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"NOTHING" CAN REDUCE "EVERYTHING"

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ABSTRACT

Vacuum bubbles formed within turbulent fluids possess unimaginable capability for rapidly reducing materials. The violent collapse of these bubbles (cavitation) is unavoidable in floods, and rampant cavitation during the historical flood explains how portions of the geologic column could have been formed within minimum time.

INTRODUCTION

If Charles Lyell and Charles Darwin had known about the quantum leap in erosion caused by cavitation reduction, and the fact that over 200 widely separate cultures have a flood record, oral tradition or legend, it seems reasonable to assume that they would not have tried to present their theories for lack of a long earth history time frame. Therefore if the public can be made aware of the geological implications of cavitation along with a new emphasis on records of the universal flood, it follows that the dominance of evolution can be ended for lack of necessary time. This focuses attention on the crucial importance of the book that brought about the revival of the creation movement, The Genesis Flood by John Whitcomb and Henry M. Morris, Jr. Improving microscopes, telescopes, cameras, computers and a wide distribution of information will also help end the dominance of evolution IF that information includes a fair hearing for the creation model.

Fossil bearing sediments provide the best tangible evidence for a very old earth IF one accepts the principle of uniformity in erosion and deposition. Other methods of age determination that disagree with the generally taught geologic column are rejected so it could be said that most methods of age determination including astronomic methods, are calibrated to the geologic column. Almost everyone would agree that evolution is impossible if the universe, solar system and the earth are young. Therefore, because we have demonstrated a reasonable model for the formation of the majority of the geologic column/fossil record in a few hundred years, we have enhanced the competitive position of the creation model.

CAVITATION EXAMPLES

Relative motion releases energy. Earthquakes, volcanoes, avalanches, large weather systems, and floods are some of the large magnitude examples of this widely observed fact. Turbulent fluids cause vortices, vortices cause vacuum bubbles, and the sudden violent collapse of vacuum bubbles cause shock waves which have resulted in measured impacts as high as 350,000 lbs. per square inch. This is one hundred times the force it takes to shatter good concrete. The effect of cavitation damage is documented in a paper by Hydraulic Engineer R. P. Regan, The Importance of Smooth Boundaries Subject to High Velocity Flow given at a hydraulic design conference at Waterway Experiment Station in February 1977.

Numerous examples of cavitation damage to dams can be cited, some of which must be categorized as nearly catastrophic. The pressure (pressures as high as 350,000 psi have been measured in the collapse of cavities by the Fluid Mechanics Laboratory at Stanford University). This is the force that ultimately inflicts the damage when the collapse occurs at or near the non-fluid boundary.

The most dramatic evidence of "cavitation" was recorded by the United States Government Bureau of Reclamation in its 1983 film, "Challenge at Glen Canyon Dam". This film records the results of the exceptionally large Colorado Basin run-off during 1983-84, and presents an understandable explanation of cavitation. It included a sequence showing water coming out of

the 40' diameter spillway tunnel which suddenly ceased to flow smoothly, or "sweep". When the flow rate was raised from 17,000 to 32,000 cubic feet per second, the water turned red because it had pulverized the 3 foot thick steel reinforced concrete lining and was chewing up the red sandstone canyon wall. There are reports that this damage was causing a Richter Scale 3 earthquake. The flow was immediately reduced and the water cleared. The hole that was formed by this short-lived event required 62,500 cubic feet of concrete to replace the lost material. If it took ten percent solid red material to color the water, 3,200 cubic feet per second x 20 seconds equals 64,000 cubic feet. Five percent solid red material results in a 40 second event, and two and one-half percent solid eroded material to show the water red gives an 80 second time duration for this dramatic event. Since the percent of solid material was not scientifically verified, one can enter their own estimate when viewing the film or video. The 62,500 cubic feet of material eroded from near the elbow of the spillway can be comprehended by visualizing a basketball court with a 12 foot thick solid rock covering the entire court.

Imagine sitting behind a transparent protective barrier and seeing this material pulverized and moved away at over one hundred mph in less than a minute. Note also that the 2" diameter steel reinforcing rods (about 120,000 psi compressive strength) were broken off. The compressive strength of the red sandstone canyon wall material averaged 6,000 psi. It is a somewhat porous material but comparable in strength (about 80%) to the concrete lining in the spillway tunnel. A common misconception is that sandstone is a generally weak material, but sandstone can include a broad spectrum of compressive strengths. The Tapeats sandstone in the Grand Canyon had the highest compressive strength (11,000 psi) of all the layers, when checked with a Schmidt rebound hammer.

The Glen Canyon event, which happened "on camera", is duplicated around the world several times each year. It happened at Hoover dam in late 1941 in the 50' diameter Arizona spillway tunnel. The maximum velocity of the water near the area of damage at Hoover was about 120 mph and the maximum flow was 38,000 cubic feet per second. The damage was comparable in size to Glen Canyon, but the time factor is not known; though some put it at under 30 minutes.

RESONANT CAVITATION POSSIBILITIES

The documented short time duration for the Glen Canyon damage supports Clifford Paiva's suggestion that the shock wave frequencies may vary with a combination of velocity, roughness and other unknown factors. A peak destructive efficiency occurs when the resonant frequency of the shock waves matches the frequency at which the hard material explosively disintegrates. This thinking may contribute to explaining disasters such as the Challenger space vehicle, Aloha 101, the Concord losing its tail over New Zealand in early 1989, a United plane suddenly losing a door, and other dilemmas awaiting a satisfying explanation. Well-known effects of resonance causing instant disintegration include: (1) the Memorex tape sound waves that shatter a goblet across a room; (2) military policy of "break step march" when crossing a bridge to preclude disaster; (3) collapse of the Tacoma Narrows bridge from wind induced resonance; (4) collapse of a bridge in Arkansas from occupant induced resonance; (5) quite possibly the bridgeway collapse in the lobby of the Kansas City Hotel since people were dancing on it when it collapsed, killing dozens; (6) and most destruction of structures from earthquakes occur because of resonant matching.

Most flood-caused bridge failures could well be related to cavitation causing an increase in what is mysteriously called "scour". This is large magnitude erosion and can activate a stream bed well below the bottom of the pier footings. During a flood of long duration there is no reason why this activity would not be miles below the fluid surface level. Inventing a way of monitoring the depth of river bed movement during floods would be a boon to our society. It is worth noting here that the specific gravity of a turbulent fluid always increases as it picks up a load of sediment, and this sediment can include what might be called sharp and heavy "hammers". This includes airborne sediment especially notable in tornados, hurricanes, "dust devils", etc.; all of which are vortices. Note the airborne automobiles which smashed a shopping center in Huntsville, Alabama during the November 15, 1989 tornado.

Cavitation damage is widely recognized in many branches of engineering. This quote from the first paragraph of an "International Cavitation Erosion Test" demonstrates this fact.

Cavitation and cavitating erosion present one of the most serious operating problems of contemporary hydraulic machines and equipment. State sponsorship of cavitation research programs is also a manifestation of deep concern with the problem in many countries.

The final report of this International group is due in October 1991.

A purpose of this presentation is to relate cavitation to geology, more specifically to the magnitude of its effects during the global flood recorded in Genesis 6-9. A large multitude of separate cultures concur universally about a catastrophic flood.

Cavitation involvement in geology is probably given its best expression in the Harlen Bretz treatment of what he calls The Channeled Scabland. In a report "Erosion by Catastrophic Floods on Mars and Earth", Baker and Milton writing for Icarus 23, 24-41 (1974) include this astounding assertion on page 31,

...during the brief duration of the flood (in the day or two of sustained high discharge) channels were incised in bedrock as deep as 200 meters.

There is, at present, visible evidence of an ancient lakeshore about 1,000 feet above Missoula, Montana. This lake was formed by a glacial ice cork blocking off Clark Fork River near the Idaho-Montana border.

When the ice dam at the mouth of the Clark River Fork failed, the lake drained at a rate unmatched by any flood known,...The maximum rate of flow is estimated to have been 9 1/2 cubic miles per hour, a rate of 386 million cubic feet per second, or about 10 times the combined flow of all the rivers of the world. For comparison, the rate of flow of the world's largest river, the Amazon, is 6 million cubic feet per second, and the Columbia averages about 255 thousand cubic feet per second.

This quote from a 1976 Department of the Interior/Geological Survey booklet means that an equivalent of 64 Amazon river discharges simultaneously roared across southeastern Washington for several days. Further quoting from page 16,

The currents were so turbulent and so powerful that they were able to pluck out and transport blocks of basalt, some more than thirty feet across. Deep canyons were eroded into the basalt and, where cascades developed, plunge pools and cataracts formed.

It is suggested here that the Grand Canyon could have been formed in a similar manner. Cavitation provides a mechanism vital to the explanation of rapid erosion of the Grand Canyon if it is assumed the strata was made of hardened rock prior to erosion. The cavitation factor provides useful elements for a rapid formation Grand Canyon Model.

DARWIN, LYELL, AND CANYONS

The Santa Cruz River canyon in Southern Argentina played a key role in turning Charles Darwin from his belief in a young earth and a reliance on the Biblical chronology which he held prior to seeing the steep walled canyon of the Santa Cruz and the relatively small river flow. If Darwin had been aware of cavitation and the fact that the Santa Cruz originates from two large lakes in the midst of an area that is prone to glaciers, earthquakes, volcanoes, and avalanches, he may not have made his "first wrong turn". Mt. Fitzroy, named to honor the captain of the Beagle, is at an elevation of 12,701 feet and just 10 miles to the southeast is Lake Viedma at 800 feet elevation, a 2 mile drop in elevation in 10 miles distance. The outflow from Lake Viedma drops 200 feet in less than 15 miles and flows into Lake Argentino. Each of these lakes is between 10 and 15 miles wide and 40 to 50 miles long. Glaciers come right down to the present shoreline of both lakes. Imagine this scenario: Mt. Fitzroy and the other glacier clad mountains in the area experience an earthquake and one or more of the region's volcanoes respond like Mt. St. Helens in 1980. The glaciers halve off into both lakes, sending a pair of huge waves that end up flooding down the Santa Cruz. The icebergs float to where Lake Argentino drains into the Santa Cruz and create an ice dam similar to a huge log jam. The seasonal snow melt raises the level of the lake until it overtops and destroys the ice dam and floods the Santa Cruz valley with results similar to the Channeled Scabland of Eastern Washington. We know from experience that if evolutionists can imagine a scenario that is reasonable and meets their needs it almost immediately becomes established dogma until someone proves it to be impossible. The idea for researching the Santa Cruz came from reading the first chapter of Michael Denton's book, *Evolution a Theory in Crisis*.

Charles Lyell researched the time it took for Niagara Falls to erode the seven mile long Niagara Gorge during a visit in 1841. Ian T. Taylor has researched it further and reports in his 1984 book, *In the Minds of Men*, pages 81-84, that Lyell's conclusion that it took 35,000 years is based on his assumption that it eroded one foot per year. This was done in spite of a local observer telling him it eroded three feet per year. It later was established that a rate of four to five feet per year was more accurate. (These rates were measured before the building of hydro-electric power plants which now take much of the flow). The facts of Niagara are actually in accord with the flood and a literal (no gaps) Bible chronology.

I suggest a reasonable earth history model that includes large volume fluid flows, the makeup of the fluids ranging from slow moving lava to extremely high velocity water, as well as high velocity winds. This model has very old historical support from almost every known culture and is given its best expression in Genesis 7:11&12 and 8:1-3. The proposed model also includes an earth crust several miles farther from the center of the earth prior to the historical flood, with the present ocean beds sinking and the mountain building explaining the tilted strata. The opening event of the flood has left its evidence as the Mid-Oceanic Ridge. This released vast quantities of subterranean fluids and sequentially removed support for the crust of the earth. During the "escape" of these fluids, cavitation erosion reduced the thickness of the crust acting on its underside, thereby reducing its load-bearing capability and at the same time the exhausted fluids which had been a support factor increasingly becoming a load factor. These pressurized exhausting fluids would have reached enormous elevations, precipitating whatever historical vapor canopy and eroding massive quantities of crust as it enlarged the escape vents. Much of the fluids for the historical flood classified as rain would have been the fluid that originated from subterranean sources falling back down to the surface of the earth. The action started at the Mid-Oceanic-Ridge would gradually be joined by similar action as large blocks of crust dropping into the newly formed cavities repressurizing the remaining subterranean fluids, and the sequence is repeated over and over with the action moving perpendicularly away from the MOR (Mid-Oceanic-Ridge). Earth movement caused by gravity is very uniform directionally, with the center of the earth its historical target. The proposal that material flowing out of the MOR drives the continental blocks horizontally is weak. The apparent fit of some continental blocks and similar strata of widely separated continents is called into question. This crustal collapse model is essentially an expansion of the model proposed by the father of stratigraphy Nicolaus Steno, also known as Neils Stensen (1631-1686). A look at a National Geographic physical globe shows many confirming elements. We need to be constantly aware that only 13 miles of vertical distance separates the highest and lowest points on an earth with a circumference of 24,000 miles. Note the statement by Dr. K. K. Landes, Head of the Geology Department at the University of Michigan writing in Geotimes Vol. III, No. 6 (March 1959), p. 19.

Can we as seekers after truth shut our eyes any longer to the obvious fact that large areas of sea floor have sunk vertical distances measured in miles? (from "The Genesis Flood", p. 126)

The sequential catastrophic failure of large blocks of crust would have been something analogous to the failure of the 1 plus mile of the Nimitz Freeway in Oakland, CA during the October 17, 1989 earthquake. Once structural integrity is lost, failure proliferates rapidly.

The model further proposes a time when the crust still retained much of its integrity with a thick layer of dense turbulent fluid containing most of the fossils moving back and forth continually from repeated catastrophic earth movements along with unrestrained tides. The fluids, mostly from subterranean sources along with the collapsed vapor canopy, provided abundant volume to cover the pre-flood hills or mountains which may have been only one or two thousand feet above pre-flood sea level. Large fluid waves caused by earthquakes could have repeatedly overtopped all landforms and the resultant cavitation and plain impact from the waves would have caused almost instant denudation and erosion similar to the water waves documented by Steven Austin in reference 151 of his book, *Catastrophes in Earth History*. As the sea floor near the MOR sequentially sinks, runoff from the continental blocks massively erodes landforms with cavitation catastrophically active.

During the year long historical global flood and the many following years of movement toward climatic and crustal equilibrium, additional runoff and localized catastrophic events of gradually decreasing intensity, would have resulted in the landforms, ocean beds, fossil record and geologic column we now observe. The proposed model will come into clearer focus with future refinements. Its dim outlines are an amalgamation of many previous proposals, but in general many elements of the model are attractive because of their economy. By starting with the surface of the crust several miles higher than the present, lifting action could be limited to the fulcrum effect when a large section of crust loses its support at one end while its support nearer the opposite end is retained. A half cycle teeter-totter effect would occur with a break occurring somewhere beyond the fulcrum at the raised end. Some may cite the absence of evidence for a vast heat release by the several mile collapse of the earth's crust. This could well match an absence of heat from the sun for a prolonged period due to an expanded "Krakatoa Effect" from particulate matter in the atmosphere caused by the intense volcanic activity that accompanied the flood. Unsupported solids displacing fluids makes gravity the main component of this model. As the energy industry removes fossil fuels from under the earth, every precaution is taken to replace the lost support. The model provides the complete restructuring of the earth in a short time frame which conforms it to the observed fact of the rapid deposition of layer after layer with no evidence of time intervals between the layers.

Was the flood, among other things, a giant cement mill? Cement can be manufactured from 50 different known materials. The process involves pulverization, then burning or heating followed by grinding the residue and adding various other chemicals. Events following the collapse of cavitation bubbles have the capability of doing all of the above. This is a speculative idea, and help is solicited from qualified sources. This possibility could shorten the time frame for lignification of sediments. It can also explain why there is an occasional layer of soft material among layers of hard rock.

It is easy and entertaining to speculate about earth history models, but the major purpose of this presentation is to solicit research into unknown aspects of turbulent flow, and sensitize geologists toward further research into the sudden large magnitude changes that occur from relative motion. Another purpose is to encourage further field exploration in promising areas, such as, ancient lakeshores above Glen Canyon Dam, The Channeled Scablands of Eastern Washington, Nelson County Virginia for effects of a 36" rainfall during hurricane Camille in 1969, Santa Cruz Canyon in Argentina, and large constantly monitored civil engineering projects that have experienced cavitation damage. Learning to preclude cavitation damage at dams has been a major achievement of the engineering profession.

CAVITATION DOCUMENTATION

The potential from cavitation for large scale rapid change in landforms and ocean beds is documented by Hubert Barnes in Cavitation as a Geological Agent (American Journal of Science, Vol. 254, August 1956, p. 493-505).

At present the experimental difficulties involved in the measurement of the instantaneous and very local pressure from a bubble collapse have not been conquered, but experimental results recently gave 30,000 atmospheres (450,000 psi) as a minimum pressure (Vennard and Lomax, 1950). The large order of magnitude of the pressure is very significant for the understanding of cavitation erosion. The effect of these "hammer blows" is to shatter the surface of any nearby solid material; then pieces become dislodged and are carried away as the fracturing continues and the surface roughness increases. ...Vibration induced by successive impacts probably causes appreciable failure through fatigue. A minor electrical and chemical effect is also known, and there may be other unknown effects. A temperature rise has been noted at the collapse of individual bubbles. The temperature at the collapse of the bubble has been calculated at 2,700 degrees K (Rutenbeck, 1941) or about 4800 degrees F, and cavitation erosion with the appearance of fusion in test samples has been cited (Nowotny, 1942; Rutenbeck, 1941) as proof of the high temperatures at the point of collapse. The author has observed carbon coated globular forms due to fusion on an iron surface and the odor of burning rubber where each has been exposed to cavitation. The temperature has not been measured experimentally because, like high pressure, the high temperature is only very local and instantaneous. This local high temperature at the collapse of a bubble would tend to form another bubble by evaporating more vapor.

CAVITATION SPECULATION

There seems to be some evidence that cavitation can rapidly proliferate and that a train of collapsing vacuum bubbles can release large amounts of energy. With a large quantity of vacuum bubbles, one bubble collapses sending a violent shock wave which causes its neighbor to collapse more violently, which causes its neighbor to collapse even more violently, and so on. Also it has been suggested that the vacuum bubble size is directly proportional to fluid velocity, and the pressure of the collapse-induced shock wave is directly proportional to the size of the bubble. With these possibilities it is well to keep in mind that no one knows what fluid velocities were present during the historical flood. What velocity would unrestrained tides reach, and what velocity would the exhausting fluids at the breaking up of all the fountains of the great, great deep have reached at their maximum?

CONCLUSION

As creationists continue to systematize their model for earth's history, it will become apparent that cavitation must be an integral element of such a model. Cavitation is a logical consequence of a "flood" model having high velocity water flows and turbulence. As the vacuum bubbles produced by this turbulence collapse, they produce shock waves causing massive erosion of strata beneath the turbulent flow. The Glen Canyon and Washington Scablands are but a few examples of cavitation. This "vacuum bubble" action reminds of 1 Cor. 1:28,

"...hath God chosen, yea, and things which are not (vacuum bubbles) to bring to naught things that are (strata)."

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This is one of three papers on cavitation as it relates to geology, with the others given by Dr. Edmond Holroyd III and Clifford Paiva. Much benefit has occurred by consultation with the other authors who, along with myself, I refer to as "The Three Caviteers". May our tribe increase.

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