

Perigee: Zero

The Terraforming of Earth by Comet Impacts

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Summary

An alternate solution set is proposed for cratering dynamics and ejecta distribution during the impact of hydrated comets captured into earth orbits. Terrestrial landforms whose characteristics may not conform to generally accepted natural processes are identified and an attempt is made to correlate these to the alternate solution set. Results are presented which are highly indicative that the landforms identified are impact and ejecta landforms. We propose that the impact and ejecta damage is manifested so extensively across the earth that the generated landforms are considered ordinary. The massive volume of water accreted into the hydrosphere during the proposed events is examined for causality of known world flood events and the stabilization of earth's environment during the Holocene era.

Introduction

Science fiction writers have proposed that mankind may some day engage in Terraforming planets in the solar system or universe. The concept envisions a massive technological undertaking to extract water and oxygen from the natural resources on the planet, creating a habitable troposphere and hydrosphere¹. We propose that the Earth's environment was enhanced during a series of naturally occurring cometary impact events over the last 15,000 years, effectively terraforming the earth and fostering the growth of human civilization.

Circumstantial evidence exists suggesting the earth has been struck repeatedly in the recent era by large-scale extraterrestrial bodies.² The Taurid Complex is often proposed as the source of these impacts.³ Anecdotal evidence, primarily in the form of legends, mythology and historical religious texts, present human eye-witness accounts of the earth in global chaos during several periods. More recently, the period around 1000 AD, collectively known as the "Dark Ages", has generated seemingly unjustifiable accounts of environmental disruption. However, the lack of physical evidence in the form of impact crater structures and debris fields has rendered the celestial impact theories moot and indefensible as mainstream science.

1 Technological Requirements for Terraforming Mars Robert M. Zubrin., Affiliation : Pioneer Astronautics, Christopher P. McKay,;NASA Ames Research Center. <http://www.users.globalnet.co.uk/~mfogg/zubrin.htm>

2 The cometary breakup hypothesis re-examined - A reply Authors:CLUBE, S. V. M.; NAPIER, W. M. Affiliation:AA(Oxford University, England) AB(Royal Observatory, Edinburgh, Scotland)Journal: Royal Astronomical Society, Monthly Notices (ISSN 0035-8711), vol. 225, April 1, 1987, p. 55P-58P.04/1987

3 The structure and evolution of the Taurid complex, : STEEL, D. I.; ASHER, D. J.; CLUBE, S. V. M. AA(Oxford, University, England; Adelaide, University, Australia) AC(Oxford, University, England) published by Royal Astronomical Society, Monthly Notices (ISSN 0035-8711), vol. 251, Aug. 15, 1991, p. 632-648.

Among potential impactors crossing earth's orbit are a class of cometary or cometary derivative objects exhibiting characteristics of low density and high water content. We propose the generally applied model for planetary impact crater formation associated with metallic or rocky impactor does not apply directly to impacts by these bodies. Specifically, we postulate that in the specialized case of shallow angle of incidence earth impacts by large hydrated comets, a fluid dynamics-based model would apply instead.

The Taurid Complex is a cometary debris stream revolving around the Sun in an earth-crossing orbit. Analysis suggests that during the recent past, a significant mass has been removed from the Taurid progenitor. We propose the earth captured this missing mass into earth orbit as large (~100+ km diameter.) cometary fragments, during several close Earth-Taurid orbit intersections over the past 15,000 years. The resulting earth satellite orbits would be highly elliptical, eventually decaying such that the captured comet bodies would make contact with the earth's surface during a grazing interface at perigee. The concept is introduced as Perigee:Zero, or PZ. We propose that after one or more grazing events the cometary body, reduced in size and having lost momentum, would dissipate in a terminal impact.

The PZ cometary bodies are hydrated silica; effectively "dirty snowballs". Due to the water content and shearing angle, crater structures are cleanly excised from sedimentary layers as a hydraulic action, resulting in geologic structures not traditionally identified with impact.

PZ-Grazing events manifest themselves as "trenches" whose width is constrained by the diameter of the comet body. PZ-Terminal events are very low angle-of-incidence impacts materialized as fan-shaped distributions of ejecta as the body is fully disrupted. PZ-Airburst event, which would result in airbursts similar to the Tunguska event of 1918, are not identified or evaluated. Similarly, on orbits immediately prior to the actual PZ-Grazing events, "near-miss" atmospheric transit events would have occurred. We suggest this caused significant environmental damage, but have not attempted identification of them. Using remote sensing imaging, we examine approximately 25 landforms meeting the criteria.

We demonstrate that PZ ejecta material is distributed over significant distances from the impact site in the form of tsunamite splash, lofted droplets and intact strata of varying masses and water/mineral ratios. PZ -Tsunamite and PZ-Splash ejecta is cleanly excised from sedimentary layers and consists of slurry of pulverized and hydrated minerals (sand, clay, mineral) and impactor elements. In several cases examined, ejecta is manifested as geographically repositioned intact terrestrial stratum, perhaps from undercutting and lofting. We will refer to this as PZ-Divot ejecta. Significantly, in each case, the resulting geologic landforms are not traditionally recognized as ejecta structures.

Visual evidence in the form of remote sensor imaging of PZ-Grazing and PZ-Terminal craters and of the correlated ejecta landforms is presented. Further correlation is attempted using the location, composition and geomorphology of the

anomalous ejecta emplacements and their immediate surroundings. Observed sequential accretion of ejecta layers is discussed.

This discussion is limited to the manifestations of damage to above-sea-level terrestrial surfaces and shallow costal areas. An observed cratering count of 20 to 30 is seen as representing the manifestations of 15 cometary bodies. The oceans represent much higher percentage of surface area. When adjusted upward to account for oceanic impacts, we propose that 40 cometary bodies may have accreted from the Taurid stream.

The advancement of human civilization is considered by some to have been fostered by the development of agriculture and the associated change from hunter-gatherer existence. This change may have been supported by the dramatic stabilization of the earth's environment that provides the demarcation between the Pleistocene and the Holocene eras. An alternative could be that a significant percentage of the Earth's hydrosphere was delivered during the PZ impact series. PZ ejecta emplacements are often manifested as water-retaining structures, and may represent a significant percentage of today's natural fresh water lakes. Together these two are seen as changing the ratio of land-to-water surface area, enhancing the energy distribution of meteorological processes and providing the observed stabilization of the earth's temperature.

It is our opinion that the terrestrial landforms identified and discussed are highly indicative of cometary impact craters and ejecta emplacements. If accepted, the theory would offer the missing proof point to the Taurid Stream's theoretical catastrophic impact series, and would have significant implications in our understanding of both the development of human civilization and of Earth's geomorphology.