The meaning of the Great Unconformity and Sauk Megasequence

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The Great Unconformity, first defined in the Grand Canyon in 1869, separates the Cambrian Tapeats Sandstone from the underlying Precambrian rocks (the geological column and timescale are used for discussion purposes only). There is some confusion in the Grand Canyon in that there is a second major unconformity between the Precambrian sedimentary rocks and the igneous and metamorphic rocks (figure 1). The uniformitarian origin of the Great Unconformity is supposed to be slow denudation over about a billion years that resulted in a nearly flat planation surface. Then after this denudation, a shallow marine transgression deposited the Tapeats Sandstone, Bright Angel Shale, and Muav Limestone in a fining upward sequence called the Tonto Group.

It is now known that the Great Unconformity has a wide extent over North America, as seen on top of the upper crust. The Great Unconformity is a distinctive physical boundary between mostly igneous rocks of the upper crust and a layer of sandstone. It apparently also occurs on other continents:

> "The Great Unconformity is well exposed in the Grand Canyon, but this geomorphic surface, which records the erosion and weathering of continental crust followed by sediment accumulation, can be traced across Laurentia and globally, including Gondwana, Baltica, Avalonia and Siberia, making it the most widely recognized and distinctive stratigraphic surface in the rock record."[1]

The Great Unconformity is also considered a unique feature within the last 900 Ma of uniformitarian time.[2] The Tonto Group in the Grand Canyon is also recognized as covering about half of North America and is called the Sauk Megasequence,[1] the bottom of six megasequences that supposedly account for sedimentation over North America. The Sauk sequence is well defined lithologically on top of the upper crust and locally on Precambrian sedimentary and metasedimentary rocks. However, the other five sequences are based on many assumptions, such as fossil dating and not lithology, and are commonly missing large sections in North America (see below).

The Great Unconformity in Montana and Wyoming

I have observed the Great Unconformity at several locations in Wyoming and Montana. Whereas the Great Unconformity is near the bottom of 1,200 m of flat strata in the Grand Canyon, it occurs at the tops of some mountain ranges in Wyoming and Montana. For instance, there are planation surfaces on the granite and gneiss of the Beartooth Mountains, Wind River Mountains, Bighorn Mountains, and locally in the northern Teton Mountains (figure 2).

However, there has been confusion on the timing of the formation of the mountaintop planation surfaces, i.e. whether these planation surfaces represent the Great Unconformity. This is because there are planation surfaces that formed in the area *after* the time of the Great Unconformity. For instance, a planation surface exists on the westward-dipping sedimentary rocks on the west side of the Wind River Mountains (figure 3) at about the same elevation as those on the granite and gneiss. A planation surface also exists on the top of the southern

Absaroka Mountains. These planing events are much later in 'geological time' and so have caused some geologists to believe that the planing event also included the flat-topped granite and gneiss mountains of the upper continental crust: "The age and origin of the high-level erosion surface [in the Wind River Mountains], the Rocky Mountains and others have been the subject of much debate."[3]

The Absaroka Mountains represent volcanic breccia flows, called the Absaroka Volcanics, that have piled up about 1,800 m deep over an area of 23,000 km^2 and contain multiple levels of vertical petrified trees at numerous locations.[4] They are dated Eocene, which is early Cenozoic, within the uniformitarian geological column. The flows occurred after the Heart Mountain and South Fork detachments, and filled in the depression left after the gravity slides.[5] After deposition and planing of the Absaroka Mountains, extensive erosion set in to erase the planation surface in the northern portion and produce canyons up to about 1,200 m deep.

Problems with the uniformitarian explanation

The uniformitarian scientists claim that the Great Unconformity represents a long period of continental denudation, well over a billion years at many locations. This is in the context of attempting to explain the evolution of biomineralization by means of the geochemical effects of prolonged continental weathering and denudation.[6] However, erosion does not form planation surfaces today, except locally when a river floods and erodes its banks.[7] Planation surfaces are being destroyed by present-day erosion, especially by running water that forms channels and valleys. Geomorphologist C.H. Crickmay states:

> "There is no reason to suppose that any kind of wasting ever planes an area to flatness: decrepitation always roughens; rain-wash, even on ground already flat and smooth, tends to furrow it."[8]

After the supposed long formation of the Great Unconformity, the Sauk Megasequence then was spread over much of North America. It is believed to represent a continental transgression of the sea but seems contradictory in that the fining upward sequence is so widespread over large areas. A rising sea level in such a transgression would be

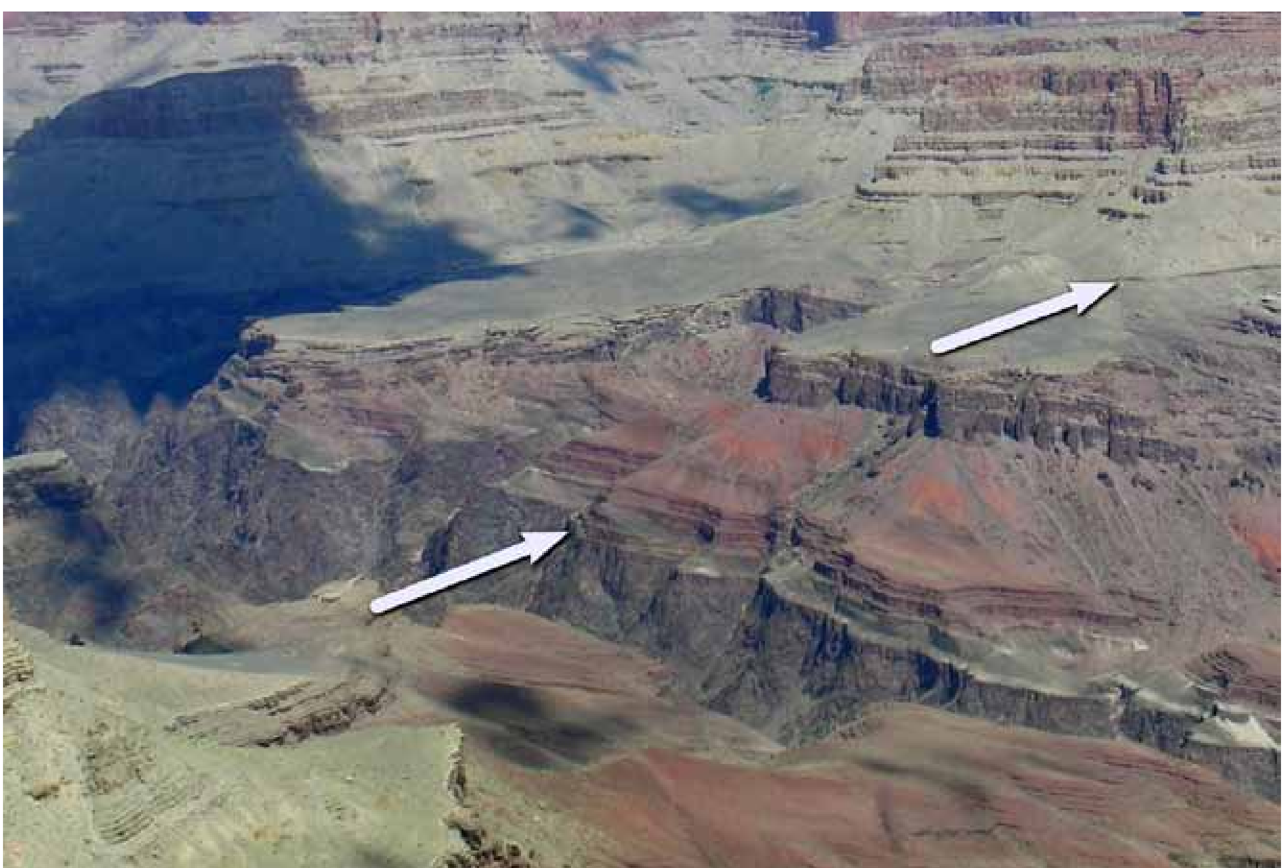

Figure 1. The Great Unconformity of the Grand Canyon (upper arrow) above another nearly-flat unconformity between Precambrian sedimentary rocks, dipping downward toward the right, and the igneous and metamorphic rocks below (lower arrow).

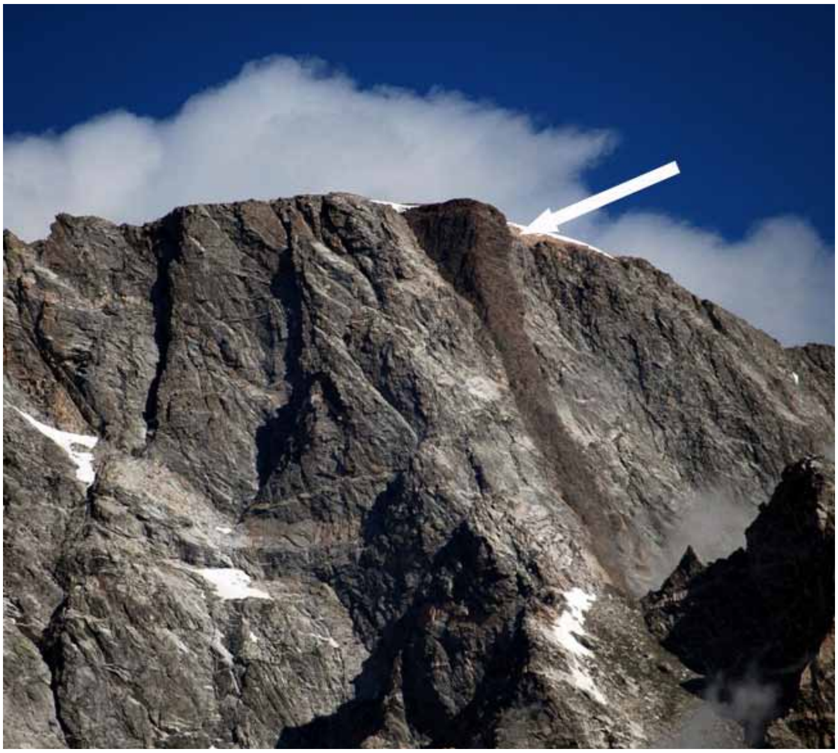

Figure 2. The top of Mount Moran, Grand Teton National Park, Wyoming, US, showing the Great Unconformity with a 15 m erosional remnant of Flathead Sandstone (arrow).[4] The vertical black rock is a dike of diabase, a basalt-like rock.

expected to produce a more chaotic distribution of sediments with much conglomerate over short lateral and vertical spatial scales—unlike the Sauk Megasequence.

A possible diluvial explanation of the Great Unconformity and Sauk Megasequence?

I have come to the conclusion that the mountaintop planation surfaces on the granite and gneiss of some Wyoming and Montana mountains is really the Great Unconformity that has been exhumed from under thick sedimentary rocks. The evidence for this is that thick sedimentary rocks still cover many mountain ranges of the Rocky Mountains, such as the Owl Creek Range that makes up the southern boundary of the Bighorn basin. The mountains apparently did not uplift enough for all the sedimentary rocks to be eroded off. Moreover, Paleozoic erosional remnants have been left on top of the planation surfaces, such as Beartooth Butte on top of the Beartooth Mountains and a 15-m thick remnant of Flathead Sandstone, equivalent to the Tapeats Sandstone in Grand Canyon, on top of Mount Moran (arrow in figure 2). The other mountaintop planation surfaces on the west side of the Wind River Mountains and the Absaroka Mountains would then represent planation during Flood runoff.

The Great Unconformity and Sauk Megasequence, plus the later planation surfaces, can be explained by Flood catastrophic processes. A possible model for the formation of these features follows. The early Flood unleashed the mechanism of the Flood, which I think was caused by impacts.[9] The very early Flood should be the most catastrophic part of the Flood, and with multiple impacts very strong currents and turbulence would occur. Such a mechanism would scour the continents down to a planation surface, even causing the second major unconformity below Precambrian sedimentary rocks in the Grand Canyon. It would also greatly erode the surface and pulverize the sediments into fine particles. Little deposition would occur at this point, except in protected deep basins that are likely impact basins.[10]

With the waning of the early Flood mechanism, currents and turbulence would decrease and the ‘Great Deposition’ would occur. This deposition resulted in the thick Paleozoic and Mesozoic sediments that we observe over much of the continents today. These sedimentary rocks are little deformed, widespread, fine-grained, and show little, if any, erosion within and between the layers, as if all these widespread sediment layers were deposited in one single uninterrupted sequence. In fact, such deposition was admitted by three geologists for the early to middle Paleozoic sedimentary rocks uplifted in the Teton Mountains of northwest Wyoming:

> “The regularity and parallelism of the layers in well-exposed sections suggest that all these rocks were deposited in a single uninterrupted sequence.”[11]

However, the geologists do not believe their eyes and stretch the deposition of this 600-m thick sequence into 200 Ma because of their stretched-out timescale. Such great time injected between the layers makes no sense based on present day erosional patterns that can erode all the continents to sea level in a few tens of millions of years. Based on erosion today, which is an application of the uniformitarian principle, the data do not support such long time periods subjectively interjected within the sedimentary rocks.

Such widespread deposition of many layers, one on top of the other, with little or no erosion is what we would expect during the early Flood.[12] The first megasequence, the Sauk, is well defined as it covers about half of North America, but it looks like the other five megasequences are sketchy with missing megasequences over large areas of North America. For instance, the next to the oldest megasequence, the Tippecanoe (dated as Ordovician and Silurian), is almost entirely missing from the Grand Canyon area and in Montana and Wyoming. Moreover, the second-youngest megasequence, the Zuni, is missing over most of central and eastern North America. Maybe this was because of erosion. Regardless, further research is required to understand whether such megasequences are real or not and what they may mean.

The warping of the Great Unconformity

Once the thick Paleozoic and Mesozoic sedimentary rocks were deposited in the Rocky Mountains region, great differential uplift (Psalm 104:8) occurred in the Cenozoic to form the current high mountains and deep basins filled with thick sedimentary rocks.[13] For instance, the Uinta Mountains of northeast Utah rose up 12 km relative to the adjacent basins during the Cenozoic.[14] That is why the Great Unconformity is low down in the Grand Canyon but located at the tops of mountains in Wyoming and Montana. The thick sedimentary rocks were greatly eroded from off many of the ranges in the Rocky Mountains and Colorado Plateau with some of the eroded debris continuing to fill up the valleys and basins of the Rocky Mountains and being transported off the continent to form the continental shelves.[15,16] This is the time when the continents were greatly eroded, forming planation surfaces with tall erosional remnants during sheet flow erosion, and pediments, water and wind gaps, deep canyons, and valleys during channelized erosion.[13,17] During the channelized erosion, the top several hundred to possibly 1,000 m of sediments and sedimentary rocks eroded from the Rocky Mountain basins and valleys and High Plains of the western United States.

Figure 3. Planation surface on Gypsum Mountain, northwest Wind River Mountains of west central Wyoming. The mountain is composed of carbonate rocks with beds dipping west about 40° to the right.

The Flood can indeed explain the big picture geology of the continents, including the Great Unconformity, the Great Deposition starting with the Sauk Megasequence over half of North America, differential vertical tectonics, and the huge erosion of the continents that resulted in all the unique geomorphological features.

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