BOMBARDMENT OF METEORS FOR THE LAST 3.8 BILLION YEARS

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Abstract: In a twenty-four hour period of time millions of meteors fall into the earth's atmosphere anywhere from a meteor the size of a grain of sand and other larger than a basketball. Every so often a meteor about the size of a small car comes through Earth's atmosphere as well. There is no reason to believe that the amount of planetesimals and debris remaining from the initial formation of the solar system would be lower then than it is now, therefore there most likely would have been a much higher frequency of bombardment of the Earth from this debris in the form of meteorites at that time. Indeed, scientists refer to this period from about 4.1 to 3.8 billion years ago. This paper is to discuss this subject and show that there is reason to believe that meteor bombardment upon the Earth is less upon the Earth now than it was 4.1 to 3.8 billion years ago.

Key words: Meteors, Meteoroids, Lunar Meteor Strikes.

1 Background

Late heavy bombardment (LHB), is clearly evidenced on the surface of our moon. Dating from lunar soil samples brought back by Apollo astronauts give a clear indication of the LHB [4]. By inference, the LHB also must have contributed a large number of meteorites to the Earth and its atmosphere as well. Since many meteorites burn up in the atmosphere, there would be a large influx of material from the meteorites, contributing to the change of the Earth's atmospheric composition due to the introduction of a wide variety of extraterrestrial material. Additionally, the increase of gases from the

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vaporization of this meteoric material would increase the density of the atmosphere, contributing H_2O, which is the primary component of greenhouse gases.

Since CO_2 would also be forming from Earth's volcanic activity during this time, a steady increase in the atmospheric density and pressure would contribute to the rising temperature levels worldwide, brought about by the greenhouse effect. Some scientists believe that comets may have struck the Earth during this time as well. Although there is no direct evidence that this has occurred, there is indirect evidence that the Tunguska event in Siberia, 1908 may have been an air burst from an inbound comet. As solid bodies composed mainly of frozen gases, one of the primary components being H_2O, this would have also contributed to the addition of atmospheric water vapor.

Comets with a radius of 50 km would contain roughly 5.26 x 10^5 km^3 of solidified gases, which would of course vaporize and expand upon impact with the Earth's atmosphere. This then poses the question: Which occurs most often- comets actually striking the Earth, or meteorites striking the Earth? Stewart [3] poses and discusses an alternative answer to meteors and meteorites striking the earth. Which is also consistent and agrees with NASA's Jet Propulsion Laboratory, approximately 100 t material lands on Earth every day [1]), mostly in the form of small particles and dust. NASA's Asteroid and Comet Watch program, states, emph"Every day, Earth is bombarded with more than 100 t of dust and sand-sized particles. About once a year, an automobile-sized asteroid hits Earth's atmosphere, creates an impressive fireball, and burns up before reaching the surface."

NASA has placed cameras in many places on a world wide basis to exactly get to the truth as to how much meteoroid, meteors, and meteorites are hitting Earth's atmosphere every day. As Figure 1 above shows where the long white streak is seen is a large meteor coming through Earth's atmosphere, which as dense as Earth's atmosphere is now, this meteor will burn up 3.0-4.0 billion years ago it would have made an impact explosion upon Earth's surface.

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Figure 1: **A Southern Delta Aquarid fireball streaks over one of the network cameras in July 2010 (Source: NASA [1])**

composition due to the introduction of a wide variety of extraterrestrial material. Especially in an infinite amount, since Earth's atmosphere was much thinner. Additionally, the increase of gases from the vaporization of this meteoric material would increase the density of the atmosphere, contributing H_2O, which is the primary component of greenhouse gases. Since CO_2 would also be forming from Earth's volcanic activity during this time, a steady increase in the atmospheric density and pressure would contribute to the rising temperature levels worldwide, brought about by the greenhouse effect. Some scientists believe that comets may have struck the Earth during this time as well.

Although there is no direct evidence that this has occurred, some scientists and researchers believe that there is indirect evidence that the Tunguska event in Siberia, 1908 may have been an air burst from an inbound comet. As solid bodies composed mainly of frozen gases, one of the primary components being H_2O, this would have also contributed to the addition of atmospheric water vapor. A comet with a radius of 50 km would contain roughly 5.26 x 10^5 km^3 of solidified gases, vaporizing and expand upon impact with the Earth's

atmosphere. This then poses the question: Which occurs most often- comets actually striking the Earth, or meteorites striking the Earth? According to NASA's Jet Propulsion Laboratory [1], approximately 100 t material lands on Earth every day, mostly in the form of small particles and dust. Consistent with Short and French [2] as well.

2 Evidence

In relation than to the recent large The Chelyabinsk Russia Meteoroid Impact in Chelyabinsk, Russia would seem to give considerable evidence, that instead of a comet blast occurring in Siberia in 1908, that in all likelihood, it was due to a large meteoroid that impacted Siberia instead. By what has been discussed in this paper because of the amount of meteors and meteorites that strike the earth's atmosphere literally millions of time per day in a twenty-four hour period of time, it would make more scientific sense, and deductably logical that when the Earth has just formed and its atmosphere was either very thin or did not exist at all, that the earth was impacted with much more intense severity from meteors and/ or meteorites in much greater quantities per twenty-four hour period of time 4.1 to 3.8 billion years ago in Earth's infancy, compared to the current day and time in Earth's history.

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