Grand Falls, Arizona: Evidence of Missing Uniformitarian Time

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Abstract

Grand Falls, Arizona, presents a beautiful setting in which to investigate the uniformitarian interpretations of near-consistent processes occurring over millions of years of time. The Little Colorado River, which incises the Kaibab and Moenkopi formations, was diverted from its course by a basaltic lava flow from the Merriam Crater, forming the falls. We examined the geomorphologic and stratigraphic setting, and postulate an historical model. Evidence in support of uniformitarian time was not found. Rather, it appears that a subaerial eruption of lava flowed across the top of the Kaibab and Moenkopi strata within the last few thousand years. The Kaibab carbonates and overlying Moenkopi sandstones reflect Flood deposition, while the basaltic lava flow was emplaced later, during the post-Flood Ice Age Timeframe. The geomorphic and stratigraphic setting of Grand Falls is consistent with the short time frames predicted by the young-Earth Flood framework.

Introduction

Grand Falls is approximately 30 miles northeast of Flagstaff, Arizona (Figure 1). It formed as a result of a lava flow that originated from Merriam Crater (Figure 2). The lava erupted and flowed approximately 7.5 miles to the northeast and dammed a section of the Little Colorado River. It is probable that the lava flow occurred rapidly as there is evidence that it flowed not only into the former river channel, but also for some distance along its course.

Figure 1. Grand Falls remains dry for most of the year, except during spring snowmelts from the nearby San Francisco Peaks or the occasional summer thunderstorm (Nations and Stump, 1996). The difference in elevation from the top to the base of the Falls is approximately 160 feet. It is more than twice that distance in width.

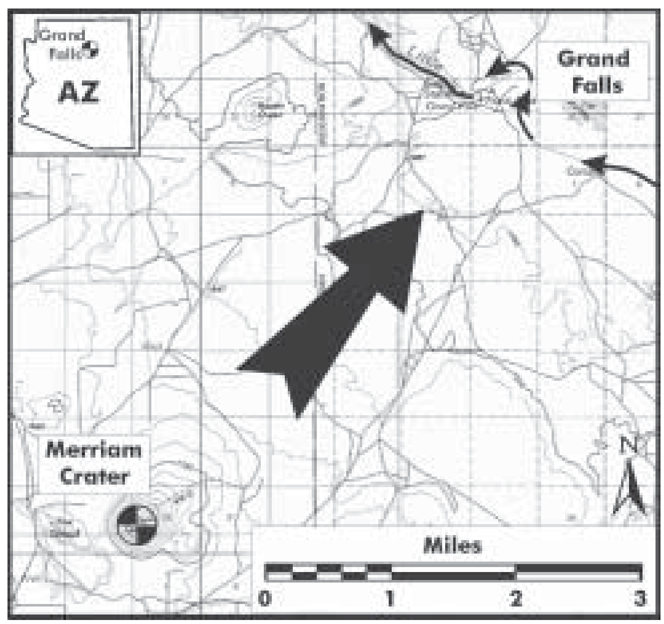

Figure 2. Topographic map showing the relationship between Merriam Crater and the lava flow that blocked the Little Colorado River creating Grand Falls. Modified United States Geological Survey Flagstaff, Arizona Topographic Quadrangle.

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The river has subsequently diverted around the front of the basalt flow and has returned into its original channel (Figure 3).

This location provides an excellent setting in which to test various uniformitarian assumptions. Evidence should be readily apparent supporting the purported 250 million years (Ma) of time having elapsed between the paleo-land surface and the subsequent overlying lava flow. Additionally, there should be evidence highlighting the differences in the erosional history of the river, along with the effects that weathering had on the basaltic lava flow. Hence, there should be ample evidence surrounding Grand Falls in support of the uniformitarian model of Earth history.

Grand Falls

Grand Falls has been studied by various geoscientists who have interpreted the geologic setting within the uniformitarian framework (Colton, 1967; Rigby, 1977; Wolfe, 1984; Nations and Stump, 1996; Gordon, 2000). Uniformitarian geologists age-date the Kaibab Formation to the Late Permian Period (250 to 260 Ma) [Gordon, 2000], and the Moenkopi Formation to the lower Triassic Period (235 to 245 Ma). At Grand Falls, the Kaibab limestone is believed to be unconformably overlain by the Moenkopi Formation sandstone or the basaltic lava flow where the sandstone is eroded away (Figure 4). For the area immediately

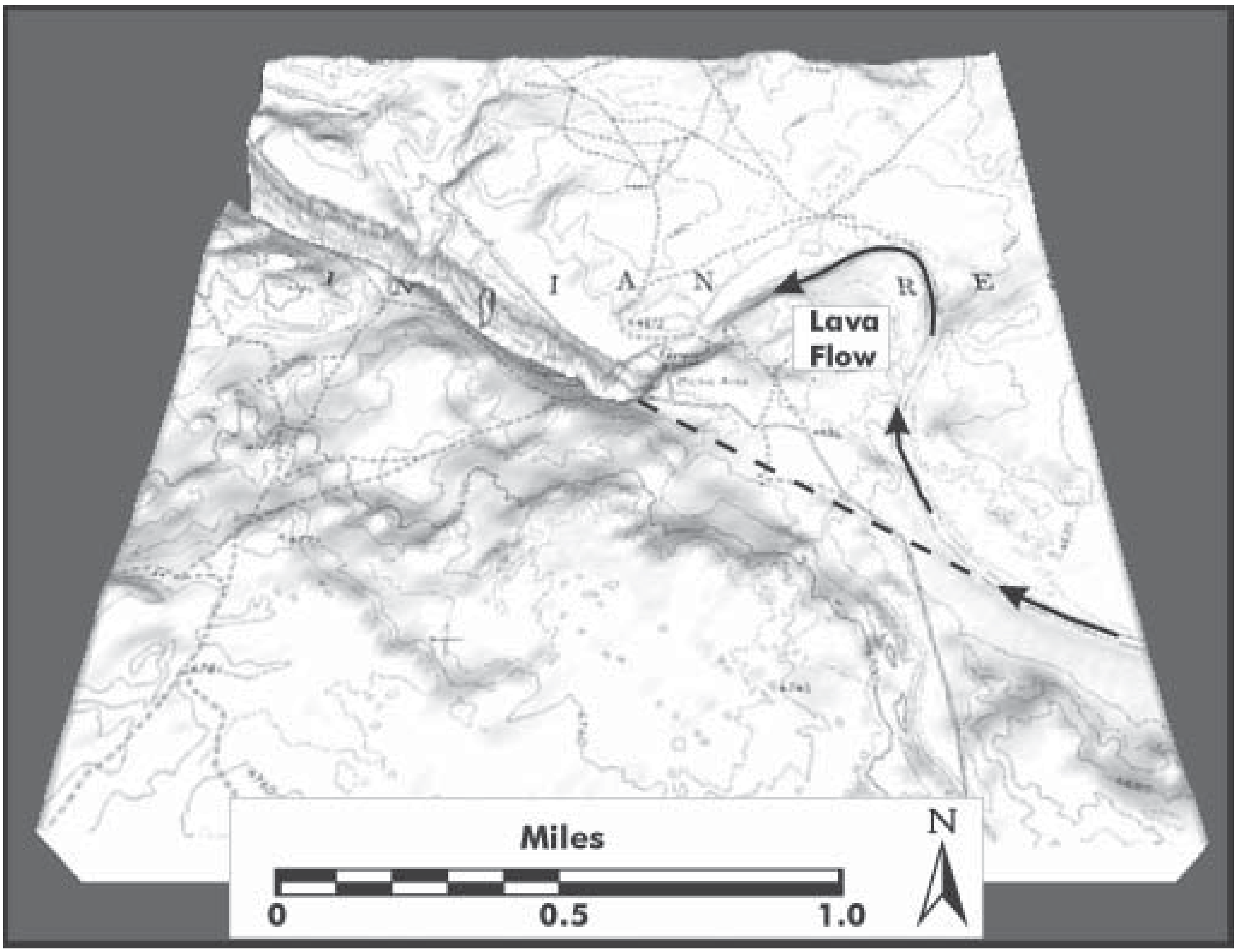

Figure 3. Topographic map showing the area immediate to Grand Falls. Arrows indicate the present course of the Little Colorado River and the dotted line represents the former channel. Note the drastic change in the depth of the river channel when the strata change from Moenkopi sandstone to Kaibab limestone. The limestone weathers more rapidly. Modified United States Geological Survey Quadrangle using Maptech ©2001 software at 4X elevation.

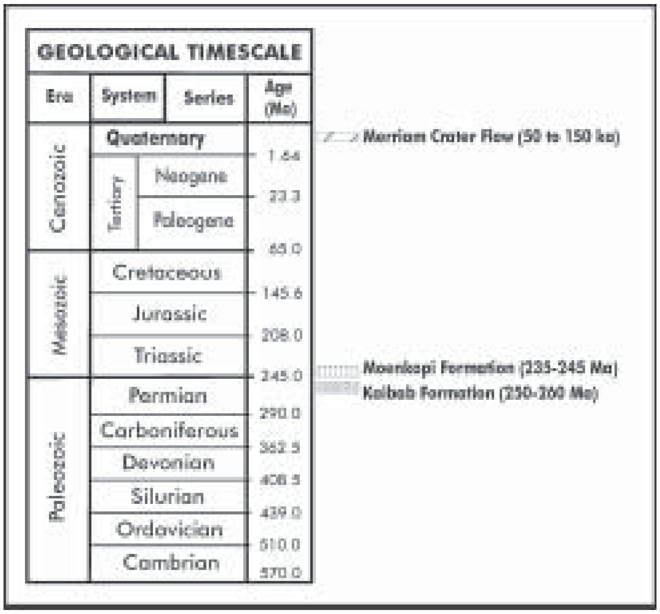

Figure 4. Generalized geologic timescale showing the chronostratigraphic position of the stratigraphic layers found exposed at Grand Falls. The gap between the Kaibab/Moenkopi and the overlying Merriam basalt is missing from the rock record. Are rocks missing because of erosion or were they never deposited? Either way, the existing strata should present evidence showing the passage of millions of years of time if that much time has actually elapsed.

adjacent to Grand Falls, we can assume that the top of the Kaibab Formation where the Moenkopi Formation is missing, should age-date to around 250 Ma.

Volcanic History

The Merriam volcano (Figures 5 and 6), located on the eastern side of the San Francisco volcanic field, is believed to have erupted at a late stage in the area's history (Colton, 1937; Luedke and Smith, 1991; Patton et al., 1991; Warner, 1978). The northeastward direction of volcanism associated with the San Francisco volcanic field is believed to be the result of major fracture zones in the lithosphere (Tanaka et al., 1986), also identified as the Colorado Lineament (Warner, 1978). Large-scale volcanic eruptions have occurred within this area and over 350 vents have been identified throughout the San Francisco Volcanic Field (Colton, 1967).

Age-dating the Merriam lava flow has been a priority in understanding the eruptive history of the area. Because of the relatively unweathered condition of the lava and the well-defined structure of its flow, Colton (1967) proposed a recent age for this basalt lava flow. Age-dating of the associated caliche supported his interpretation with an approximate age-date of 5,600 years (Colton, 1967, p. 53).

However, more recent age-dating by uniformitarians has increased the age of the Merriam lava significantly. Wolfe (1984) stated that the Merriam-age flows range in age from approximately 50 to 150 thousand years. Therefore, we can assume that Grand Falls age-dates to this same period as it formed as a result of the Merriam lava flow.

Figure 5. Merriam Crater is the taller of the two exposed craters and rises majestically above the plain. The lava flow that emanated from its base moved toward the right side of the photograph, down to the Little Colorado River.

Figure 6. Looking across the Merriam lava field, near Grand Falls. Note the numerous pressure ridges exposed across the surface. There is much detail found around these ridges. The rather low relief reflects pahoehoe lava flow. The surface is eroded and covered in places with plants. This is not what would be expected if 50 to 150 thousand years of weathering had occurred.

Figure 7. Aerial photograph that reveals the significant differences between the Little Colorado River flowing across the Moenkopi sandstones (right side of image) and the Kaibab limestones (left side of image). Note how the river has created a deep and narrow canyon in the Kaibab carbonates. This is opposite to what is expected in uniformitarian reasoning.

Uniformitarian Erosional Rates Oppose Observational Data

Within the area of Grand Falls, the Little Colorado River flows across the top of the Moenkopi sandstone (upgradient to the falls) and then across the top of the Kaibab limestone (where the lava flow blocks the former channel). According to Colton (1937; 1967), the Moenkopi sandstone erodes "much faster" than the Kaibab limestone. However, just the opposite is demonstrated along the course of the Little Colorado River. In fact, the Kaibab limestone has experienced tremendous erosion along its channel once the river descends from Grand Falls (Figure 7). Based on the channel erosion experienced by the Kaibab limestone downgradient from Grand Falls, we should expect to see a highly eroded Kaibab limestone surface in adjacent areas if it experienced approximately 250 Ma of erosion.

Weathering of the Merriam Basaltic Lava Flow

Colton's (1937; 1967) work classifying the age of the various vents and volcanic features found across the San Francisco volcanic field centered on weathering effects of both the eruptive vents and their associated lava flows (Figures 8 and 9). He considered the Merriam Crater and lava flow to be Stage IV:

> Stage IV. The true edge of the flow is visible. The surface is rough and broken. Lava tops are present but displaced by frost. Spatter cones and pressure ridges are prominent features.

Regarding the condition of the Merriam basalt flow, Wolfe (1984) stated:

> ...the surfaces of Merriam-age flows are rough and relatively fresh. The flows commonly have promi-

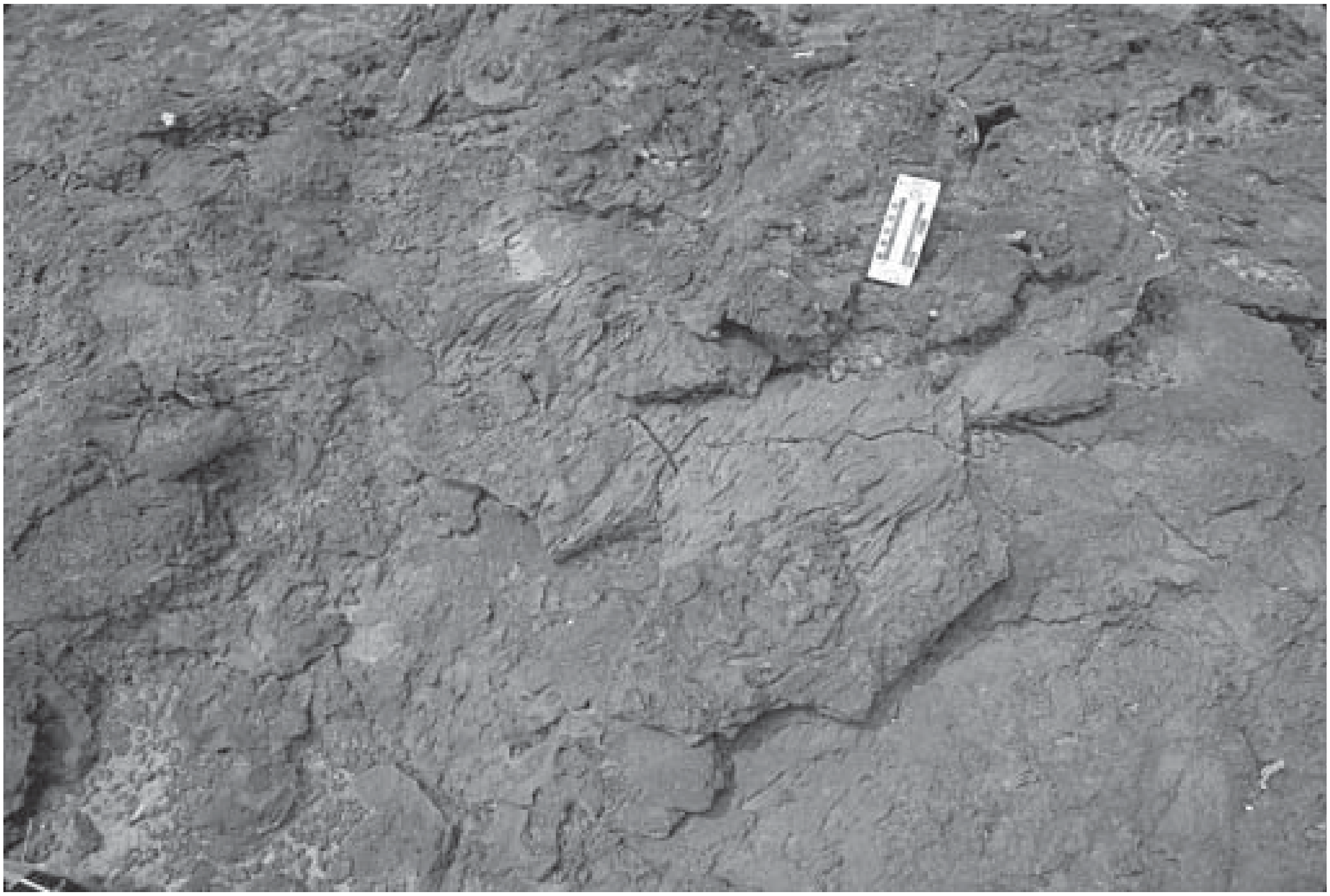

Figure 8. Agglutinated lava flow with excellent preservation of the flow features. The presence of these delicate features argues against the proposed uniformitarian age-dates ranging from 50 to 150 thousand years. Scale in inches and centimeters.

Figure 9. Large pressure ridge. This feature rises several feet above the lava surface. Exposed within it are many delicate features that are frozen in rock. This is not expected if vast amounts of time passed since its original emplacement. Weathering should have broken the rock down into sand and clay.

> nent ridges at their lateral margins, and delicate flow structures.

Moore and Wolfe (1974) described the "Merriam age-group" volcanics as:

> Basalt flows of the Merriam age-group are generally rough and relatively fresh, commonly with well developed levees and with delicate structures preserved on the flow tops.

In later work, Moore and Wolfe (1976) described the Merriam basaltic lava flow surfaces as rough, relatively fresh pahoehoe and aa forms of lava.

According to uniformitarian geoscientists, this region experienced three major periods of alpine glaciation during the Pleistocene (Updike, 1969; 1977; Péwé, Merrill, and Updike, 1984). Based on the age-date range of the Merriam basaltic lava flow, it could possibly extend through at least two of those glacial periods. While alpine glaciation occurred only in association with the San Francisco Mountains, it does reflect a wetter climate than what the region experiences at present. Because of increased fluvial

Figure 10. Contact between the Merriam basalt and the underlying Kaibab limestone. A melt zone exists just below the contact within the limestone. Beneath this surface we should expect to find evidence for 250 million years of erosion. Instead, we find massive limestone with no indication of earlier weathering. Where is the evidence in support of uniformitarian time? This outcrop strongly indicates that it never existed.

Figure 11. A close-up view of the contact between the Merriam basalt and the Kaibab limestone. The limestone beneath the melted zone is massive with no evidence of a former karstic surface, one or more soil horizons, or plant alteration. This is predicted within the short time frames of the young-Earth Flood framework

activity that would have been present during the glacial periods, we might expect a more weathered Merriam basaltic lava flow than is reported by these geologists.

The Kaibab Limestone— Merriam Basalt Contact

Probably the most interesting stratigraphic contact at Grand Falls is found between the Kaibab carbonates and the overlying basalt lava flow (Figures 10 and 11). This contact represents the end of erosion for the Kaibab limestone and its preservation since the lava covered it. We should expect to observe the effects of 250 Ma years of surface erosion and paleosol development in the Kaibab limestone. Limestone is soluble in naturally occurring acidic conditions. Rainwater is made naturally acidic after passing through the atmosphere and combining with carbon dioxide to form carbonic acid, with a pH around 5.6 (Foster, 2000). Hence, we should expect to witness a well-developed karstic surface on the top of the exposed Kaibab limestone and associated highly developed paleosol soil horizons (see Froede, 1998).

What we found in our study of the area is surprising. Approximately, two to four inches of the top of the Kaibab limestone is fused into solid rock. The Kaibab upper surface does not appear to reflect any karstic influences. Additionally, there is no physical evidence of any former paleosol horizons beneath the volcanically-fused layer. There is no evidence for past plant activity or any disturbance of the shallow subsurface beneath the fused layer. Where is the evidence to support 250 Ma of time as represented by erosion and/or soil development?

Conclusions

A common sense approach to understanding the timing and age of the Merriam lava flow has apparently been challenged by radioisotopic dating. While the lava flow provides every appearance of being recent, age-dates obtained from the lava suggest otherwise. We believe that Duffield (1997) offers the most candid perspective on the age and origin of the Merriam basaltic lava flow stating:

> The dam-building lava flow at Grand Falls erupted from either the cinder cone known as Merriam Crater or a smaller volcano nearby, about 7 miles west of the Little Colorado River. Geologists do not agree on exactly when this eruption occurred, but it may have been several thousands or tens of thousands of years ago.

While we are not able to quantify or qualify the time necessary to create Grand Falls, we are puzzled by the conventional geoscientist's contention that the Little Colorado River has created a more substantial channel in the Kaibab limestone in 50 to 150 thousand years compared to the upgradient Moenkopi sandstone with an age of at least 235 Ma (Figure 1). We would expect a softer sandstone to weather more rapidly and create a drainage channel similar to that observed in the Kaibab limestone downgradient to Grand Falls.

That the surface of the Merriam basaltic lava flow has remained rather "rough and relatively fresh" with "delicate structures preserved on the flow tops" over the course of 50 to 150 thousand years appears to defy the passage of time by lack of evidence of substantial weathering. The flow appears to be of a recent origin by nature of its excellent preservation. This is empirical evidence. Why do uniformitarians force the time issue by adopting inappropriate age-dates? Unfortunately, they are forced to interpret and skew data in an attempt to bolster an archaic, unrealistic, and nonscientific model of Earth history.

Voluminous physical evidence should exist in support of the uniformitarian concept that 250 Ma elapsed between the top of the Kaibab limestone and the bottom of the Merriam lava flow. No credible supportive evidence is present. Perhaps the purported span of time never existed.

Everything that we observed at Grand Falls is consistent with the time frames and changing geologic energy levels expected in support of the young-Earth framework. We were not able to identify anything geologically that demonstrated any credible defense of the uniformitarian assumptions. Additionally, the uniformitarian literature about this site also failed to provide us with any physical evidence necessary for its support. Grand Falls provides testimony to anyone who is willing to acknowledge evidence of recent events that resulted in its creation. Its very existence supports the young-Earth Flood framework of Earth history.

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