

A UNIFYING MODEL FOR CATASTROPHES ON EARTH AND IN THE SOLAR SYSTEM

Abstract

A "heating model" is proposed to explain cosmic catastrophes. Particular attention is given to catastrophes in the solar system. Solar system debris, such as asteroids, meteors, comets, and planetary rings, are shown to be fragments from the destruction of celestial bodies due to internal heating, rather than material remaining from a hypothetical primordial nebula, as assumed by the nebular hypothesis.

Possible origins of the internal heat build-up are discussed. Many evidences of past catastrophic events are unified in a scenario which sees them as direct, or indirect, results of the heat build-up.

Introduction

When one studies the creation, the ravages of catastrophe appear on every hand. The earth has experienced the Arizona meteor impact (Weaver, p. 415) and the Tunguska event (Weaver, 402). Planets and moons are pock-marked with craters; comets break up, sometimes resulting in meteor showers periodically visible on earth (e. g., the Leonid and Perseid showers; Whipple, p. 98).

Within the rings of planets, and in the asteroid belt, destructive collisions constantly occur between chunks of debris (Pollack and Cuzzi, p. 113; Hartmann, p. 208). Even in the cosmos at large, stars self-destruct in gigantic explosions and become visible as novas or supernovas (Gribbin, p. 78).

Origin of Catastrophes

When did such catastrophic events begin, and what was their cause? The claim of the evolutionary nebular hypothesis, that all remnants of catastrophe are related to debris remaining from the evolutionary formation of the solar system (Trefil, 72), can be rejected. In fact, all evil and destruction must have begun after the Creation Week. At the end of that week, God pronounced His creation "very good" (Gen. 1:31). The cosmos began not in chaos, but in perfection.

However, man chose to disobey God, and as a result, God "cursed the ground" (Gen. 3:17). It is clear that this curse affects the entire cosmos, since Paul states "that the whole creation groaneth" (Rom. 8:22). Paul also states the cause-and-effect relation between sin and death in Rom. 5:12. Just as every individual organism dies, so also the cosmos is slowly dying as it suffers one catastrophe after another.

Models for Catastrophe

Since all angels were created to function in the cosmos by "[ministering] for them who shall be heirs of salvation" (Heb. 1:14), it is possible that some catastrophes may have been related to angelic conflicts (see Jude 9; Dan. 10:12,13,20) after sin caused some of the angels to fight against God. However,

most catastrophes seem to be consistent with the expected physical operation of the cosmos, and only physical scenarios will be considered here.

An old idea put forth to explain craters and other apparent remnants of catastrophe is that God created them. But such remnants seem inconsistent with the original good creation of Gen. 1:31. God is not the author of evil, and the Fall and curse on the ground did have consequences, as the Bible states. To ignore the impact of the Fall, then, is to make God the author of evil.

Another commonly held idea is that craters and other signs of catastrophe were caused by meteoritic or asteroidal impacts. While there is no doubt that such impacts have occurred (Unfred, p. 82), this idea does not explain the existence of meteors, asteroids, and other debris involved in the impacts.

Furthermore, there is no direct evidence of impacts on earth massive enough to have caused catastrophes such as the Flood and extinctions. No meteoritic fragments have been found in any Flood-deposited materials (Heide, p. 119; Mason, p. 4; Twenhofel, p. 144), and the evidence claimed for massive impacts can be interpreted in other ways.

Evolutionists in recent years have cited the K-T iridium-rich deposits as proving there have been impacts powerful enough to cause extinctions of many organisms. But Ir-rich deposits could just as easily have been formed by massive vulcanism, possibly during the Flood, and diligent searches for sufficiently large impact craters have to date produced no results (Murray, p. 356).

While impacts have no doubt been an agent of catastrophe on the earth and elsewhere in the solar system, these alone are not sufficient to explain the marks of catastrophe we see.

This paper proposes a scenario for the fundamental physical causes of catastrophe on the earth and the solar system. Such an approach can be extended to the cosmos at large. The proposed scenario seeks to explain the following observations in the solar system:

- 1) the greater incidence of catastrophes in the past (Hartmann, p. 163; Miller and Hartmann, p. 165; Clube and Napier, p. 98; Weaver, p. 397);
- 2) the existence of the asteroid belt and other asteroidal regions (Hartmann, p. 180);
- 3) the apparent common origin of comets and asteroids (Miller and Hartmann, p. 8);
- 4) the composition of asteroids, meteors, and comets;
- 5) the orbits of comets and asteroids;
- 6) the uneven (asymmetrical) cratering of most cratered bodies;
- 7) the lack of cratering on surfaces of some moons with solid surfaces;
- 8) the apparent evidence of past flooding on Mars (Carroll, p. 22);
- 9) the evidence that both Venus and Mars were once less inhospitable (Venus was cooler and Mars was warmer) and

may have had stores of liquid water (Eberhart [1982], p. 295; Silberner, p. 356);

- 10) signs of ancient vulcanism on Venus and Mars (Baugher, p. 30);
- 11) the release of excess heat by planets such as Jupiter and Saturn;
- 12) the occurrence of rings around some planets but not others;
- 13) man's ancient fear of comets and meteors.

Formation of Asteroids, Meteors, and Comets

The two most common ideas about the formation of interplanetary debris are the nebular hypothesis and the explosion theory.

The nebular hypothesis claims that (1) a massive gas cloud (a "nebula") condensed to form the solar system; (2) gases condensing in the center formed the sun, while gases condensing on the fringes formed the moons and planets; and (3) asteroids, meteors, and comets are debris from planets that failed to form. Likewise, the rings of planets are debris from moons that failed to form.

But if the nebular hypothesis is true, why don't all the planets have rings (Waldrop, p. 112)? Why are most asteroids confined to a relatively narrow belt between Mars and Jupiter? In true evolutionary fashion, the nebular hypothesis assumes development from a simple-to-complex state, but without genuine supporting evidence.

The explosion theory claims that at least one planet exploded (Gamow, p. 18). Asteroids, meteors, and comets are fragments from the explosion. The explosion theory is Biblically compatible because it assumes degradation from a complex-to-simple state, in line with the Biblical teaching that the creation is not getting better but running down.

Relation of Asteroids, Meteors, and Comets

The evidence that asteroids, meteors, and comets all resulted from the explosion of possibly a single planet falls into four categories: (1) evidence based on composition; (2) evidence based on orbits; (3) evidence based on cratering; and (4) evidence based on anthropology.

(1) evidence based on composition

Most if not all planets seem to have a similar structure. Surrounding a dense core made of iron or other metals, is a region of less dense material near the surface and made of rocky materials, comparable to earth's mantle and crust. Liquids and gases are on the surface. These may be solidified if the planet is far enough from the sun.

Asteroids seem to be composed of dense materials like those found in the cores of planets (Gamow, p. 18), and meteors seem to have the same composition as asteroids (Hartmann, p. 180; Miller and Hartmann, p. 171). In other words, meteors are asteroids that have been knocked out of their orbits by collisions.

Comets are made largely of ices that liquify and vaporize when the comets orbit close to the sun (Eberhart [1986], p. 327). The ices in comets are the type of substances found on the surfaces of planets, especially those far away from the sun (Mars and beyond).

It is possible that certain carbonaceous substances may undergo combustion with each other during the heat of perihelion approach (Drobyshevski, p. 87), and that this may sometimes be a cause in the break-up of comets. "Burned out" comets seem to have cores similar to asteroids (Weaver, p. 402; Whipple, p. 245).

(2) evidence based on orbits

All the planets orbit the sun in nearly the same plane. If the nebular hypothesis were true, it might be expected that this would not be so, but the planet deviating most from the ecliptic is Pluto. Its deviation is only 17 degrees.

In contrast to the planets, asteroids and comets have erratic orbits (Hartmann, p. 190). But compared with comets, asteroids are for the most part in a relatively narrow belt between Mars and Jupiter. Their orbits are relatively predictable (though collisions do occur). This is what would be expected if asteroids came from the interior of a planet, and therefore were scattered less by the explosion of the planet.

There is no doubt that comets originate from within the solar system (Whipple, p. 74), but by any standard, comets have elongated and very erratic orbits (Snow, p. 217). This is what would be expected if they came from the surface of a planet, and therefore were scattered more by the explosion of the planet.

(3) evidence based on cratering

Nearly all planets and moons with solid surfaces are more heavily cratered on one side than the other. These include Mercury, the earth, earth's moon, and Mars (Metz, p. 132; Snow, p. 227; Anonymous [1974], p. 241; Baugher, p. 30). Such asymmetric cratering indicates that there was a unique, one-time explosion that spewed debris out through the solar system. A few moons show no obvious evidence of cratering. Perhaps they were shielded by other moons or planets from the swarm of debris.

A leading evolutionary argument against the explosion theory is that the combined mass of all the existing asteroids (4% of earth's mass) is too small to have been a planet (Snow, p. 215). But if most debris from the explosion left the solar system, or at least left the asteroid belt, then the asteroid belt as it now exists is only a partial remnant of the original planet.

(4) evidence based on anthropology

The Greek legend of the planet/goddess Electra says that Electra vanished from view for shame over Troy's defeat.

Electra was said to have been between Mars and Jupiter (Bullfinch, p. 173). The fall of Troy puts this event at about 1000 BC. This date is a significant amount of time after the Flood, which occurred very roughly in 3000 BC.

Other evidence also suggests that asteroid formation took place after the Flood. As noted previously, there have been no finds of meteoritic fragments in Flood-deposited or pre-Flood materials. However, fragments abound in post-Flood glacial deposits and ice caps (Weaver, pp. 410, 415; Weisburd [1986a], p. 133).

In the cases of terrestrial craters that have been dated directly by erosion rate and plant growth, the age limit seems to be about 5000 years, as in the case of the Arizona meteor crater (Baker, p. 260). In the Biblical account of the battle of the Israelites against Sisera (about 1500 BC), Judges 5:20 states that "the stars in their courses fought against Sisera." Since to the ancients all celestial objects except the sun and moon were "stars," these may have been "falling stars," i. e., meteoritic debris.

Such an event as a planetary explosion would have been lethal to life once the debris reached earth. Perhaps this is the basis for the ancient fear of meteors and comets. The ancient fear of comets was so great that merely to see one was supposed to be a bad omen. The obsession of ancient peoples for building massive observatory-temples (Corliss, p. 115) may have been motivated partly by the fear of unpredictable meteoritic/asteroidal impacts. Perhaps they felt if they could placate the gods, the impacts would not happen.

The Carnac astronomical alignments, for example, are 2-1/2 mi. long and contain 3000 multi-ton megaliths. What must have been the prowess of the culture that erected these! And how great must have been their compulsion for predicting astronomical events! Unless driven by some degree of fear, the compulsion seems quite irrational (Whipple, p. 1).

A Scenario for Solar System Catastrophes

What caused the planetary explosion resulting in asteroids, comets, and meteors? The proposal is made here that the heating of planetary interiors caused instability, which in at least one case caused the destruction of a planet. However, such internal heating in other planets and moons yielded less extreme consequences.

Some planets still radiate more energy than they receive from the sun. These include Jupiter, Saturn, and Neptune (Hubbard, pp. 263, 276, 290). Some bodies suffered surface catastrophes as heat build-up caused vulcanism and other instabilities not severe enough to cause total destruction by explosion (Table 1). Some bodies, however, did explode, such as the moons whose debris now comprises planetary rings.

Explosions of celestial bodies hurled fragments of rock through the solar system. Thus most remaining bodies were cratered, almost always asymmetrically. Some moons were nearly fractured by massive meteor impacts and still show cleavage

today, but other moons were shielded by other bodies and were slightly or never cratered (Table 2 and Table 3).

Finally, some fragments were captured by planets (e. g., the moons of Mars, Phobos and Deimos, Miller and Hartmann, p. 167; and some of Jupiter's outer moons, Hartmann, p. 147) and became moons (Table 4). No doubt Viking 2, during its Neptune flyby in August 1989, will discover additional moons that were part of this scenario.

Catastrophe Scenario on Earth

The existence of primary radiohaloes of Po-218 indicates the earth was not molten originally. Po-218 has a half-life of only 3 minutes. Had the earth been molten, the haloes would not have been preserved (Gentry, p. 125). An earth with an interior at non-destructive, mild temperatures seems consistent with the perfect earth made by God as the abode for life (Isa. 45:18).

Anyhow, the presently-hot interior is related to the curse on the ground, as indicated by the Biblical statement that "a fire has been kindled by my wrath, one that burns to the realm of death below . . . (Deut. 32:22, NIV). As internal heat build-up occurred, instability ensued. Eventually the Flood began with great crustal explosions involving the dissolution of the "fountains of the great deep" (Gen. 7:11).

The geologic record indicates that there was a massive heat build-up in the earth in the past, with a hotter interior than now exists (Peterson, p. 294). Much of this heat was released during the Flood cataclysm (as shown by massive rock deposits laid during the Flood that are of the sort formed by precipitation from hot water; e. g., non-fossiliferous limestones, Gross, p. 159), but of course much heat remains in the interior. Mechanisms for heat generation today do not account for the rate of heat dissipation from the earth (Hartmann, p. 253), showing that most of the heat now being released was generated in the past.

Heat release still occurs, not only by conduction through the crust, but by volcanic eruptions and ocean vents (Weisburd [1986b], p. 389). The water released via ocean vents is probably primeval water remaining from the ante-diluvian "fountains of the great deep" which the Bible states were only "stopped" at the end of the Flood (Gen. 8:3), not emptied.

Mechanisms for Heat Generation

Though the explosion scenario has had strong supporters in the past (e. g., Van Flandern adduced evidence pointing to asteroid formation by the explosion of a 90-earth mass planet between Mars and Jupiter; Van Flandern, p. 280), an apparent obstacle to this scenario has been that there is no known *presently-acting* process capable of breaking up a planet or moons. Both evolutionists (Snow, p. 215) and creationists (Steidl, p. 158) have stumbled over this objection. However, such an objection actually amounts to an assertion of uniformitarianism, the

belief that all past events can be and must be explained only in terms of today's processes.

Mechanisms for heat generation within the earth and heavenly bodies include (1) radioactive decay; and (2) magnetic field decay. Earth's magnetic field decayed at a higher rate in the past (Barnes, p. 36), and presumably the same holds true for other bodies that have (or had) a magnetic field. Evidence also indicates that radioactive decay rates are not constant (Dudley, pp. 52, 54; Clark, 319), and may have been higher in the past.

Higher ancient conversion rates of radioactive and magnetic energy into heat apparently exceeded the ability of some bodies to dissipate the heat non-destructively. Today, with lower rates of heat generation, the solar system is relatively stable. Many sites of ancient heat release, such as extinct volcanoes on Venus, earth, and Mars, are now quiet.

It has been proposed that higher radioactive decay rates in the past could have been tied to a decay in the speed of light from an initially very high value. There does seem to be evidence that the speed of light has decreased with time (Henry [1987], p. 13), and atomic theory holds out the possibility that radioactive decay rates depend on the speed of light (Henry [1987], p. 79). These possibilities need to be studied much more than they have been.

Extensions of the Present Model for Catastrophes

Extensions of the present heat build-up model include (1) applications to cosmic catastrophes; (2) computer modeling studies; and (3) applications to Biblical prophecy.

(1) applications to cosmic catastrophes

One remarkable property of the universe is that the farther away we look, the more violent the cosmos seems to be (Margon, p. 112). For example, supernovas are rare in our galaxy, but many occur each year in Andromeda Galaxy 2 million light-years away. At distances of billions of light years there are quasars, which seem to be entire galaxies in the throes of the most cataclysmic self-destruction.

Not only does the incidence of violent objects increase with distance, but the intensity of violence increases with distance. The conventional explanation is that we see all very distant objects as they were eons ago, and therefore all objects must pass through a violent evolutionary stage (Ferris, p. 184). However, this conclusion cannot be correct, since order and complexity in highly structured galaxies cannot come from disorder and destruction.

A better explanation is that we see very distant objects as they were several thousands of years ago. Hence all objects went through the same catastrophe at some time in the past, which has been decreasing in intensity with time. Our own galaxy and solar system experienced the same kind of cataclysm.

This catastrophe occurred after the curse on the ground. Whereas in the solar system it resulted in planetary and moon

explosions in the worst cases, in stars and galaxies it resulted in stellar or galactic explosions, some of which we see happening today in distant objects.

This scenario explains why stars are often enveloped by gas or dust (Weiner, p. 350), including our own sun, which is surrounded by a very tenuous dust cloud (Anonymous [1983], p. 277). Though such envelopes are often claimed to be "stellar nurseries" that are collapsing to form stars and eventually planets (Thomsen, p. 24), all direct observations of such clouds show them to be expanding. Examples include the Crab Nebula (Goldsmith, p. 316) and the gas shell around Betelgeuse (Levy and Jedicke, p. 13).

The highly publicized disk of dust around beta-Pictoris (Anonymous [1987], p. 76; Snow, p. 244) is often claimed to be an evolving planetary system, and hence "evidence" that there are planetary systems besides our own (inhabited possibly by extraterrestrial life). But according to the scenario proposed here, it is actually the product of a partial blow-up of the star. It is a remnant of a creation degrading, not of a chaos evolving.

(2) computer modeling study

Beginning with the presently observed trajectories and using the techniques of celestial mechanics, the paths of the moons and planets can be retrodicted 100 million years into the past (Hartmann, p. 145).

Now it is known for many moons which ones are heavily cratered, which are partly crated, and which ones have no craters. As discussed previously, lack of cratering or partial cratering indicates some degree of shielding behind another body during the passage of the asteroid swarm. In addition, those planets with known asymmetrical cratering must have been facing the asteroid swarm on the heavily cratered side.

A computer model of the heat build-up scenario would consist of:

- 1) computing the positions of moons and planets in the past;
- 2) noting that time in the past when the moons and planets were aligned so they could be shielded or cratered according to observations;
- 3) comparing that time with the apparent historical date of asteroid formation (i. e., about 3000 BC or rather soon after that).

A match between the computed alignment time, and the apparent historical time of asteroid formation, would corroborate and confirm the scenario proposed in this paper.

(3) applications to Biblical prophecy

Biblical prophecy speaks of a number of scientifically inexplicable darkenings of the sun and stars during the Tribulation (e. g., Ezek. 32:7; Joel 2:10, 3:15; Mic. 3:6; Matt. 24:39; Rev. 8:12). Much instability has been manifested via

catastrophes in heavenly bodies in the past. The prediction of these future catastrophes indicates that the sun and stars have in them some latent instability which will be catastrophically manifested in the future.

Summary

The original creation was perfect, but sin has brought death and catastrophe. This paper proposes that as a result of the curse on the ground, heat build-up occurred in moons and planets. Evidence indicates that this heat build-up was a unique, past event. Heat dissipation eventually caused the destruction of some bodies and the scarring of others.

The heat build-up resulted from the decay of radioactive elements and magnetic fields, which seems to have happened at higher rates in the past. This heat build-up model explains and unites a number of observations under one mechanism, including cratering, planetary rings, evidence of past flooding on Mars, and extinct volcanoes on Mars and Venus.

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Observation *	Cause
1. Huge <i>extinct</i> volcanoes on Venus	Volcanic eruptions from internal heating
2. Flood cataclysm on earth (Gen. 6-9)	Breaking forth of "fountains of the great deep" (Gen. 7:11) due to internal heating
3. Huge <i>extinct</i> volcanoes on Mars	Volcanic eruptions from internal heating
4. Massive erosion channels and other evidence of <i>past</i> flooding on Mars	Release of sub-surface water due to internal heating

TABLE 2. RESULTS OF ASTEROID FORMATION: FRACTURING OF MOONS

Observation *	Explanation
1. Deep cleavages on Phobos' surface	Nearly fractured by meteor (asteroidal) impact
2. Massive fractures on Dione, Tethys, Rhea	All nearly fractured by meteor (asteroidal) impacts (Note 1)
3. Huge crater on Mimas the size of Mimas	Massive meteor (asteroidal) impact
4. Massive fractures are on Oberon, Titania, Ariel, and Miranda	They were nearly fractured by meteor (asteroidal) impacts (Note 1)

Note 1. Some fractures may have been caused by internal heating of the moons themselves. However, most fractures radiate out from sites of meteor (asteroid) impacts.

TABLE 3. RESULTS OF ASTEROID FORMATION: CRATERING AND "SHIELDING"

Observation *	Explanation
1. Asymmetrical cratering	An asteroid swarm passed by only <i>once</i>
2. Europa is very smooth; no known process for destroying young craters	Jupiter shielded Europa from the asteroid swarm; cratering never happened
3. Few large craters on Ganymede	Jupiter partly shielded Ganymede
4. Crater density increases for Jovian moons out from Jupiter.	Outer moons were less shielded
5. Black dust deposit on half on Iapetus	Asteroidal dust swarm passed by <i>once</i> (Note 1)
6. Shiny surface on Enceladus (shiniest known solar system object, albedo = 1)	Saturn shielded Enceladus from asteroid swarm
7. Dark surface on Umbria due to dust layer With very low reflectivity	Asteroidal dust swarm passed by <i>once</i> (Note 1)

Note 1. Such deposits may have resulted from fragments of moons that formed planetary rings.

TABLE 4. RESULTS OF ASTEROID FORMATION: CAPTURED ASTEROIDS BECAME MOONS

Observation *	Explanation
1. Phobos and Deimos are very small and non-spherical; appear to be fragments of a larger body.	Asteroid capture (Note 1)
2. Some of Jupiter's moons are very small and non-spherical.	Asteroid capture (Note 2)
3. Some of Saturn's moons are very small and non-spherical.	Asteroid capture (Note 2)
4. Some of Uranus' moons are very small and non-spherical.	Asteroid capture (Note 2)

Note 1. All moons in the original "very good" creation (Gen. 1:31) were apparently created spherical, no matter how small. Evidence of this is existing moons that are spherical, yet are too small to have formed in this way naturally (e. g., Phoebe has a diameter of only 220 km, yet Phoebe is spherical). By contrast, irregularly-shaped moons seem not to have been part of the original creation.

Note 2. Some of these very small moons may be fragments from other moons that fractured to form the planetary rings.

*REFERENCES for **Observation** columns in Tables 1-4: Audouze; Snow.