SURTSEY: A MICRO-LABORATORY FOR FLOOD GEOLOGY†

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The contemporary Evangelical debate over "Flood Geology" centers upon the legitimacy of extrapolating present-day rates of geologic processes into the past, and using this extrapolation to challenge the possibility of a significant portion of the earth's sediments and fossils being the result of the Noahic Flood of Genesis 7-9. The problem is complicated by the impossibility of repeatable experiments or present-day observations on a flood that is thought to be a singularity, of world-wide extent, and of over one year in duration.

The birth, in 1963, of the volcanic island, Surtsey, off the coast of Iceland, may cast some light on the problem. Since Surtsey's birth was both unique and spectacular, most works on geology make mention of it. Only two Icelandic scientists write about what may be the most significant geological factor of all—the development of a mature landscape in days or weeks on Surtsey that would normally take thousands of years elsewhere. Since the two geologic forces operating on Surtsey—volcanism and marine action—are also two of the forces thought to be in operation during the Noahic Flood, Surtsey may be as close as one can come in the natural world to a micro-laboratory for "Flood Geology."

"Flood Geology" is the term usually applied to the concept that a large portion of the geologic activity that has taken place on planet Earth took place during or in conjunction with the Noahic Flood recorded in Genesis 7-9. Evangelicals taking issue with "Flood Geology" can be roughly divided into two schools depending upon their attitude toward biological evolution. "Progressive Creationism" is the term applied to the school of thought that, although rejecting biological evolution, accepts more or less the time scale of the geologic column and the concept known as uniformitarianism in geology. An alternate position known as "Theistic Evolution" accepts both biological evolution and geologic uniformitarianism.

Uniformitarianism in geology extrapolates present-day rates of geologic processes into the past. It seeks, in this way, to determine not only the age of specific geologic formations, but the age of large portions of the earth's crust. Although these ages are usually stated to be only relative, they are sometimes given absolute values. Radioactive dating methods are said to corroborate the vast ages implied by the concept of uniformitarianism. It is declared by most uniformitarian Evangelicals that a universal flood lasting just over one year is simply not sufficient to explain a sizable portion of the past geologic activity evidenced in the earth's crust.

"Progressive Creationists" have tried to explain the Noahic Flood in several different ways. The concept of a local flood has been popular in some Evangelical circles. However, this explanation is not in harmony with the details of Genesis 7-9, and calls for a questionable exegesis of the text. Furthermore, since there have been innumerable local floods since the time of Noah, it is obvious that the Noahic Flood was a radically different kind of flood or else the covenant God made with Noah becomes meaningless. In this covenant, God said (Genesis 9:8-17) that He would never again destroy the earth and all flesh by a flood and that He would set the rainbow in the sky as a sign of that covenant.

A second explanation of the flood seems equally lacking in credibility. It is the idea that the Biblical Flood had very little, if anything, to do with rocks and fossils. It was primarily a judgment of God upon sinful people. Hence, it produced very little permanent geologic change upon the earth. This view seems to call for a greater miracle than any that are stated or implied in the Genesis account, and it fails to comprehend the very nature of the Genesis Flood.

The Noahic Flood was actually a combination of supernatural and natural forces. Just a few of the supernatural elements of the flood are: (1) God causing the catastrophe of the flood in the first place (Genesis 6:13,17); (2) God giving the dimensions and the plans of the ark to Noah (Genesis 6:14-16); (3) God bringing the animals to the ark (Genesis 6:20); (4) God shutting the door of the ark (Genesis 7:16); and (5) God making a wind to pass over the earth (Genesis 8:1).

On the other hand, there were a number of geologic factors that, although originated by the supernatural agency of God, when once unleashed would do immense amounts of geologic work without the further intervention of the supernatural. These forces are: (1)

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ELECTION RESULTS

249 ballots were cast in the annual election, held earlier this year. The following persons were elected to the Board of Directors for a term of three years, 1979-1981.

John W. Klotz
Richard G. Korthals
Henry M. Morris
Wilbert H. Rusch
Harold S. Slusher
E. Norbert Smith

Only ballots postmarked not later than 1 March 1979 were counted, as had been announced.

Rain for forty days and forty nights (Genesis 7:4,12); (2) The fountains of the deep opened up releasing vast amounts of magma (as lava) and subterranean water. (Genesis 7:11); (3) A wind to pass over the earth (Genesis 8:1); (4) Tidal action of the flood waters, possibly caused by the moon's gravitational pull and unhindered by the continents because they were submerged (Genesis 8:3,5); (5) Although it is not specifically mentioned in Genesis, we can also infer intense earthquake activity because of the very close association of the volcanic zones of the earth with the earthquake zones.

Given the intensity of these four and probably five geologic factors and the duration of the flood, the fact that the flood was a judgment for the sin of man would not hinder an intense amount of geologic work from being done with abundant evidence remaining even today. It was God's stated intent to destroy the earth with its life (Genesis 6:7,13) and this intent was carried out (Genesis 7:21-23). The New Testament confirms that fact (II Peter 3:5-6). To suggest that all of these forces were unleashed to destroy the earth and its life without leaving much geologic trace is incredible. In fact, it would require a miracle of the highest order to keep geologic work from being done. It hardly needs to be said that the Bible nowhere even remotely implies that such an unlikely miracle took place. It would be in keeping with the nature of God that He would want the effects of this judgment to be clearly seen by man in order to serve as a warning to man of the judgment of God upon sin.

There are two ways in which geologic work can be accomplished. A very large amount of geologic work can be accomplished by very passive geologic forces if these passive geologic forces have an immense amount of time in which to work. This same amount of geologic work can be accomplished in a very brief moment of time if the geologic forces are intense or violent enough. Only rather recently have some geologists recognized the importance of this concept of catastrophism in interpreting the geologic record. Derek V. Ager (University College of Swansea, and 1976 President of the British Geologists' Association) writes:

> So we come back again and again to the notion of the rare catastrophic happenings playing a major role in the working out of the stratigraphic record as we find it today.
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> The hurricane, the flood or the tsunami may do more in an hour or a day than the ordinary processes of nature have achieved in a thousand years.
>
> We cannot demonstrate anything really comparable to the sudden mass extinctions of the past happening at the present day. . . . What is more, we cannot even see the processes going on today that might lead to such extinctions. I feel that we rely too much on the present state of affairs, too much on uniformitarianism, when interpreting the fossil record. . . . It may be said of many palaeontologists, as Professor Hugh Trevor-Roper said recently of 18th century historians: "Their most serious error was to measure the past by the present." We may arrive, therefore, at the second proposition of this book: PALAEONTOLOGISTS CANNOT LIVE BY UNIFORMITARIANISM ALONE.[1]

There is, without question, a measure of truth in uniformitarianism if by that one refers to the regularity of nature established by God (Genesis 8:22). In fact, the entire foundation of modern science rests upon this regularity in nature. It is this regularity that makes experiments possible. The problem with the doctrine of uniformitarianism is that it is often used as an atheistic club arbitrarily to rule out any possible divine intervention in the past—either regarding Creation or the Flood. This atheistic aspect of uniformitarianism is not only implied in the practical application of the concept to the rock strata, but is stated without equivocation in many secular university classrooms.

A philosophical weakness is resident in the doctrine of uniformitarianism that most secular and some Christian geologists seem to have missed. In order to state with authority that the present is the key to the past, one would either have to possess the attribute of omniscience, which only God possesses, or else one must be able to establish witnesses for the entirety of past geologic history in order to know with certainty that there are no exceptions to the concept of uniformitarianism. The Scriptures plainly declare that there has been a major exception, a singularity in the past history of this planet. This major exception—the Flood—could not help but have had a tremendous impact on the past geology of our planet.

In dealing with those who do not accept the amount of geologic work such a flood could accomplish in a brief period of time, a problem presents itself in terms of scientific validation. By the very nature of the Biblical Flood—a singularity happening only once and of world-wide extent—it is totally beyond scientific verification by experiment. It is for this reason that the recent birth of the volcanic island, Surtsey, takes on special significance as an indication of the speed with which geologic processes can, under certain conditions, take place.

Surtsey, named after a figure in Icelandic mythology, began as a submarine volcanic eruption on November 14, 1963, about 400 feet below the surface of the Atlantic and 20 miles south of the coast of Iceland. It is 75 air miles southeast of the Icelandic capital, Reykjavik. The next day, November 15, a narrow black ridge broke the surface of the ocean as the top of the cinder cone appeared. A new island was born.

The birth of a volcanic island is not completely unknown in recorded history—especially off the coast of Iceland. But in all such previous cases, they were soon eroded away by the onslaughts of the ocean. The tephra—ash, cinders, and pumice—usually involved in the initial stages of the eruption was not resistant enough to oceanic erosion. However, on April 4, 1964, the lava flows began on Surtsey, flowing intermittently until June 5, 1967—the last time lava was seen flowing on the island. The lava flows provided a very hard cap to the island thus insuring its permanence as the southernmost of a group known as the Westman Islands, all of them probably having been formed in

about the same way as was Surtsey.

The lava flows also changed Surtsey from a cinder cone to a shield volcano. It thus became the first time in possibly 3,000 years that man had witnessed the creation and development of a shield volcano. At the height of the lava flow, as much as one acre was added to the island's size daily. By April 1965, the island had become circular in shape with a diameter of 1.7 km, an area of 1¼ square miles, having a tephra cone of 170 m. (568 feet) in height, and a composite cone of 122 m. in height which housed a lava lake. During the course of Surtsey's development, two smaller islands were born nearby as a result of submarine eruptions but were soon eroded by the sea and disappeared.

It is not entirely surprising that Surtsey was born where it was. It sits atop the Mid-Atlantic Ridge, the chain of fissures and submarine mountain ranges stretching from the Arctic to the Antarctic. There has been recent volcanic activity along this ridge—1957 in the Azores, 1961 in Askja volcano in Iceland, 1961 in Tristan da Cunha in the South Atlantic, and 1963 at Surtsey. In fact, Iceland constitutes the largest above-sea section of this 10,000-mile-long Mid-Atlantic Ridge and gives geologists a unique opportunity to study the Ridge on dry land. Iceland, itself, seems to be splitting apart at this line as is indicated by numerous gaping fissures all over the median zone of the country. It is believed that the entire Ridge is undergoing this type of tension process. The point of all this is that Surtsey is on one of the very few geologically active zones on earth, and this makes a vast difference in the rate of geologic processes.

Surtsey has become famous. Its initial volcanic activity was very dramatic and colorful. Further, the birth of an island was utterly unique in our scientific age. The result is that there is scarcely a geology book published since 1963 that does not have one or more pictures of Surtsey in eruption. The popular textbook, *Physical Geology*, by Longwell, Flint, and Sanders has a two-page spread of Surtsey introducing the chapter on volcanism.[2] The work by Nigel Calder, *The Restless Earth*, has one picture of Surtsey on the front jacket, a second picture on the back jacket, and a third picture of Surtsey in the book itself.[3] Most general geology books published today have a paragraph or two on Surtsey in the text as well as one or more pictures of its dramatic eruptions.

Yet, for all of this fame and photography, most geologists have completely missed the true geological significance of Surtsey. Surtsey's true significance is that the combination of the sea and volcanism—two of the same forces that were at work in the Noahic Flood—have in days or weeks produced a landscape so varied and mature *that it gives the appearance of being thousands of years old.* Even creationists have been strangely silent regarding the striking evidence Surtsey presents for Flood Geology. Other than a three-page review of a book on Surtsey by Dr. Wilburt H. Rusch, Sr., in *Why Not Creation?*[4] the only creationist reference of which I know is on pages 142–143 of Whitcomb's *The World that Perished.* So let us consider the geological activities on Surtsey."

Of all that has been written in English on Surtsey, only three publications by two Icelandic scientists mention this rapid development of a mature landscape. The first, and still the most complete account of the geology of Surtsey, was written by the official Icelandic geologist, Sigurdur Thorarinsson. He flew over Surtsey within hours after the eruption was first sighted and kept a continuous written and photographic record of developments on Surtsey. He was the first scientist to set foot on the island itself, and by the time his book, *Surtsey: The New Island in the North Atlantic*, was published in 1964, he had made more than one hundred visits to Surtsey by sea and air including a large number of actual landings on the island. His book was first published in Iceland with an English translation. In 1967, it was published with very slight changes in the text and a different format by Viking Press in New York. It remains the definitive book on the geology of Surtsey. Later, Thorarinsson wrote a more popular account of Surtsey for *National Geographic* that was published in May, 1965.

The second author to write about the maturity of Surtsey's landscape is Icelandic biologist Sturla Fridriksson. His book, *Surtsey*, published in 1975 by John Wiley and Sons, New York, deals basically with the biota of Surtsey. Since it is a precise account of how animals and plants invaded a sterile volcanic island, it is also of importance to creationists who are interested in plant and animal migrations after the Flood.

The closing paragraphs of Thorarinsson's book set forth the dramatic geological changes that took place on Surtsey. The section is entitled, "you wander and wonder":

> When the news of a volcanic eruption in the sea off the Vestmann Islands reached the ears of Icelandic geologists in the early morning of November 14, 1963, some of them had to have it repeated to them, and received it with a grain of salt all the same. And when they in the spring and summer of 1964 wandered about the island which was being born then, they found it hard to believe that this was an island whose age was still measured in months, not years. An Icelander who has studied geology and geomorphology at foreign universities is later taught by experience in his own homeland *that the time scale he had been trained to attach to geological developments is misleading* when assessments are made of the forces—constructive and destructive—which have molded and are still molding the face of Iceland. *What elsewhere may take thousands of years may be accomplished here in one century.* All the same he is amazed whenever he comes to Surtsey, *because the same development may take a few weeks or even a few days here.*
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> On Surtsey only a few months sufficed for a landscape to be created which was so varied and mature that it was almost beyond belief. During the summer of 1964 and the following winter we not only had a lava dome with a glowing lava lake in a summit crater and red-hot lava flows rushing down the slopes, increasing the height of the dome and transforming the configuration of the island from

one day to another. Here we could also see wide sandy beaches and precipitious crags lashed by the breakers of the sea. There were gravel banks and lagoons, impressive cliffs, grayish white from the brine which oozes out of the tephra, giving them a resemblance to the white cliffs on the English Channel. There were hollows, glens, and soft undulating land. There were fractures and faultscarps, channels and screes. There were often furious gales and sandstorms, which reduced the visibility to zero, and Aegir, the Northern counterpart of Neptune, dealt blows of no less violence. You might come to a beach covered with flowing lava on its way to the sea with white balls of smoke rising high up in the air. Three weeks later you might come back to the same place and be literally confounded by what met your eye. Now, there were precipitous lava cliffs of considerable height, and below them you would see boulders worn by the surf, some of which were almost round, on an abrasion platform cut into the cliff, and further out there was a sandy beach where you could walk at low tide without getting wet. The next time you came there, glowing lava-falls rush over the sea-cliff. One day, the surf had cut a large section out of a tephra wall. The next, the lava spread across the sandy beach, protecting the cliff from further inroads by the sea. In this way destructive and constructive forces waged a constant battle for this island, which is and will be a true paradise for geomorphologists.[5]

Later, in his more popular account in *National Geographic*, Thorarinsson states:

> For geologists and geomorphologists it is a great adventure to explore this new island. Contours shift from day to day, *and in one week's time we witness changes that elsewhere might take decades or even centuries.* We observe gravel downs, calm lagoons, and bluffs so whitened by brine that they recall the chalk cliffs of Dover. *Despite the extreme youth of the growing island, we now encounter there a landscape so varied that it is almost beyond belief.*[6]

Thorarinsson's book is illustrated with fifty-four remarkable photographs of the development of Surtsey. One of the most striking, from the standpoint of rapid geologic processes, is plate no. 39 showing a very level sand beach perhaps 150 yards wide and a quarter of a mile long on the northwestern side of the island. This photograph was taken April 16, 1964. Since Surtsey broke the surface of the ocean as a volcano on November 15, 1963, it means that this large sand beach developed in just five months. Yet, it is not the first time mention of a beach is made in the book. On what appears, from the text, to be Thorarinsson's second actual landing on the island itself, February 19, 1964, he writes:

> At 3 o'clock that afternoon seven of us, including two women, stood on the sandy beach of Surtsey on the northeastern side.[7]

This means that there was a sandy beach on Surtsey just three months after the island had broken the surface of the ocean as a fiery volcano. The rapidity of this development staggers the imagination.

Biologist Fredriksson is much more concerned about the invasion and development of life upon this volcanic island. Yet, the first forty-seven pages of his book are devoted to geological matters. He, too, studied the island from its birth. His observations confirm those of Thorarinsson. In his "Preface", Fredriksson writes:

> But here something quite different and much greater had happened: a whole island had been created, and an extensive area of land had been formed from the primary rock. From the depths of the ocean there had been built up a broad base, on the top of which was an island with mountains and craters, lava flows, cliffs, gentle slopes, flat sandy beaches and withered coastal strips with worn, rounded pebbles and boulder rims *that gave the landscape an ancient appearance.* Surtsey had thus a diversity of topographical features and a variety of substrates in marine and terrestrial habitats.[8]

He further describes these boulder rims as follows:

> This shaping-up of the island is caused by the predominant waves generated by low pressure areas moving from the south-west. Boulder rims run along the shores 4 to 5 m above sea-level, extending from the lava edges and encircling the ness (Plate 9). These boulders are well rounded 0.5 to 1.5 m in diameter, forming terraces with sand, gravel and cobbles. In severe winter storms and high tides most of this coastal plain can be flooded and a high-water mark is found at the foot of the tephra cones (Figure 6.5). A great part of the ness is now covered with silt, sand and cobbles, with some boulder ridges and even some small sand dunes. Both the lagoons have been filled up by beach material.[10]

There is no indication in the book as to when the picture of the boulder rim was taken. Since the book was published in 1975, and one normally assumes that a book is one year in preparation, that gives a maximum time of eleven years for the formation of a boulder rim of very ancient-appearing rocks. However, a soil map of Surtsey drawn in 1970 shows this boulder rim surrounding the island at that time.[11] That would give the outside age of the boulder rim as seven years.

Surtsey has several lessons for geologists—indeed, for all of us. The first is that terms found so often in geological literature, such as "ancient landscape" or "mature landscape" are at best subjective and misleading. They may be used to refer to development or progress, but they have no meaning as far as age is concerned. One simply cannot speak authoritatively of age unless one knows the type and intensity of the forces that produced that landscape.

The second lesson of Surtsey is that it appears that there could be a very fundamental error involved in the time measurements of geological phenomena when one extrapolates into the past. To use today's measurements in determining the time involved in past geologic activity, one first must assume that the earth has always been shaped by very passive forces such as are at work in almost all of the world today. If, however, the bulk of the past geologic activity took place under intense and

violent conditions—such as the Flood—then today's measurements of the rates of geologic processes mean nothing in interpreting earth history. In fact, they not only mean nothing, they are totally misleading. To geologists who are in bondage to the doctrine of uniformitarianism, these sobering words of Sigurdur Thorarinsson should help produce an agonizing reappraisal of the entire concept.

> An Icelander who has studied geology and geomorphology at foreign universities is later taught by experience in his own homeland *that the time scale he had been trained to attach to geological developments is misleading when assessments are made of the forces—constructive and destructive—which have moulded and are still moulding the face of Iceland. What elsewhere may take thousands of years may be accomplished here in one century.* All the same he is amazed whenever he comes to Surtsey, *because the same development may take a few weeks or even a few days here.*[12]

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[7]Reference 5, p. 23.

[8]Fredriksson, Sturla, 1975. Surtsey. John Wiley and Sons, New York. P. VII. (Emphasis added.)

[9]*Ibid.*, Plate 9, facing page 31. (Emphasis added.)

[10]*Ibid.* p. 37.

[11]*Ibid.*, p. 71.

[12]Reference 5, p. 39. (Emphasis added.)

PANGAEA SHATTERED

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Current geological facts and theory support the concept of plate tectonics—continental drift and sea-floor spreading. A short time span for such drift is shown to be reasonable being supported by rapid rates of sedimentation and fossil formation. Further, there is no viable theory for magnetic reversals of the Earth's magnetic field. Plate tectonics may be used, in part, to explain the distribution of flora and fauna as well as some of the ethnic groups on Earth.

Introduction

Since the mid-1960's there has been a radical change in the thinking of the geo-scientists. Before that time it was generally believed that the continents were fixed as to location and the only significant changes that took place were subsidence of sedimentary basins, the formation of geosynclines and mountain building supported by a concept of isostasy. Now, due to many facts that have come to light—magnetic stripes on the ocean floor, geometric fit of the coastlines, strike of shear zones, island chains and island arcs—it is seen that the continents have not always been in the positions they now occupy. In fact, they can be reassembled, much like a giant jigsaw puzzle, into a former single supercontinent called Pangaea (all land), composed of two major parts, Laurasia in the northern hemisphere and Gondwanaland in the southern hemisphere. Information is rather sketchy and inconclusive, being mostly confined to the Applachian and Ural Mountains regarding pre-Pangaea continents.

During the Deluge there could have been some continental drifting, as shown by mountain belts such as the Urals and the Applachian Mountains which appear to be older than the land mass known geologically as Pangaea. This supercontinent lay astride the equator and apparently reached well into both the Antarctic and Arctic regions. The Tethys Sea was an embayment between Laurasia and Gondwanaland and the entire supercontinent of Pangaea was surrounded by Panthalassa, the world ocean and ancestral Pacific.

Noah's Ark, it is suggested, came to rest on the mountains of Ararat near the western end of the Tethys Sea. During the century following the Deluge, Noah and his progeny would have migrated to the area of Babel. At this time the tongues were confounded; and perhaps 100 years later (during Peleg's lifetime) Pangaea started to break up. Between these two events the peoples could have migrated to the farthest regions of Pangaea. At an easy slow pace of 16km per day (10 miles per day) it would have taken at most two years. There would have been no need for land bridges or ships as both man and animals could have easily walked to any part of Pangaea without difficulty. The historical distribution of peoples, vegetation and animals could have easily come about during the two centuries following the Flood; and their separation due to the breakup of Pangaea would have kept them isolated.

Dr. John Piley[1] indicates that there is an ethnic connection between the black-skinned peoples in lands bordering the Indian Ocean, in particular, E. Africa,

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