3. It is claimed that continents fit together like fingers in a glove to form Pangea. However, it should be noted that in order to get this perfect fit, some small pieces of the continents have to be left out.

4. The Appalachian and Rocky Mountains are not parallel, as they should be according to the Pangea notion.

5. Whence came all the power to move the continents? From radioactive disintegration? But there should have been more radioactive material, and hence more disintegration, in earlier times, back to Precambrian. Why, then, was there no motion until (as is stated) Cretaceous times?

6. If the present Atlantic Ocean did not exist until Cretaceous and later geological times, why are Cambrian fossils found in the north Atlantic?

7. The Stromatolite fossils, to mention just one kind, indicate stable continents in the past, as Meyerhoff has shown.

8. The evidence shows that in the Permian age the North Pole was in essentially the same location as it now is.

9. The only driving mechanism proposed for continental drift seems to be convection currents in the mantle and crust of the earth. But Jeffreys, Knopoff, and Tozer, citing the Lomnitz Law[7,8] question whether such currents are possible.

10. The convection notion would require that the continents be stacked at the equator or at the poles.

11. There is at present no evidence for the subduction crustal movements. Yet they would be an essential part of the crustal shortening, and so would seem necessarily to go along with the drift.

References

[1]Wesson, Paul S., 1972. Objections to continental drift and plate tectonics. *Journal of Geology* 80 (2): 185-197.

[2]Meyerhoff, A. A., 1970. Continental drift: implications of paleomagnetic studies, meteorology, physical oceanography, and climatology. *Journal of Geology* 78 (1): 1-51.

[3]Meyerhoff, A. A., 1970. Continental drift II. High latitude evaporite deposits and geological history of Arctic and North Atlantic Oceans. *Journal of Geology* 78 (4): 406-444.

[4]Meyerhoff, A. A., and Curt Teichert, 1971. Continental drift III. Late Paleozoic glacial centers, and Devonian-Eocene coal distribution. *Journal of Geology* 79 (3): 285-321.

[5]Meyerhoff, A. A., and Howard A. Meyerhoff, 1972. Continental drift IV. The Caribbean "plate". *Journal of Geology* 80 (1): 34-60.

[6]Meyerhoff, A. A., Howard A. Meyerhoff, and R. S. Briggs, Jr., 1972. Continental drift V. Proposed hypotheses of earth tectonics. *Journal of Geology* 80 (6): 663-692. All of this series of articles, and especially the last, may be recommended to Creationists as likely to stir up helpful ideas.

[7]Lomnitz, C. 1956. Creep measurements in igneous rocks. *Journal of Geology* 64 (5): 473-479. The idea here seems to be that the motion of rocks under stress is like creep: eventually the distance moved increased logarithmically with time. Thus the rate decreases; and so in very long times disappointingly little would be accomplished.

[8]Jeffreys, Sir Harold, 1976. The earth, its origin, history, and physical constitution. Sixth edition. Cambridge University Press. See especially p. 491, also under "Lomnitz law" in the topical index.

CONTINENTAL TILT

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The continents are seen, to a large extent, to be tilted toward the Atlantic and Arctic Oceans, and to drain into them, the oceans being as it were catchbasins. It is suggested that that state of affairs dates to the conclusion of the Flood, when the continents were drained by being tilted thus. Other evidence, especially from the bottoms of the oceans and from the Arctic regions, points in the same direction.

Introduction

In Hebrew the first book of the Bible was called "In The Beginning". The Greeks translated this as "Genesis", by which name we still know the book. The testimony of Jesus Christ, who quoted many texts from Genesis, indicates that He considered the book as part of Holy Scripture, and authentic. It contains a sketch of the world's history covering many centuries. The early chapters cannot be placed in a historical setting, in the sense of correlating them with other historical accounts; for there are no others going back that far. So our only history of the antediluvian world is that written by Moses. Neither are there archaeological records (except possibly a few obscure and often disputed finds); only the mute testimony of the fossils, which is itself often obscure. We do have much geological testimony, written on the surfaces of the continents and on the ocean basins. It is the oceans, in particular, which can give us much information about the great catastrophe which took place early in man's history.

What was this event? And what were the conditions on the surface of the Earth before and after?

A Catastrophe Widely Recognized

Oceanographic studies of the oceans, and geological studies of the continents, should tell us much about the changes which took place during the great catastrophe. For there was a catastrophe: one which changed the surface of the Earth from its antediluvian condition to that which we now see.

Let us consider a typical uniformitarian opinion about the occurrence of catastrophic (whether or not that word be used) changes in the past, and the condition of the Earth before they happened.[1]

> Today it is generally accepted that the relatively short span of the Pleistocene brought greater changes to the face of the earth than any that occurred during the previous seventy million years of the Cenozoic Era. The present boundaries between land and sea were established, the earth attained

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the relief it has now, and much of the world's history was fashioned; and the physical and cultural evolution of man took place.[2]

As earth history goes we are living in a time of exceptionally rapid change, a time of geological unrest. Our era is characterized by emergent continents and deep ocean basins, by long ranges of lofty mountains too young to have been worn down by erosion. It is also marked by great diversity of climate from place to place and by drastic changes of climate over relatively short periods of time.[3]

The climate during most of the geological time seems to have been mild and remarkably uniform throughout the world, in contrast with the well-defined climatic zones of the present day. Probably this uniformity was a consequence of low continents, many broad seaways, and few or no mountains.[4]

The study of the ocean records shows that the onset of the Pleistocene was sudden and that the subsequent climatic changes came in abruptly. Mountains simply cannot rise and fall at such a preposterous rate; nevertheless the present topographic state of the earth, marked by strong contrast between continents and ocean basins, by the absence of shallow seas and by long ranges of lofty mountains—is very probably essential to the spread of continental ice sheets, though it is evidently not the sole cause. The cause was probably a combination or coincidence of some other factor of fluctuating effect, acting in conjunction with exceptional topography.[5]

The authors cited here have painted a picture of the Earth's history which is largely acceptable to Creationists, except for the assumption of long periods of time. Table 1 shows how much, in outline but not in detail, Creationists and uniformitarians, hold in common.

Table 1. Both Creationists and uniformitarians recognize a catastrophe.

Antediluvian (Pliocene)	*Sudden change*	*Present Time (Pleistocene)*
a) Shallow seas	1. Creationists refer to it as the time of the Flood—one year duration.	a) Boundaries between land and sea set up
b) Low continents		b) Physical and cultural development
c) Vast areas of continents flooded	2. Uniformitarians refer to it as the catastrophe or catastrophic change–usually no specific time given.	c) Land characterized by emerging continents
d) Seas and rivers teeming with life		d) Deep ocean basins
e) Mild climate		e) Long ranges of lofty mountains
f) Uniform climate		f) Diversity of climate from place to place over short periods of time
g) Heavy vegetation		g) Geological unrest
		h) Vast differences of vegetation in quantity and quality

Evidence About the Catastrophe

It is quite evident that uniformitarian thought offers no consistent or plausible answers as to the nature and cause of the catastrophe, or catastrophic change. Both uniformitarians and Creationists, however, recognize that there was a catastrophe.

Creationists will look to the Bible for an outline of the catastrophe. If details are wanted, the testimony of nature, that is the state of the face of the Earth, needs to be considered.

I have found relief maps of the continents, and especially oceanographic maps, showing the details of the bottoms of the oceans, extremely helpful.[6]

Let us start by examining maps of South America, and of the adjacent Pacific Ocean. A range of mountains extends along the entire length of the west coast; and alongside this range is an ocean trench, deep enough that one might imagine that the mountains were taken out of it. All the rivers of any size in South America flow to the east and empty into the Atlantic Ocean. The surface of the continent is tilted toward the east.

Now consider North America. Here, too, is a range of mountains in the west, diverting all the rivers east of them into the Atlantic, some by way of the Gulf of Mexico and some through the Great Lakes, and the St. Lawrence. Again, the surface is tilted toward the east. The rivers east of the Appalachians also flow to the east.

The extreme north of North America will need to be considered a little later.

The continent of Africa, which directly faces the Americas across the Southern Atlantic, has its principal mountain system along the east coast. Drainage is not so predominantly in one direction as in some of the other continents. But two of the four great rivers flow west; the Nile would do so eventually were there not so much evaporation in the Mediterranean; and the great falls along it may show that the course of the Zambezi is, in a sense, anomalous.

In summary, then, a considerable part of the continents which surround the Atlantic are tilted toward the Atlantic, and drain into it.

Let us consider Europe and Asia together. They really form one continent, which has been called Eurasia. On this (combined) continent is the longest range of mountains on Earth, except, it is true, the ridge of mountains on the bottom of the Atlantic ocean. This chain of mountains runs more or less continuously from the Atlantic to the Pacific. Some facts about them are gathered in Table 2. It is notable that the farther east one goes, the wider is the continent and the higher the mountains.

In general, then, these mountains occupy much of the southern part of Eurasia, mostly from about 30° to 50°

Table 2. The various parts of the Eurasian mountain chain.

Mountains	*Location*	*North Latitude*	*Notable or highest mountain*
Pyrenees	Between Spain and France	40°–50°	Maximum altitude about 11,200 ft.
Alps	Most of southern Europe	40°–50°	Mt. Blanc 15,770 ft.
Anatolian and Caucasus Mountains	Turkey and the Caucasus	40°–50°	Mt. Ararat 16,946 ft.
Elbruz Mountains	Iran	35°–40°	Mt. Dama Vand 18,606 ft.
Himalayas and Hindustan Plateau	India, Tibet, and adjacent regions	30°–40°	Mt. Everest 29,028 ft.

north latitude. They turn northward at the North China Plain. This chain of mountains, extensive as it is, is relatively narrow in comparison with the size of the whole continent. Having this ridge of mountains toward the south, Eurasia, as a whole, is tilted toward the north. The direction of the great Siberian rivers, for instance, indicates this pattern, tilting toward and drainage into the Arctic Ocean.

It is worth while, at this point, to return to North America, and to notice that the extreme north, parts of Alaska and Canada, are tilted toward the north. The great Mackenzie River shows the drainage into the Arctic Ocean, set by this tilt.

The continents, then, form a huge basin around the Arctic Ocean, and eventually around the North Pole. The southern boundary of this basin would be around 65° north latitude.

As already noticed, the Americas and Africa, especially, form another basin, although a much more open and broken one, around the Atlantic.

Submarine Evidence

It is suggested, then, that this tilt of the continents toward an ocean was established at the end of the Flood; that it was, in fact, the means of emptying the water off the land. There should still remain, then, evidence of flood-water flowing over the continental shelves, especially in the Atlantic and Arctic Oceans.

Such evidence does exist. Shepard, for instance, while he does not mention the Flood, describes in detail the undersea canyons which could have been made only by the action of running water. He points out that these canyons resemble the great canyons on land.

We will not attempt to describe these canyons and the various other types of marine valley. We wish to emphasize that these canyons are world-wide.[7]

These canyons can serve as proof that there was a Flood, and that at its conclusion the method of freeing the continents of water was by tilting them. The water, pouring off the newly raised land, carved out the canyons. Further evidence is to be found in the great amount of material deposited on the bottom of the ocean basin. Only a world-wide flood could do work on such a scale.

> The transportation of sand and near-shore organic materials down the canyons and adjoining fan valleys has been proven by numerous cores.
>
> Some of the sand layers along canyon axes are graded, most are not, although well sorted.
>
> Much evidence exists of the transportation of shallow-water foraminifera along the axes of the canyons into great depth. Wood fragments and mats of kelp and sea grass are carried sea-ward along the canyon walls.
>
> We know that sand and accompanying finer sediments occur widely in the ocean basins and are in fact the dominant type of sediment in the broad deep basins of the Atlantic.[8]
>
> Much of this material is granite sand. Granite sand cannot be made at the bottom of the oceans. Chemical decay of silicate materials associated with quartz in granitic rocks must occur in order that quartz crystals may be released as sand. The generation of quartz sand by the disintegration of granitic rocks at the bottom of the ocean is ruled out, even if such rocks did occur there. Actually, according to geophysical theory and observation they do not occur there. The granite sand found on the bottom of the sea must have been washed off the continental surfaces.
>
> The sands in cores from deep stations contain shells of foraminifera that have never been found living anywhere but in shallow water. This strongly suggests that before reaching the abyssal depths the sand passed over the continental shelves.[9]
>
> Another form of deposition occurring is the deltas of such rivers as the Mississippi. The huge fans outside the delta-front troughs of the Ganges, the Mississippi, and the Congo Canyon indicate long-continued existence of a channel across the shelves in these areas. No such accumulation could have been formed by the short periods of low sea level during the Pleistocene.[10]

In other words, only a world-wide flood could have accomplished all of this in the short time available.

The Great Arctic Sump

There is additional evidence of the Flood, besides the tilt of the continents, the submarine deposits, and the many other things mentioned above, which, I believe, has never been mentioned before, at least in quite this context.

I shall call this new evidence, found in the polar regions north of 60° latitude, "The Great Arctic Sump".

> Here in the Arctic north of 60° latitude we will find great mounds of animal remains, many in a good state of preservation. These are mixed with mud, sand, vegetation, usually in a frozen condition. The conditions found in Alaska are believed to be contemporary with those in Siberia.[11]

There were formed, in fact, during or at the end of the

Flood, a ring of mounds around the North Pole, a little north of the Arctic Circle. This ring was later removed from many places by the ice sheets which covered large areas of North America and Europe.

The formation of this deposit can be ascribed to a complex series of causes which acted during the Flood. First of all, there being no land in the way, the tides caused huge waves, more or less in resonance, to travel around the Earth.[12,13] It is true that the primary effect of a wave is just to cause the water to move back and forth; but it can also tend to drag the water bodily along, to some extent, and thus cause a current. Thus a very strong current encircled the Earth, being strongest at or near the Equator. Things carried along in that current would tend to be carried to the north or south, just as in a stream floating objects collect in a backwater. The Coriolis effect, the interaction of currents and the Earth's rotation, may have helped here also. Currents due to differences of temperature of the water may have been important then, as now; and the fact that there was no land in the way would likely make them much stronger.

The result, then, was that much debris of the Flood: bodies of animals, vegetation, wood, mud, salt, etc., was carried to the north (and south, likely; but we are interested in the north, where some of this material remains) and deposited there, around 60° north latitude.

Such mounds of debris are found in Alaska, and in parts of Siberia. And the National Geographic map of Canada calls such mounds, at about 65° north, "Refugum", placing the time of their formation about 12,000 years ago.

Similar conditions have been found on the islands, usually called the New Siberian Islands, off the Arctic coast of Siberia.

> The remains on these islands and along the coast of Siberia are abundant. These remains were located in mud.[11]
>
> Water at a fairly high velocity will carry mud, sand, and gravel.[14]

Possible Subsequent Catastrophes

Once the tilt of the continents had been established, at the close of the Flood, the stage may have been set for subsequent catastrophic events, lesser in extent but still devastating. It has been suggested, for instance, that water trapped from the Flood may have formed a vast inland sea in North America, and that the rush of water when that sea eventually broke the barriers holding it in may have excavated some of the great canyons.[15] Maybe something similar happened in Asia, possibly hundreds of years after the Flood; and such a catastrophe might have left some of the remains of mammoths, especially those which are well preserved.

Conclusions

It has been suggested that the present tilts, and patterns of drainage, found on the continents, may provide a clue as to what happened at the end of the Flood. Moreover, they may suggest where to look for other evidence of the Flood.

References

[1]Ericson, David B., and Goesta Wollin, 1964. The deep and the past. Alfred E. Knopf, Inc., New York.
[2]*Ibid.*, p. 12.
[3]*Ibid.*, p. 13.
[4]*Ibid.*, pp. 13 & 14.
[5]*Ibid.*, p. 249.
[6]The following maps, all issued by the National Geographic Society, have been useful. Pacific Ocean floor, October, 1969; Arctic Ocean floor, October, 1971; Canada, March, 1972; and The Physical World, November, 1975. To study the Arctic regions, the map should be a projection centered on the North Pole. The common Mercator's projection distorts the Arctic regions so much as to be about useless.
[7]Shepard, Francis P., and Robert F. Dill, 1966. Submarine canyons and other sea valleys. Rand McNally and Co., Chicago, and Wiley, New York.
[8]*Ibid.*, pp. 312-315.
[9]Reference 1, pp. 47 & 48.
[10]Reference 7, p. 337.
[11]Coffin, Harold G., 1969. Creation—accident or design? Review and Herald Publishing Association, Washington. Chapter 19.
[12]Clark, M. E., and H. D. Voss, 1980. Computer simulation of large-scale wave motions associated with the Genesis Flood. *Creation Research Society Quarterly* 17 (1): 28-40. See especially p. 39.
[13]D'Armond, David B., 1980. Thornton Quarry deposits: a fossil coral reef or a catastrophic Flood deposit? A preliminary survey. *Creation Research Society Quarterly* 17 (2):88-105. (This issue.) See especially 98-103
[14]Merriman, Mansfield, and Thaddeus Merriman, 1916. Treatise on hydraulics. Tenth revised edition. Wiley, New York. Article 135, pp. 399-342. Incidentally, Diluviologists might still find some useful hints here.
[15]Burdick, Clifford, 1980. Grand Canyon report. *Bible-Science Newsletter* 18 (2): 5-7.

The Faraday-Disc Dynamo and Geomagnetism

(Continued from page 122)

References

[1]Elsasser, Walter M., 1945. Induction effects in terrestrial magnetism. *Physical Review* 69 (3 & 4): 106-116.
[2]Busse, F. H., 1978. Magnetohydrodynamics of the earth's dynamo. *Annual Review of Fluid Mechanics* 10, 435-462.
[3]Carrigan, Charles R., and Davis Gubbins, 1979. The source of the earth's magnetic field. *Scientific American* 240 (2): 118-130.
[4]Barnes, Thomas G., 1971. Decay of the Earth's magnetic moment and the geochronological implications. *Creation Research Society Quarterly* 8 (1): 24-29.
[5]Barnes, Thomas G., 1972. Young age vs. geologic age for the earth's magnetic field. *Creation Research Society Quarterly* 9 (1): 47-53.
[6]Barnes, Thomas G., 1973. Electromagnetics of the earth's field and evaluation of electrical conductivity, current, and joule heating in the earth's core. *Creation Research Society Quarterly* 9 (4): 222-230.
[7]Barnes, Thomas G., 1975. Earth's magnetic energy provides confirmation of its young age. *Creation Research Society Quarterly* 12 (1): 11-13.
[8]Barnes, Thomas G., 1973. Origin and destiny of the earth's magnetic field. Creation-Life Publishers, San Diego.
[9]*Ibid.*, p. 60.
[10]*Ibid.*, section III. The same result has been confirmed independently by Mr. Robert Lamb and me from a statistical study of the data listed by Barnes. The standard deviation of the best-fit straight line fit to the magnetic field data is 0.01757989, and that of the best-fit exponential is the slightly smaller figure 0.01731578.
[11]Lamb, Horace, 1883. *Phil. Trans.* 174, 519.
[12]Lamb, Horace, 1884. *Proc. London Math. Soc.* 15, 139.
[13]Barnes, *op. cit.*, section IV.
[14]Halliday, David, and Robert Resnick, 1974. Fundamentals of physics. Wiley, New York. P. 619.
[15]Carrigan, reference 3, p. 125: "No one has developed an explanation of why the sign reversals take place. The apparently random reversals of the earth's dipolar field have remained inscrutable."