Flood processes into the late Cenozoic: part 6—climatic and other evidence

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This paper summarizes five more Cenozoic factors best explained by the Flood. These are: warm-climate plants and animals at mid and high latitudes, tremendous volcanism, many meteorite or comet impacts, accelerated radiometric decay, and the geology of the Middle East.

In previous parts I have explained how many geological phenomena from the Cenozoic were much better explained in terms of Flood processes rather than post-Flood catastrophism.[1–5] These include numerous aspects from a wide range of geological considerations: seven sedimentary rock features, eight organic factors, five tectonic factors, and eight geomorphological factors. This paper explores three climatic factors: warm-climate fossils found at mid and high latitudes, the climate effects of volcanic eruptions, and the climatic effects of meteorite impacts. Then I will briefly expound on two miscellaneous considerations that favour explanation by Flood processes: the problem of Cenozoic accelerated radiometric decay and the Cenozoic geology of the Middle East. That makes a total of 33 general features of the Cenozoic best explained by Noah's Flood, indicating a Flood/post-Flood boundary in the late Cenozoic (i.e. the Miocene, Pliocene, and Pleistocene series), most often the very late Cenozoic.

Cenozoic warm climate fossils at mid and high latitudes

There are abundant plant and animal fossils in the Cenozoic that indicate a warm climate at the mid and high latitudes of both hemispheres.[6–8] This presents a radical contrast with the climate in those regions today. The early Cenozoic is supposed to have been very warm, even subtropical, at high latitudes. The late Cenozoic is claimed to be a period of gradual cooling (figure 1), although the temperatures are still significantly warmer than today.[9–14] Sometimes, a mix of paleoflora from different climates or environments is found.

Worldwide trend

Many sites in central Siberia have plant and pollen fossils that indicate a past mild climate.[15,16] In lower Cenozoic strata, palms and mangroves are among the tropical fossils found in southern England.[17] Palms and swamp cypress are found on the island of Spitsbergen in the Svalbard archipelago, north of Norway at 80°N.[18] Petrified palm fruits have been discovered in north-western Greenland.[19] Tropical and subtropical plant and animal fossils, such as palms and crocodiles, are found in the Green River Formation (early Cenozoic) in the central Rocky Mountain basins.[20] This formation is far from the ocean and straddles the continental divide near 2,400 m altitude in south-west Wyoming. Early Cenozoic crocodiles, large tortoises that cannot hibernate, tree ferns, and palm fossils are found not only in Wyoming, but also farther north in Montana.[21–23]

Fossil plants from warm Cenozoic climates are abundant in Alaska. Paleobotanist Jack Wolfe has documented palms, swamp cypress, mangroves, climbing vines, and other plants that would be found today in a warm, if not tropical, climate.[24] Swamp cypress is common today in swamps of the south-east US (figure 2). Wolfe has found similar vegetation in British Columbia and Siberia.

The north-west United States is well known for numerous Cenozoic paleoflora sites. Palm leaves and cycads from a warm climate are sometimes found, for example in the early Cenozoic Chuckanut Formation south of Bellingham, Washington (figure 3). Some of the 130 species of plants found in thin shale at Clarkia, Idaho, come from a warm-temperate to subtropical climate, such as the avocado, magnolia, and sycamore.[25] Warm climate fossils are common in the John Day area of north-central Oregon.

One of the most difficult plant fossil sites for uniformitarian scientists to explain is that of unfossilized, mummified 'forests' and leaf litters in the Geodetic Hills on Axel Heiberg Island. This discovery is located at 80°N latitude in the Queen Elizabeth Islands of Canada and dated early Cenozoic.[26] Contrary to the present climate, the trees, leaves, cones, and fruits found in the deposits of the Geodetic Hills indicate a much warmer, wetter climate. Tree rings in the stumps are unusually thick, typically 3–10 mm,

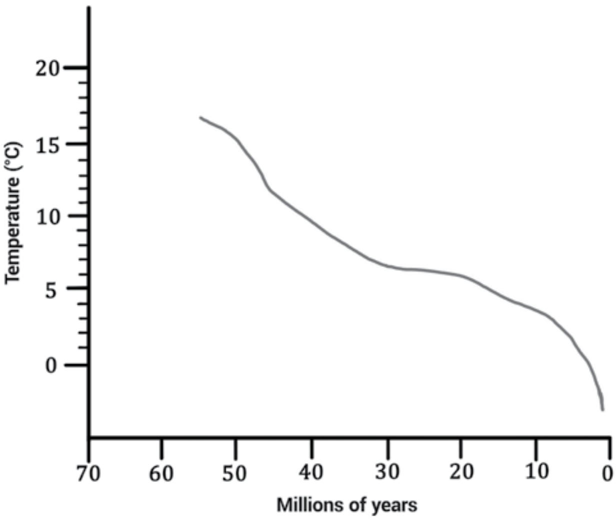

Figure 1. Inferred Tertiary cooling curve for the bottom of the ocean off Antarctica based on oxygen isotopes of benthic foraminifera from Deep Sea Drilling Project sites 277, 279, and 281 (drawn by Melanie Richard and Emily Moes)

Figure 2. Swamp cypress forest from a lake in central Mississippi, US (USDA, Wikimedia Commons PD USDA NRCS)

Figure 3. Palm fossil from the early Cenozoic Chuckunut Formation south of Bellingham, Washington, US

Table 1. Summary of Cenozoic climatic and miscellaneous evidences best explained by Flood processes. The assessed strength is based on the difficulty of explaining these features according to post-Flood processes.

Climatic and miscellaneous evidences	Strength
1. Warm climate fossils at mid and high latitudes	Strong
2. Volcanic winter	Strong
3. Impact winter	Strong
4. Radioactive decay	Strong
5. Ultrahigh-pressure minerals	Strong

and show little or no indication of growth stress.[27] Early Cenozoic vertebrate fossils have been found near the plant sites on west-central Ellesmere Island, also indicating a warm climate. Flying lemurs uncovered here are of particular note because they need a constant supply of seeds and fruits in the trees, indicating temperatures above freezing *year round*. The animals, like the trees, suggest a warm, possibly even subtropical climate with little seasonal contrast.[28–30]

Scientists have been able to quantify aspects of the early Cenozoic climate on Axel Heiberg Island. During the Eocene, the region had an estimated mean temperature of 13–15°C, a coldest month mean of about 4°C, and a mean annual precipitation greater than 1,200 mm![31] This estimate is based on fossils of alligators, tortoises, flying lemurs, and other mammals and their climatic tolerances. Today, things are very different. Axel Heiberg and Ellesmere Islands are mostly frozen all year. The only trees are a few dwarf willows that grow about an inch high in the short summer. The current annual average temperature for the area is about –20°C with an annual average precipitation of only 6.5 cm.[32] The average temperature for the coldest month of the year is –38°C,[33] and the lowest temperatures are around –55°C. Thus, Eocene temperatures must have been 35–40°C warmer than today![31,34] Considering winter minimums, the temperatures were probably as much as 55°C warmer than today, and precipitation was more than 18 times the current rate. That is a radically different climate compared to today.

All these fossils are greatly out of place for the climate and conditions there now. These Cenozoic fossils would also be out of place assuming the Ice Age was delayed for several hundred years in the post-Flood catastrophism model. This is because of powerful Cenozoic volcanism and meteorite impacts causing volcanic and impact winter (see below). Besides, winter temperatures at high latitudes and altitudes, as well as in continental interiors at mid latitudes, are mainly determined by the *angle of the sun*, which would have been the same for the first few hundred years after the Flood as today. Of course, the temperatures would not be as cold as today with a warm ocean after the Flood,[35,36] but the temperatures certainly would not be warm temperate to tropical in these locations.

Mix of fossil plants from widely divergent climates

One of the challenges of the Axel Heiberg Island paleoflora is the wide variety of plants and pollen from many climate zones, such as hickory, maple, elm, ash, alder, birch, beech, oak, pine, fir, cedar, hemlock, and katsura.[37–39] Most of these indicate a warm, wet climate. The climate range varies from cool temperate to subtropical.[39] Swamp cypress today grows in the swamps of the Alabama wetlands[40] and the Florida Everglades.[41] The spruce, larch, birch, and white pine usually represent a cooler climate.[42]

Two hundred or more species of plants that range from tropical jungles to cool temperate regions are associated with the Yellowstone fossil 'forests' of the early Cenozoic.[43] The same climatic mix is also found at Ginkgo Petrified Forest State Park in Washington State,[44] but this is dated as late Cenozoic, the time the temperature was supposedly cooling toward the future 'ice ages'. In north-eastern Washington State 450 species of fossil plants from diverse climates have been found at Republic and nearby Princeton, British Columbia, of the Okanogan Highlands.[45–47] The cooler climate plants usually 'fit' the location, but the warm climate plants do not.

Computer simulations indicate cold winters

Uniformitarian scientists have attempted to apply computer climate simulations to the data in order to understand the inferred warm climates at mid and high latitudes.[48] However, even when temperature boosting mechanisms are used, such as lower altitudes (temperatures are generally warmer at lower altitudes), much warmer ocean temperatures, and much higher amounts of atmospheric carbon dioxide, the computer simulations all fail to produce such warm winters at high latitudes and mid-latitudinal continental interiors. Climate modellers continue to tweak their models to try to simulate an equable (i.e. little seasonal temperature change) warm climate at high latitudes. Under pressure from the geologists, their attempts to solve this 'problem' by manipulating the climate simulations have resulted in modest success, but they use extreme values for some of the variables in the models, such as Eocene Arctic Ocean temperatures 6–12°C warmer than today held constant. Basic meteorology shows that these warm ocean temperatures would cool at high latitudes. Jahren and Sternberg sum up the results of climate simulations:

> "Despite this myriad of paleoclimate determinations [by computer simulations], a congruent climate hypothesis remains elusive for the Eocene. Sloan and Morill (1998) described 'persistent discrepancies' between climate model results and interpretations from proxy data in the Eocene."[49]

Why do the simulations fail? The answer can be found in elementary meteorology. Winter temperatures at mid and high latitudes are primarily caused by *little or no sunshine* or a low angle of the sun, and there is nothing that can be done about it.

The warm climate fossils best explained by the Flood

The warm climate fossils at mid and high latitude are best explained by burial in the Flood. The plants and animals either lived at that latitude in a warm pre-Flood climate, were transported from lower latitudes on fast currents during the Flood, or both. Regardless, the fossils do not fit a post-Flood climate at all.

Cenozoic volcanic winter

Volcanism dramatically affects climate.[50] Aerosols, small particles around 1 μm or less in diameter, and sometimes ash, reflect some of the sunlight back to space (figure 4). Such loss of solar radiation would cause a cooling effect, especially over large land areas. We know that large historical volcanic eruptions cause a modest global cooling for several years (see below). However, the tremendous volcanism during the Cenozoic would have been much worse (see below), leading to an extended 'volcanic winter'.[51] This Cenozoic

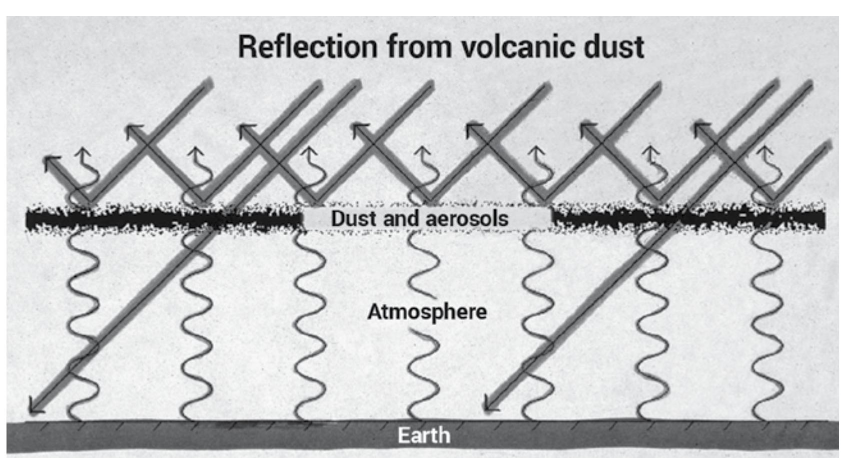

Figure 4. Schematic of the cooling effect of volcanic dust and aerosols by the reflection of some of the sunlight back to space

volcanism is best placed during the Flood. If it was after the Flood during the first few hundred years, it would likely have killed all surface life on Earth. During the Flood, such volcanism would have little atmospheric effect because the globe was covered or mostly covered by warm water, which cools very slowly. Moreover, such extensive Cenozoic volcanism, and the cooling it would have caused, makes it hard to believe that all the warm climate vegetation at mid and high latitudes, especially in continental interiors, could have occurred after the Flood.

Small volcanic eruptions do not produce a significant climatic effect, unless they are sulfur rich. It is mainly the large eruptions that inject abundant aerosols into the stratosphere that cause climatic cooling.[52,53] The main aerosol is sulfur dioxide, which reacts with water to form sulfuric acid. The eruption of Krakatoa in 1883 is estimated to have deposited 30–100 million tons of aerosols into the global stratosphere. The net loss of solar radiation was claimed to be 4%.[54] Large eruptions will reduce solar radiation 5–7% for about a year in polar latitudes.[55] For instance, the dust and aerosols from the eruption of Mount Agung on Bali in 1963 caused an observed surface cooling of about 0.4°C in the tropics for several years.[56] Generally, these large modern eruptions cool a region or a hemisphere, or possibly the whole earth, by about 1°C. The large eruption of Tambora in 1815 in Indonesia is believed by many scientists to be responsible for the 'year without a summer' in New England and adjacent Canada in 1816.[57] The eruption at Laki, Iceland, in 1783, was a basalt fissure eruption, but it produced a 'dry fog' for several months in north-west Europe. The eruption of Laki apparently did not penetrate the stratosphere.[58] However, the abundant sulfuric acid haze has been estimated to have significantly cooled the Northern Hemisphere that winter, producing below normal temperatures for the next two years.[59] The Toba eruption on Sumatra, dated about 74,000 years ago in the uniformitarian timescale, produced over 50 times the stratospheric aerosols as Tambora. The temperature of the Northern Hemisphere is estimated to have cooled 3–5°C for several months![60]

Studies of 'nuclear winter' have estimated that dust and soot blown up into the stratosphere from a nuclear exchange can cause a severe cooling by reflecting some of the sunlight back to space, dropping temperatures below freezing in a matter of days.[61] Some think that the consequence would be more like a 'nuclear fall', not as severe but still significant.[62] Moreover, one of the mechanisms for supposedly killing off the dinosaurs at 65 million years ago within the uniformitarian timescale is by 'meteorite winter', caused by a 10 km diameter asteroid hitting the Yucatán Peninsula (see next section). These ideas have spurred the notions that large volcanic eruptions, like the one on Toba, would cause 'volcanic winter' resulting in massive freezing across the earth.

The historical volcanic eruptions and Toba are nothing compared to what is inferred from the Cenozoic geologic record:

> "Even the greatest of these historic eruptions, however, was small compared with the very large explosive and effusive eruptions that are well known from the geologic record."[63]

Cenozoic volcanism was enormous in many parts of the world (figure 5). If this all occurred within several hundred years following the Flood, the dust and aerosol loading of the atmosphere would have been almost continuous. It would have likely killed off all surface life.[50] In just the western United States, several of the massive volcanic eruptions include the Columbia River Basalts of the north-west states, the San Juan volcanics of Colorado, the Challis volcanics of Idaho, the Absaroka volcanics of Montana and Wyoming, the Snake River eruptions in southern Idaho, and the Yellowstone super-eruptions. It is estimated that just one of the large flows of the Columbia River Basalts, consisting of a few hundred flows, would have produced large quantities of sulfuric acid aerosols that could reflect most sunlight back to space.[64] Since water has a high heat capacity and several mechanisms would have heated the ocean during the Flood, such drastic volcanic winter would not significantly cool the ocean water when the earth was mostly covered by the Flood water.

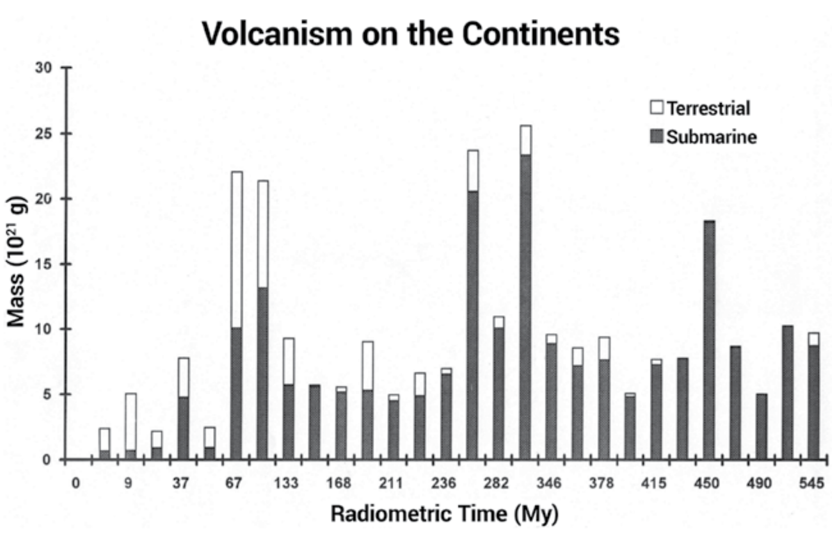

Figure 5. Distribution of Phanerozoic continental volcanics, broken up into submarine volcanics, which would not have an immediate climate effect, and presumed subaerial eruptions (from Holt,[50] p. 149). This graph does not take into account erosion, which would at least double these estimates.

Impact winter

Besides enormous volcanism during the Cenozoic, there would also have been many meteorite and/or comet impacts during this same period. Impacts would also be tremendously devastating to the post-Flood earth. As of 2011, 182 impacts had been reported by scientists,[65] with several more impact sites added each year. Phanerozoic rocks contain 155 known or claimed impacts, and Precambrian rocks contain 27. Sixty of these impacts are in the Cenozoic. Table 2 lists the location, diameter, and supposed age of all Cenozoic craters larger than 1 km, including the Chicxulub impact crater. There are 38 total craters with some quite large, such as Kara-Kul, Tajikistan, at 52 km; Chesapeake Bay, Virginia, US, at 40 km; Popigai, Russia, at 90 km; Mistasin, Canada, at 28 km; Haughton, Canada, at 23 km; Logancha, Russia, at 20 km; Kamensk, Russia, at 25 km; and Montagnais, Nova Scotia, Canada, at 45 km. I am puzzled at the small diameter cited for the Chesapeake Bay impact, which Wayne Spencer and I studied.[66] The buried crater is supposed to be about 85 km in diameter, more than twice the diameter given in Table 2.

These impacts would blast a lot of particles up into the upper atmosphere and beyond, which would reflect some of the sunlight back to space, making it unavailable to warm the earth. Although the particles from an impact would settle out quicker than volcanic aerosols, the effect of the particles would likely last around six months and result in a 'meteorite impact winter'.[67] It is unknown how many very small particles, the size of volcanic aerosols, would result from an impact, and thus the climatic effect it would have. The smaller the particles, the longer-lasting in the upper atmosphere they would be, with their resultant climatic effect. Regardless, the climatic effect would be somewhat similar to volcanic winter.

Although there are questions on the details of the Chicxulub impact,[68] it still had a remarkably circular gravity anomaly with a peak ring and an annular low, up to several hundred metres of suevite, shocked quartz, coesite, a little pseudotachylyte, a small amount of melt, and a few shattercones.[69,70] Of course, the Chicxulub crater is not ideal because other Flood processes would have modified the crater. It was discovered that the Chicxulub impact would disintegrate more 'evaporites' with high sulfate that would cause more SO_2 to enter the stratosphere than expected.[71] The global temperature drop is believed to have been greater than another recent calculation of a 26°C temperature drop for three to 15 years with residual effects to 30 years,[72] which means that it would continue well after the Flood. This is much greater than large volcanic eruptions like Tambora and even Toba. Much more dramatic cooling would have occurred because impact aerosols reach up into the mid and upper stratosphere, while volcanic aerosols usually reach only the lower stratosphere.[73]

Table 2. Location, diameter, and supposed age of 38 Cenozoic impacts—and the Chicxulub impact at the supposed K/T boundary[65]

Location	Diameter (km)	'Age' (millions of years)
Tenoumer, Mauritania	1.9	0.02
Barringer, Arizona, US	1.18	0.05
Lonar, India	1.83	0.05
Xiuyan, China	1.8	>0.05
Rio Cuarto, Argentina	4.5	~0.1
Tswaing, South Africa	1.13	0.22
Zhamanshin, Kazakhstan	14	0.9
Bosumtwi, Ghana	10.5	1.07
New Quebec, Canada	3.44	1.4
Talemzane, Algeria	1.75	~3.0
Elgygytgyn, Russia	18	3.5
Roter Kam, Namibia	2.5	3.7
Kara-Kul, Tajikistan	52	~5.0
Karla, Russia	10	5.0
Bigach, Kazakhstan	8	5.0
Colônia, Brazil	3.6	5 to 36
Steinheim, Germany	3.8	15
Ries, Germany	24	15.1
Chesapeake Bay, Virginia, US	40	35.5
Popigai, Russia	90	35.7
Flaxman, Australia	10	>35
Crawford, Australia	8.5	>35
Mistasin, Canada	28	36.4
Wanapitei, Canada	7.5	37.2
Haughton, Canada	23	39
Logancha, Russia	20	40
Beyenchime-Salaatin, Russia	8	40
Logoisk, Belarus	15	42.3
Shunak, Kazakhstan	2.8	45
Ragozinka, Russia	9	46
Chiyli, Kazakhstan	5.5	46
Kamensk, Russia	25	49

Location	Diameter (km)	'Age' (millions of years)
Gusev, Russia	3	49
Goat Paddock, Western Australia	5.1	~50
Montagnais, Nova Scotia, Canada	45	50.5
Jebel Waqf as Suwwan, Jordan	5.5	56 to 37
Marquez, Texas, US	12.7	58
Connolly Basin, Western Australia	9	~60
Chicxulub, Mexico	150	64.98

Cenozoic impacts would be much better placed during the Flood and not afterwards.

Miscellaneous factors

Radioactive decay

A great amount of radioactive decay occurred during the Cenozoic.[74] Creation scientists finished a major research endeavour in 2005 called RATE (Radioactivity and the Age of The Earth).[75] In this project, they did their own dating and made a major discovery. Besides the well-known 'precision' problems with radioactive dating (discordant dates, etc.), they discovered that radiometric dates yield 'ages' of millions and billions of years because there has been accelerated radiometric decay in Earth history at the creation and during the Flood. Accelerated radiometric decay is a solid result, based on helium diffusion out of zircon crystals.[76] Zircon crystals in a drill core down into granite showed that the diffusion of helium had taken place for only 6,000 years while the amount of decay from radioactive uranium was 1.5 billion years. The only plausible way to resolve this dilemma is if there was a period of accelerated radiometric decay in the 6,000 years of biblical Earth history. Other evidence reported that supports accelerated radiometric decay were radiohalos[77] and fission tracks.[78]

Radioactive decay gives out a lot of heat and radiation, and at least a half billion years' worth of radiometric decay at present rates during the one year of the Flood would produce enough heat to melt the entire earth's crust many times over.[79] Since the Cenozoic is 12% of the time since the beginning of the Cambrian, there still would be enough heat to melt the crust or much of the crust. Cenozoic accelerated radioactive decay is best explained during the Flood and not afterwards.

Moreover, radioactive decay gives off radiation—a huge amount and enough to easily kill all life. No one can say that radioactive decay stopped at the beginning of the Cenozoic, because we have fission track evidence from the Peach Springs tuff, dated as mid Cenozoic by uniformitarian geologists, that shows radioactive decay did occur in the Cenozoic.[78] In other words, people and animals spreading from the 'mountains of Ararat' during the Cenozoic would still be 'zapped' with so much radiation from radioactive minerals in the rocks, as well as potassium-40 in their bodies, that they would soon die, unless God of course continued to miraculously protect life on Earth after the Flood. It is more plausible to place practically all the Cenozoic within the Flood, and that all accelerated radiometric decay occurred during the Flood. Such radiometric decay still raises questions on how the occupants of the Ark survived.

The Cenozoic geology of the Middle East

The Bible is clear that the Ark landed on the 'mountains of Ararat' on the 150th day of the Flood. Although traditionally the resting place of the Ark has been considered Mount Ararat in north-east Turkey, some creationists believe the Ark landed on some other mountain range in the Middle East.[80,81] The inhabitants of the Ark stayed on board the vessel until the end of the Flood, which means that the mountains should still exist. So, if we can geologically date the formation of the mountains of Ararat, then the 150th day of the Flood is geologically dated and the Flood/post-Flood boundary must be younger than the mountains of Ararat.[82] Regardless of the exact location of the mountains of Ararat, ancient tradition associates Ararat with Armenia or the ancient kingdom of Urartu, which is in eastern Turkey and the area eastward.

The late Roy Holt summarized the geology of eastern Turkey and vicinity, assuming the geological column. Although the geology is complex, in general the geology is dominated by marine sedimentary rocks of various ages and volcanic rocks that include the Cenozoic, volcanic mountains not formed until the Cenozoic, and all significant mountain-building occurred during the very active Cenozoic. In other words, practically all the mountain uplift and volcanism in this region, including the Zagros Mountains of western Iran and the Caucasus Mountains north of Mount Ararat, occurred during the middle and late Cenozoic. Holt summarizes:

> "Even so, the Caucasus Mountains, like other mountains in the area, appear to have reached their highest elevation in the Pliocene [late Cenozoic]. … The geological age of the mountains in and around Urartu indicate that the 150th day of the Flood should be placed somewhere between the Palaeocene and Early Pleistocene, depending on the identification of the true Mountains of Ararat. Since the year of the Flood lasted another seven months with significant geological activity (at least massive erosion due to receding Flood waters), the Flood/post-Flood boundary must be well after the Palaeocene [very early Cenozoic]."[83]

It seems evident that the Flood/post-Flood boundary is in the very late Cenozoic in the area of the mountains of

Ararat. It would also imply that even much of the Cenozoic was deposited before Day 150.

Conclusion

This concludes our six-part survey of 33 factors from various fields of earth science that support explaining most of the Cenozoic within the context of the Flood. A final part will provide reasonable answers to many of Whitmore's objections for a late Cenozoic Flood/post-Flood boundary.[84] There are several climatic conundrums that are solved by placing the post-Flood boundary higher, at the very late Cenozoic. Warm-climate, even subtropical, fossils found at high latitudes do not fit with the expected cold climates, even with warmer oceans immediately after the Flood. The sheer volume of aerosols inferred from terrestrial volcanic deposits and impact craters in the Cenozoic, as well as the K/Pg Chicxulub impact, would have also likely cooled the earth down sufficiently to kill all life. Accelerated nuclear decay is inferred to have continued into the Cenozoic, making it unrealistic to place those rocks after the Flood. Finally, the geology of the Middle East includes Cenozoic uplift and volcanism, which must have occurred before Noah's Ark came to rest. Thus, the Flood/post-Flood boundary is in the late Cenozoic, often in the very late Cenozoic.

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