Park in Washington, just north of Vantage on Interstate 90 along the Columbia River (Coffin, 1974; Coffin and Brown, 1983, p. 213; Oard, 1995). The layers are within basalt lava flows and thin sedimentary interbeds within the Columbia River Basalt flows of eastern Washington. A number of petrified trees, some quite wide, can be observed on a nature walk at the park. Some of the trees are vertical and some are buried in the basalt at an angle and do not appear to be burned by the heat of the lava. As far as I know, the bases of these trees are not exposed, but the fact that many are tilted at an angle to the basalt flows indicates that it is likely the trees did not grow there.

An Alaskan Coal Mine

Polystrate trees have been observed in three open-pit coal mines about 7 km north of Sutton, Alaska, about 80 km northeast of Anchorage (Oard and Giesecke, 2007). The polystrate trees were found at *different levels* in the mines. Derek Ager (1993, pp. 47–49) pointed out that vertical trees are not uncommon in Carboniferous coal. Figure 8 show two of these polystrate trees with the base exposed, showing no roots and likely no associated soil.

Florissant Petrified Stumps

Massive, petrified sequoia or redwood stumps in vertical position have been found at Florissant Fossil Beds National Monument in Florissant, Colorado (Figure 9) (Oard, 2019). These are probably the largest-diameter petrified tree stumps in the world. Based on an explanatory plaque, one is more than 4 m in diameter and represents less than 1,000 years of growth. No roots were observed at the base of this petrified tree. It is possible that the centers of the large trees are not petrified as observed at the site. The location is west of Pikes Peak at an elevation of 2,485 m in Colorado's Rocky Mountains. In addition to the fossil trees, geologists have found 1,500 species of insects and spiders (McLeroy and Anderson, 1966; Meyer et al., 2004, pp. 151–166) and 150 species of plants in the thin-bedded sedimentary rocks in the area (O'Brian et al., 2002).

Figure 9. Vertical Redwood tree at Florissant Fossil Beds National Monument in Florissant, Colorado.

Figure 10. Portion of one layer of vertical petrified trees in the "fossil forest" of Theodore Roosevelt National Park. Peter Klevberg pointing to the lack of soil under the vertical tree stump.

Numerous Petrified Stumps in Theodore Roosevelt National Park

The last area mentioned is the hundreds of polystrate tree stumps about 1 to 2 m tall found in Theodore Roosevelt National Park. Because of the intense erosion of the surrounding badlands, the base of the trees and presumably the material the trees grew in are well-exposed (Oard and Klevberg, 2022). Many once-vertical trees had already toppled because of more recent erosion. Most trees had a bulbous base and are of the species *Metasequoia glyptostroboides* or dawn redwood, a common type of tree found as a fossil.

Oard and Klevberg (2022) noticed that the trees were not only truncated at the top, as if sheared off by a powerful wind, but also the bottom had no roots and no evidence of a soil horizon underneath (Figure 10). There are also areas within the national park and in southwest North Dakota and northwest South Dakota with many logs without stumps.

It is interesting that at one time the *Metasequoia* tree was thought extinct, the last fossil is found in Pliocene layers, claimed to be over 2.5 million years ago, but it was found alive in 1941 growing in a remote area of southern China (Bartholomew et al., 1983). It is considered a "living fossil," and the question can be asked, where are the fossils of this common tree between 2.5 million years ago and today? The same can be asked of other living fossils. If the millions of years claimed by conventional science are real, why don't we find these tree fossils at least somewhere in Pleistocene time?

Upside-Down Trees

A rare, but provocative, line of evidence for transported trees is the upside-down polystrate trees. Rupke (1970, p. 155) stated: "And, what's more, examples [of vertical trees] are found

which appeared to be *upside down*, or, in other words, which have their root end uppermost." Coffin et al (2005, p. 203) show a picture of an upside-down tree from a large coal seam in Australia (Figure 11). Upside-down polystrate trees should be evidence that the trees did *not* grow in place but were transported. The only other possibility is that the entire sedimentary column in the area was overturned; something that should be easily determined by physical field evidence.

Log Mats in Noah's Flood

The catastrophe at Spirit Lake was very small compared to the global scale of the Flood. Instead of destroying vegetation over a several hundred square kilometers, the Flood obliterated vegetation over the entire land surface of the planet. Therefore, it is easy to suppose that in the initial stages of flooding the pre-Flood land, billions of trees as well as large amounts of other plant material could have floated on the surface of the Floodwaters as well as become buried in the sediments to create future coal beds. Much of this vegetation would have been broken and buried due to the violence and the water currents of the Flood. Mount St. Helens, on the other hand, gives us a recent example of the power and work of a local catastrophe:

> …the eruption of Mount St. Helens, with its effects on surrounding forests, is proving to be a helpful model of what could happen to trees in a worldwide flood. (Coffin and Brown, p. 14)

Floating vegetation could have aggregated due to the effects of wind, waves, and currents. It would have formed tangled mats, which for simplicity's sake will hereafter be called "log mats," even though additional types of vegetation would likely have been included. Numerous mats were likely present during the Flood, and some would have been carried long distances by currents and winds. Smaller mats probably coalesced to form larger ones, while at the same time, some mats were likely constantly losing pieces of vegetation as they became waterlogged, sank, and are buried in Flood sediments. Log mats from different climatic regimes could conceivably mix. And of course, some of these violent waves buried entire mats of vegetation to later become coal beds, some of which were 100 km by 100 km and up to 60 meters thick as in the Powder River Basin of Wyoming (Clarey et al., 2021).

Such a Flood model can help explain the Yellowstone fossil "forests" (Coffin, 1997; Oard, 2014). Comparing the observations at Yellowstone National Park with those at Spirit Lake and elsewhere, provides a basis for understanding examples in the rock record like the Yellowstone fossil "forests." Coffin (1997, p. 39) concluded:

> A transport model involving the flotation of trees and organic debris in a body of water, as illustrated in Spirit Lake, gives a better fit to the data as observed in the Yellowstone Petrified Forests. We propose that the Yellowstone Petrified Forests provide an example of catastrophic deposition.

Figure 6 provides a schematic of how trees can sink from a log mat while the bottom is filled with multiple volcanic debris flows.

Conclusions

The floating logs on Spirit Lake north of Mount St. Helens provide an excellent analog for how to explain numerous locations with vertical trees that are found in various places all over the Earth. Upside-down trees provide evidence for this model. This analog can also explain multiple levels of vertical trees, like in Yellowstone National Park. It answers convincingly the strong challenge to the Flood by anti-creationists.

Figure 11. An upside-down petrified tree from a large coal seam in Australia (courtesy of Dr. Harold Coffin).

There is a more general lesson in this example for Christians. When challenged, we need to do a deep dive into the observations. Often, we will find the problem lies with the interpretation rather than the data. I have often found that when I gather the observations, any challenge to creation science is also a challenge to uniformitarianism. Half the time I can find an answer within Biblical Earth history. For the other half, and due to the complexity of the Flood, it may take years of research to find an answer. And, it is likely, we may never find a viable solution to some challenges, since we were not there to observe them. And we must always be aware that there will always be numerous unknowns in science, especially in the area of so-called historical science, in which paleontology and geology fall. But once in a while, our Creator, the Lord Jesus provides a solution before our eyes, as is the case for the eruption of Mount St Helens.

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