The Ice Age and Catastrophic Models of Origins

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Much evidence supports a rapid, post-Flood Ice Age. Catastrophic melting produced at least 41 gigantic floods, the most well-known being the Lake Missoula flood in the northwest United States. This Ice Age model can also explain at least five major associated mysteries for secular science, including the mass extinction at the end of the Ice Age. The following reasons indicate that the Ice Age was the only widespread post-Flood catastrophe associated with the Genesis Flood: 1) the Ice Age began immediately after the Flood and 2) thirty-five criteria indicate a late Cenozoic upper diluvial boundary. Examples of these criteria are: 1) very thick Cenozoic sediments, 2) Cenozoic coal, 3) enormous Cenozoic differential vertical tectonics, and 4) geomorphology. Such a location for the upper Flood boundary does have challenges, which need to be worked out.

Thousands of pieces of evidence indicate that there was an ice age following the Flood (Oard, 2023a). The ice eventually covered 30% of the continents, mainly at high and mid latitudes, whereas only 10% of the earth is glaciated today, namely Antarctica and Greenland. Tropical mountain areas were also glaciated about 1,000 m lower than the current snow line. Early in the Ice Age, the climate forced some people groups migrating from Babel to live in caves for protection. These became the “cave men” discovered mainly in Europe along with numerous stone tools and exquisite drawings on cave walls. However, these people were not primitive as evolutionists often depict. They had to be very intelligent and resourceful to have survived the Ice Age.

Catastrophic Floods

Meltwater from retreating ice sheets left a trail of lakes. Sometimes these "proglacial lakes" overflowed a rock or ice barrier and carved a canyon due to the ensuing local flood. Sometimes the flood would fill up another low area forming another lake. Sometimes lakes occurred within enclosed basins during the Ice Age, rose, and eventually broke through a rock barrier. One example is "Lake Bonneville" in the southwest United States. The lake was about 10 times the size of Great Salt Lake and 245 m deep. It eventually broke through a rock or debris barrier causing the Bonneville flood which swept down the Snake River in Idaho (O'Connor, 1993). Dr. Victor Baker, an expert on Ice Age flooding, has catalogued 41 catastrophic Ice Age floods in North America, Eurasia, and southern South America, mostly from ice-dammed lakes (Baker, 2013; Oard, 2015).

The Lake Missoula flood

The most famous example of a catastrophic Ice Age flood is the Lake Missoula flood in the northwest United States (Oard, 2004, 2014a). The Lake Missoula flood occurred when Glacial Lake Missoula burst through an ice dam at the peak of the Ice Age. This lake formed in the western valleys of Montana, USA, when a finger of the Cordilleran Ice Sheet in southeastern British Columbia, Canada, and northern Idaho, USA, blocked the Clark Fork River, allowing the lake to grow each summer as meltwater filled the valleys. When the water reached 600 m deep at the ice dam, the dam gave way. The volume of glacial Lake Missoula was about 2,200 km^3, about five times the volume of Lake Erie in the Great Lakes of the north-central United States. To this day ancient shorelines can be easily seen in the mountains and foothills of western Montana (Figure 1).

The ice dam was a disaster waiting to happen. The huge lake burst catastrophically, and the water rushed over eastern Washington up to 100 km/h. The floodwater was 180 m deep over what is now the city of Spokane, Washington, USA. It was 300 m deep as it thundered 120 km/h through the Columbia Gorge between Washington and Oregon, USA. Exiting the gorge, it flooded the lowlands west of the Cascade Mountains but was still 120 m deep over the current location of Portland, Oregon. The water backwashed south up the Willamette Valley to Eugene, Oregon, before it exited down the Columbia River into the Pacific Ocean. The flow was 10–15 times the combined average discharge of *all* the rivers in the world!

The Lake Missoula flood eroded 200 km^3 of hard basalt lava and about 30 m of soft silt on top of the basalt. The flood carved eastern Washington into a series of diverging and converging vertically walled channels with flat bottoms, called coulees. It first filled glacial Lake Columbia in northern Washington, and then overtopped a lava ridge, breaking into two main channels. One is the Grand Coulee, 80 km long, up to 10 km wide at its upper end, and 275 m deep (Figure 2). As the floodwater raced down the Grand Coulee it was at least 120 m deep and formed a huge waterfall in the middle of the Grand Coulee that is now called Dry Falls (Figure 3).

The erosion of the silt produced hundreds of lens-shaped, streamlined hills. From space, silt is light colored and the basalt dark, so it is easy to see the path of the flood, which was about 160 km wide, converging and diverging on its way toward the Columbia Gorge (Figure 4). This unique terrain is called the Channeled Scabland. It is impossible to cultivate the rough butte and basin terrain of the basalt, but crops grow well on the islands of un-eroded silt.

Despite this evidence, the geological establishment rejected the Lake Missoula flood. Forty years passed before the overwhelming evidence, including satellite and aerial pictures, finally persuaded them. Scientists rejected the flood mainly because of their commitment to uniformitarianism; they assumed large catastrophes never happen. The flood was too large to accept, no matter the amount of evidence presented. Some said that the flood was too biblical in scale, referring to Noah's Flood.

Five Ice Age Mysteries Solved

At least five major mysteries for secular scientists are associated with the Ice Age (Table 1). First, climate simulations show that the lowlands of Siberia and Alaska should have been glaciated, but only the mountains were glaciated. Second, large lakes, rivers, aquatic animals, and man occupied presently arid to semi-arid areas indicating that these locations were once well watered. The most outrageous example is the Sahara Desert that was well watered with large lakes (Oard, 2020). Third, Ice age sediments show a mix of animals that loved the cold with those that loved the warmth. These are called disharmonious associations and are the rule for the Ice Age. The most outrageous example of a disharmonious association is finding of hippopotamus fossils in England at 100 locations buried with cold loving animals such as woolly mammoths, reindeer, and musk oxen. This distribution can only be explained by a mild climate with mild winters and cool summers, just as predicted in the rapid, post-Flood Ice Age (Oard, 2023a). A fourth mystery is the existence of millions of woolly mammoths and about 40 other species of animals in Siberia, Alaska, and the Yukon Territory where it was not glaciated. Why would they live there? Fifth, a mass extinction occurred at the end of only the last ice age in the secular ice age scheme. This would indicate that those previous ice ages did not exist, unless the extinctions can be tied to man, which is doubtful (Oard, 2023a).

1. Lowlands of Siberia, Alaska, and northwest Yukon Territory never glaciated
2. Arid and semi-arid areas today were well watered
3. Ice Age sediments had a mix of animals and plants from cold and warm environments
4. Millions of woolly mammoths and 40 other animals lived in the far north
5. Mass extinction of about 66% of mammals over 44 kg at the end of the Ice Age

Table 1. Five major Ice Age mysteries for secular scientists.

The mysterious Late Ice Age Extinctions

It is hard to imagine that during the Ice Age numerous gigantic exotic mammals lived all over the world. But it’s true! These animals include the woolly and Columbian mammoths, American mastodons, various types of huge ground sloths; saber-tooth tigers; cave bears; diprotodons; toxodons; glyptodons; and the so-called Irish elk, actually a giant deer. Some have said areas without glaciers were like the Serengeti of Africa (Lyons et al., 2004).

Table 2 lists the percentages of large animals greater than 44 kg that went extinct on every livable continent at the end of the Ice Age. The different figures suggested in the literature for Africa and Eurasia reflect the fact that accurate estimations (and therefore figures) have been hard to estimate. However, it is undisputed that large extinctions happened. The question that remains to be answered is: what were the significant variables for such differential extinction?

Continent	**Percent extinct**
Africa	25%
Australia	88%
Northern Eurasia	36%
Northern America	72%
South America	83%

Table 2. Percentage of mammalian megafauna over 44 kg that went extinct during the Late Pleistocene/early Holocene on all continents, except Antarctica (Barnofsky et al., 2004; Faith, 2014). Southern Eurasia is not included because of insufficient data.

A huge debate is taking place among secular scientists is whether climate overchill or human overkill caused the mass extinction. Both have some good arguments and neither adequately explains all the data. The uniformitarian scientists are currently in a stalemate about how to solve this 200-year-old mystery. Maybe the problem lies in their assumptions. Guthrie admits that uniformitarianism is no help:

> "Looking at the extinction problem through the eyes of a young paleontologist in the early 1960s, I encountered my first important lesson—that the present can be used to understand the past only with sensitive discretion. In fact, much of the past may have no modern analogue" (Guthrie, 1984, p. 292).

In other words, uniformitarianism does not explain the mass extinctions, which should cause one to doubt "events" that supposedly happened hundreds of thousands to millions of years ago. Field et al. (2008, p. 97) admit that neither overchill nor overkill have definitive evidence:

> "On the basis of available evidence arguments for either human or climatic causation are entirely circumstantial and implicitly require acceptance of many unproven assumptions."

However, the post-Flood Ice Age model can provide a more reasonable answer to this important mystery (Oard, 2008).

The Ice Age Climate Can Explain the Extinctions

The Ice Age climate was much different from what secular scientists predict. Instead of a bitterly cold ice age, winters early in the post-Flood Ice Age were actually *much* *warmer* than the secular model proposes with only small seasonal differences caused by a warm ocean. This is a climate that was equitable, mild, and wet in areas that were not covered by ice sheets. A mild early Ice Age climate is strongly supported by the ubiquitous observations of disharmonious associations (Oard, 2012). More rainfall and vegetation covered non-glaciated areas during the early part of the Ice Age than today. The animals thrived in this climate and that is why the number and variety of animals globally has been described as similar to the Serengeti.

But the Ice Age climate was continually changing; the winters gradually became colder and the summers warmer (Figures 5 and 6). By the end of the Ice Age, the summers were warm enough to melt the ice sheets. The winters for a time had become even colder than today with a large seasonal contrast. Global precipitation was significantly less than today, especially in the colder latitudes. Light winter snowfall would have melted quickly from the warmer summer temperatures. Summer melting shrunk the ice sheets, causing massive floods on many rivers. In the Arctic Ocean, the less dense fresh water from melting ice caps in the mountains rapidly spread over the salt water. Fresh water freezes much easier than salt water, so the Arctic Ocean and other high latitude oceans froze over quickly. This is one reason why there was more sea ice during deglaciation.

Larger amounts of sea ice greatly reduced evaporation and reflected more sunlight back to space. As such, the ocean temperatures fell below today's average. These variables would have resulted in a drier atmosphere. Drought would have been widespread, and was likely the main variable causing the extinctions in Australia and South America.

The tropics and subtropics would have warmed to near their present-day temperatures during deglaciation. With ice sheets and more sea ice lingering in the middle and high latitudes causing colder temperatures, there would have been a much stronger north-south temperature difference than exists today. Using the thermal wind equation, the stronger this temperature difference, the stronger the winds aloft, including the jet stream. Therefore, the surface winds would have been much stronger and more frequent during deglaciation. Sand sheets and loess across the Northern Hemisphere verify that winds were stronger during deglaciation. The loess in the lowlands of Siberia and Alaska reach 50 m thick and contain the vast majority of Ice Age fossils (Murton et al., 2015). Many of these sand dunes no longer move, highlighting that they were formed by strong, dry winds most likely during the Ice Age. Fires would likely also have been common.

Extensive permafrost developed in many non-glaciated areas, farther south in the Northern Hemisphere than today. Since the top of permafrost would melt during the summer and refreeze in the fall and winter, numerous wetlands developed south of the ice sheets in the Northern Hemisphere and un-glaciated parts of the Siberia, Alaska, and the northwest Yukon Territory.

Winters colder than today
Massive floods draining ice caps and ice sheets
More sea ice and cooler sea surface temperatures
Less ocean evaporation
Stronger north-south temperature difference

Stronger winds
Blowing sand and dust
Fires
More permafrost than today
Drought

Table 3. The different climate at the end of the Ice Age that would contribute to mass extinctions

The animals especially those close to the ice sheets in the higher latitudes were *not* conditioned to cold winters as uniformitarian scientists imagine. When the bitingly cold winters arrived, they were greatly stressed. The summer bogs would mire them, drought would weaken them by loss of grazing, blowing dust would suffocate them and bury some, and the cold would freeze them. All these conditions worked together in various combinations and various continents to cause the mass extinctions at the end of the Ice Age (Table 3). The smaller animals survived better because they did not need as much food and because they multiply faster than large animals.

No Other Post-Flood Catastrophes

Some creation scientists have suggested enormous post-Flood catastrophes, other than the Ice Age. The evidence for these catastrophes is rarely specified in detail. The magnitude of these possible post-Flood catastrophes can be determined mainly by events deduced from Cenozoic "history," since advocates of this position hold that the Flood/post-Flood boundary is at or a little above the K/Pg boundary, with reference to the geological column for the sake of discussion. But I have discovered many reasons why there were no significant post-Flood catastrophes other than the kind mentioned above.

Ice Age Began Immediately after the Flood

From my study of the Ice Age and volcanic and meteorite cooling mechanisms caused by the Flood, the Ice Age would have begun in favorable areas *immediately* after the Flood. The enormous Chicxulub meteorite impact late in the Flood would have caused a global temperature cooling believed to have been greater than an older estimate of 26°C for 3–15 years with residual effects to 30 years (Artemieva et al., 2017; Brugger et al., 2017). Great volcanism would have continued hundreds of years after the Flood to reinforce continental summer cooling through the resulting increase in atmospheric volcanic ash and reflection of solar energy.

Favorable areas for initial glaciation would be far from the onshore flow of warm ocean air. Central Canada and possibly the north central United States would qualify as favorable areas (Figures 7 and 8). Southeast Europe and the high mountains of the Earth would also be favorable to rapid accumulations of snow and ice. Figure 9 shows the postulated ice cover after 200 years.

Ice Sheets and Ice Caps Not Disrupted by Postulated Post-Flood Catastrophes

Since the Ice Age began so soon and would have greatly expanded from these favourable areas, huge post-Flood catastrophes, as deduced from the Cenozoic, would have greatly disrupted Ice Age features. However, there is no evidence for this happening. For instance, if the Yellowstone super eruptions went off while an ice cap up to 1,000 m thick in the valleys was developing (Licciardi and Pierce, 2018), enormous debris flows from melting ice would have swept down the adjacent valleys, and they did not.

Thirty-Five Criteria Point to a Late Cenozoic Flood/Post-Flood Boundary

Based on many fields of earth science studied over the past 40 years, I have concluded that the Flood/post-Flood boundary is in the late Cenozoic, defined as the Miocene, Pliocene and Quaternary depending upon location (Oard, 2022). I have developed 33 criteria to determine the location of the boundary (Oard, 2014b, 2016, 2017a, 2017b, 2018, 2019), presented in Table 4. Any one criterion may be equivocal, which is why multiple criteria are required to determine the boundary at a particular location. Clarey (2017, 2020) reinforced several of these criteria and added two additional lines of evidence not mentioned by Oard: (1) the early Cenozoic Whopper Sand is thick and widespread in the Gulf of Mexico, pointing to large, powerful currents well out into the Gulf, and (2) traditional landing site for the Ark in Turkey is surrounded by uninterrupted Cenozoic marine strata (Clarey and Werner, 2019). Both are readily explained by the Flood but inexplicable by post-Flood catastrophes.

Summary of Cenozoic Evidence for High Flood Boundary

Sedimentary Rock Evidence	Strength	Reference
1. Significant volume of sedimentary rocks	strong	
2. Thin, widespread strata	moderate	
3. Consolidated sedimentary rocks	moderate	
4. Deposition of widespread, thick 'evaporites'	strong	Oard, 2016
5. Phosphorites	weak	
6. Formation of carbonates	moderate	
7. Significant continental margin rocks	strong	
Organic Evidence		
8. Mineralized fossils	moderate	
9. Thick, pure coal seams	strong	
10. Amber	strong	
11. Oil and gas formation	moderate	Oard, 2017a
12. Large, pure layers of microorganisms	moderate	
13. Jump in number of mammal fossils	strong	
14. Fossil order and large extinctions	moderate	
Tectonic Evidence		
15. Significant vertical tectonics	strong	
16. Significant horizontal tectonics	modrerate	Oard, 2017b
17. Ophiolites	moderate	
18. Metamorphic core complexes	weak	
19. Ultrahigh-presssure minerals	moderate	
Geomorphological Evidence		
20. Significant erosion of continents	strong	
21. Erosional escarpments formed	moderate	
22. Tall erosional remnants, like Devil's Tower	strong	
23. Widespread planation surfaces	strong	Oard, 2018
24. Long-distance transport of hard rocks	strong	
25. Deep valleys	strong	
26. Pediments	moderate	
27. Wind and water gaps	strong	
28. Submarine canyons	moderate	
Climate Evidence		
29. Mid and high-latitude warm-climate fossils	strong	Oard, 2019
30. Volcanic winter	strong	
31. Meteorite or comet impacts	weak	
Other Evidence		
32. Accelerated radiometric decay	strong	Oard, 2019
33. Middle East geology	strong	

Table 4. Evidence for a late Cenozoic boundary and references. Relative strength refers to the difficulty for a K/Pg boundary explanation with published references in the right column.

Example of Thick Cenozoic Sedimentary Rocks

It has been claimed that the Cenozoic era is post-Flood because it has less sedimentary rocks than the periods of the Mesozoic and Paleozoic eras (Wise et al., 1996). However, the volume of Cenozoic strata is huge. Thick Cenozoic sediments collected along the continental margin is a typical feature of Flood runoff. Many basins around the world contain thousands of metres of Cenozoic sedimentary rocks. The Los Angeles, California, USA, basin subsided in the *late* Cenozoic collecting about 6,000 m of sediment, now sedimentary rock (Ingersoll and Rumelhart, 1999). The Santa Clara Valley, northwest of Los Angeles also contains about 6,000 m of late Cenozoic strata that has been uplifted along the edges, deformed, and the top eroded off (Sharp. 1975). The South Caspian Basin, northeast of Iran, is about 450 km in diameter and has a total thickness of 26,000 to 28,000 m of sedimentary rocks (Knapp et al., 2004). Most of the sedimentary rocks in this basin are considered Cenozoic, with only the bottom layers possibly being Cretaceous (Artyushkov, 2007). The top 10,000 m alone are regarded as Pliocene and Quaternary, the very late Cenozoic (Richardson et all., 2011). This Cenozoic strata would have to be eroded from the surrounding mountains and transported in some cases hundreds of kilometres over low slopes. Thick Cenozoic sedimentary rocks is powerful evidence for Flood activity and not post-Flood catastrophism.

Example of Cenozoic Coal

It is estimated that between 12.3% and 28.7% of coal resources are Cenozoic in age (Holt, 1996). Many early Tertiary coal deposits are very thick and extensive, such as those in the Powder River Basin of northeast Wyoming and southeast Montana (Figure 10). Some of these coal seams are nearly pure and extend about 100 km north-south, 25 km east-west, and range up to 75 m thick (Seeland, 1993). Late Cenozoic coal beds are found in several areas of the world, including a Late Miocene coal with polystrate trees in Hungary (Hámor-Vidó et al., 2010), and the Miocene Latrobe coal in southeast

Australia that is 100 m thick and covers about 565 km^2 (Holdgate et al., 2007). To form coal, thousands of metres of sediment must be deposited on top, and if the coal is located at the surface, the overburden subsequently eroded away. One cannot even begin to imagine a post-Flood scenario sufficient to account for Cenozoic coal.

Example of Huge Differential Vertical Tectonics

The Cenozoic Era is characterized by huge differential vertical tectonics in which mountains rose and valleys sank (Psalm 104:8). Many of the mountain ranges within the greater Rocky Mountains in the western U.S., which include about 100 individual small ranges, have uplifted *around ten thousand metres* relative to the same rocks in adjacent valleys or basins. In the state of Wyoming, granite and gneiss of the upper crust rose up to about 14,000 m with respect to the granite in the Hanna Basin to the southeast (Love, 1960). Differential vertical tectonics is a global phenomena, mainly in the late Cenozoic (Ollier and Pain, 2000).

Geomorphological Evidence

During the Recessive Stage of the Flood (Walker, 1994), great erosion took place as the Floodwaters swept off the continents. Oard et al (2023) have estimated erosion averaged 1,900 m on the continents based on the amount of sediment in the oceans from the GlobSed project. During this erosion multiple geomorphological features were carved on the surface of the continents and along the continental margin. These include planation surfaces over large areas. Planation surfaces are not forming today except when a river overflows its banks. Water gaps were cut through mountains and wind gaps form passes across the top of mountains. These are not forming today. The immense erosion and geomorphological features would be exceedingly difficult to explain by post-Flood catastrophism.

Difficulties

Some observations of the rocks and fossils challenge this placement of the upper diluvial boundary. These challenges need to be worked out. One difficult area is the mammal fossils in the Ogallala Formation in the U.S. High Plains. Some features indicate a post-Flood environment, but the most significant evidence points to a Flood mechanism (Oard, 2023b).

“Hypercanes” do not work

Some creation scientists have suggested hypercanes as causing post-Flood catastrophes (Whitmore, 2013). They believe hypercanes would produce so much precipitation that huge mass wasting occurred to deposit over 1,000 m of sediments in places. However, hypercanes are hypothetical super hurricanes that would generate over water temperatures around 40°C or greater. Just like hurricanes, hypercanes take time to develop, so the initial storm must intensify slowly over a hot water source hundreds of kilometers wide, possibly by hot ocean-bottom rocks. So, both the atmosphere and water must almost be at *rest* to generate hypercanes. Moreover, hypercanes can only produce a limited amount of rain caused by limited moisture input into the storm, and once they move over land, they would quickly weaken. Hypercanes are unlikely after the Flood, and if they occurred would not be significant enough to produce huge post-Flood catastrophes.

Concluding thought

Numerous comparatively small-scale catastrophes occurred during the Ice Age, such as the Lake Missoula flood. However, other post-Flood catastrophes as deduced from Cenozoic “history” are unlikely. Despite difficulties understanding where certain events or features of the rocks fit into Biblical earth history, 35 pieces of earth science evidence indicate that the events of the Cenozoic did not occur after the Flood; there were no huge post-Flood catastrophes. This information helps us better sort rocks and events into the Flood or during a post-Flood period. It would create a more solid foundation to do research and build a better Flood model. It clears the way to develop viable explanations of geological features within Biblical earth history.

Figures captions

Figure 1. Shorelines from glacial Lake Missoula on Mount Sentinel, just east of the city of Missoula, Montana, USA

Figure 2. Upper Grand Coulee

Figure 3. Dry Falls, central Washington, carved while the Lake Missoula flood was eroding the Grand Coulee (courtesy of Rick Thompson).

Figure 4. A satellite picture of eastern Washington showing the erosional path of the Lake Missoula flood (Landsat image courtesy of NASA). The flood eroded the light-colored silt and exposed the black basalt, which shows up like a braided stream bed, but it is about 160 km (100 mi) wide.

Figure 5. The postulated average winter, summer, and annual temperature with time for the Northern Hemisphere mid- and high-latitude continents from the end of the Flood through the Ice Age to today (drawn by Mrs. Melanie Richard).

Figure 6. The postulated annual mid- and high-latitude Northern Hemisphere precipitation with time from the end of the Flood through the Ice Age to today (drawn by Mrs. Melanie Richard).

Figure 7. Postulated snow and ice after 50 years in the Northern Hemisphere (drawn by Mrs. Melanie Richard).

Figure 8. Postulated snow and ice after 100 years in the Northern Hemisphere (drawn by Mrs. Melanie Richard).

Figure 9. Postulated snow and ice after 200 years in the Northern Hemisphere (drawn by Mrs. Melanie Richard).

Figure 10. Wyodak coal seam, Powder River Basin near Gillette, Wyoming, USA.

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