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THE FLOODING OF THE MEDITERRANEAN BASIN AT THE YOUNGER-DRYAS BOUNDARY

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ABSTRACT

This paper updates the published timing of the Mediterranean Sea's flooding, as well as its causation. In so doing, we correct an historic error committed by geologists nearly two-hundred years before present that has all of science and related fields of inquiry based on the tenet that there was never a worldwide flood. In correcting geology's error, we unify science with the human narrative tradition.

KEYWORDS: Younger Dryas, coherent catastrophism, cosmic impact, worldwide flood

1. INTRODUCTION

We begin by reviewing the source of geology's prevailing "no flood, ever" paradigm, and we identify its indisputable error. From there, we turn to recent findings from geology and other earth sciences, now supported by recent archaeoastronomic analysis of Göbekli Tepe, indicating that a major cosmic impact induced catastrophic consequences roughly 12,800 years before present at the Younger-Dryas (YD) boundary. Until this paper, the impact's remnants and its primary effect were unknown. We satisfy these shortcomings by identifying and analysing the impact site and then by describing its major effect, the worldwide flood, which included the subsequent flooding of the Mediterranean Sea through the Strait of Gibraltar.

Our findings lead to a better understanding of earth and human history. Furthermore, the findings will induce fundamental reformations in geology and anthropology, and they will inspire archaeological expeditions to formerly subaerial but now submerged landscapes.

Geology's prevailing "no flood, ever" paradigm has a simple history, and it is summarized as follows. In the early decades of the 1800s, geologists set about Europe in search of a common deposit layer left by the presumed worldwide flood. Adam Sedgwick, president of the Geological Society of London, professor at Cambridge University, and an ordained minister in the Church of England, led the effort. Unfortunately, the sought-after deposit layer was not to be found. As a consequence, in his 1831 president's address to his society, Sedgwick renounced his belief in a worldwide flood. He stated, in part, "*The vast masses of diluvial gravel…do not belong to one violent and transitory period. It was indeed a most unwarranted conclusion when we assumed the contemporaneity of all the superficial gravel on the earth…. Having been myself a believer [in a worldwide flood], and, to the best of my power, a propagator of what I now regard as a philosophic heresy, … I think it right … thus publicly to read my recantation*" (Sedgwick, 1831).

The pronouncement has been celebrated as the triumph of science over religion, and Sedgwick's recantation has had lasting effect: to this day, all of science accepts that there was never a worldwide flood. This is why culturally ubiquitous flood accounts are classified as myths by historians and archaeologist.

Despite its longevity, celebration, and effect, Sedgwick's "no flood, ever" conclusion is indisputably wrong. From the evidence, Sedgwick instead should have concluded: presently exposed landscapes were never submerged by a common flood. Whereas it is undeniably true that currently subaerial landscapes were never flooded by a common event, that is not equivalent to the claim that there was never a worldwide flood. Sedgwick mistakenly passed judgment on vast, submerged landscapes that could not be observed until the recent publication of bathymetry maps. By assuming that all of Earth's waters have been with us since the beginning, Sedgwick's error precluded the possibility that now-submerged landscapes might once have been exposed and then flooded, which, as we will see, is exactly what happened at the YD boundary.

2. THE YOUNGER-DRYAS IMPACT AND THE WORLDWIDE FLOOD

2.1. The YD Impact

The YD event is an episode marked by abrupt increases in snowfall and dramatic changes to flora, fauna, climate, and the oceans (Firestone et.al., 2007). Its precise cause is unknown, although it has been attributed by some to a cosmic impact roughly 12,800 years before present that has yet to be identified (Holliday, 2014; Wolbach et.al., 2018). The impact is reported to have induced YD effects across at least four continents (Kennett et.al., 2015), and it also formed an associated layer of nanodiamonds (Kennett et.al., 2009), microscopic diamond crystals that are created by very high-velocity collisions, found across most of the planet (Kinzie et.al., 2014). Interestingly, none of the papers identifies the impact, something that we accomplish immediately.

The remnants of the YD impacting object (IO) are found in the Southern Ocean southeast of South Africa, north of Antarctica, and south of Madagascar; the impact centre is in the vicinity of 53°E, 57°S. Figure 1 shows two views of the impact site. The upper image is the standard Google Earth view along with a superimposed line depicting the approximate diameter of the impact crescent. This diameter measures approximately 2500 km (distance obtained using Google Earth's ruler function). Note that the diameter's line is perpendicular to what appear to be two parallel central scrapes interior to the impact crescent. The lower image is a magnetic anomaly overlay (Korhonen et.al., 2007), and on it we note that anomalies extend approximately 1,500 km to the northeast through the gap in the impact crescent.

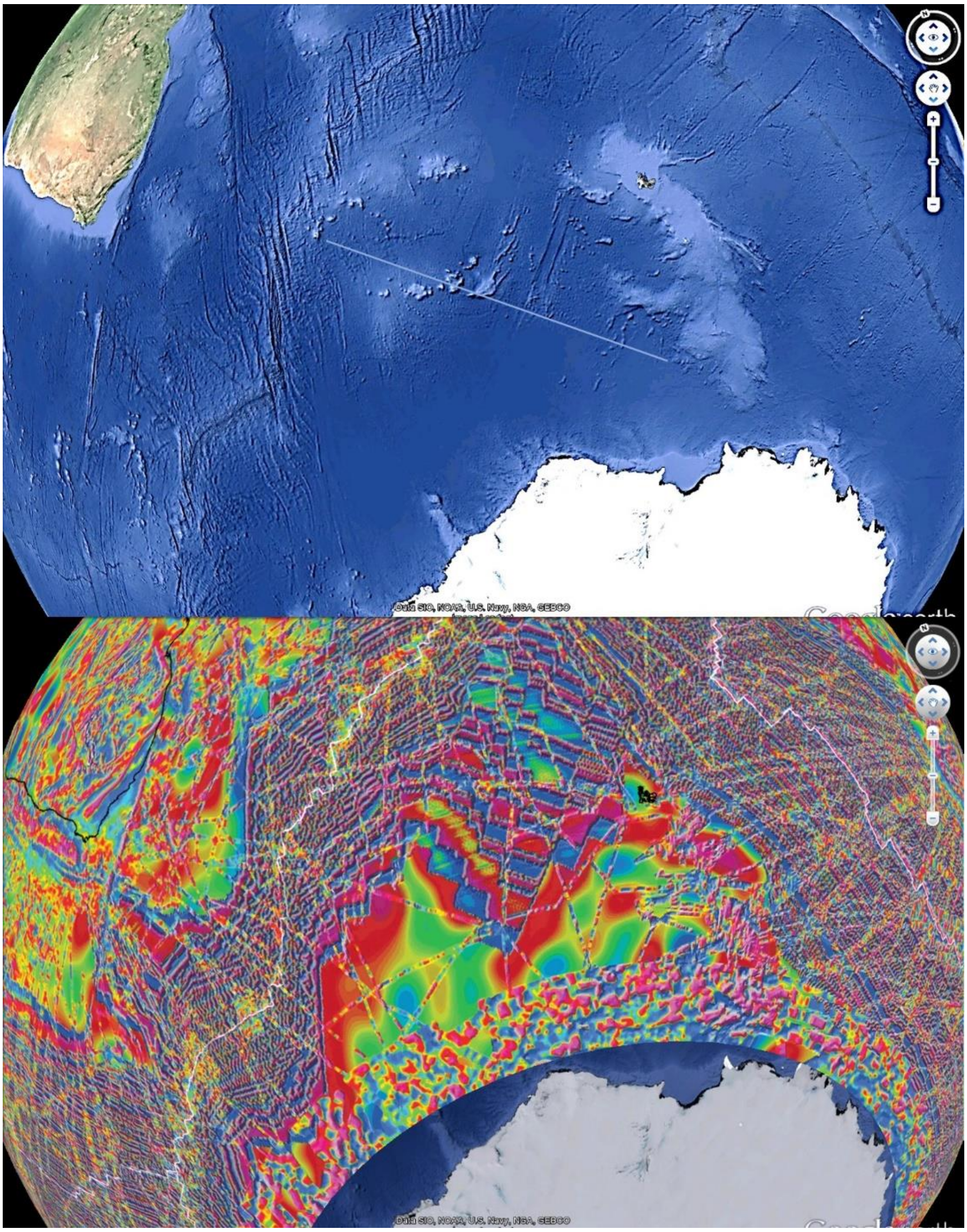

Figure 1. Identical Google Earth perspectives of the IO impact site include: (top) standard view with a superimposed diameter measuring 2,500 km; and (bottom) a magnetic anomaly overlay, from Korhonen et al. (2007).

The IO's composition is modeled on Figure 2. Having formed in the Oort Cloud, far from gravitational effects from our Sun and other stars, the IO was loosely packed due to very small gravitational accelerations (relative to Earth's) induced by its dense, solid nucleus. The IO's outer layer was consistent with known comet composition: porous, mostly open space, "unbelievably fragile," and "less strong than a snowbank."(Wilson, 2005) It is likely that the IO was displaced by a binary star system that passed through the Oort Cloud roughly 70,000 years before present (Mamajek et.al., 2015), was later captured by our sun's gravitational field, and was eventually brought into Earth's path.

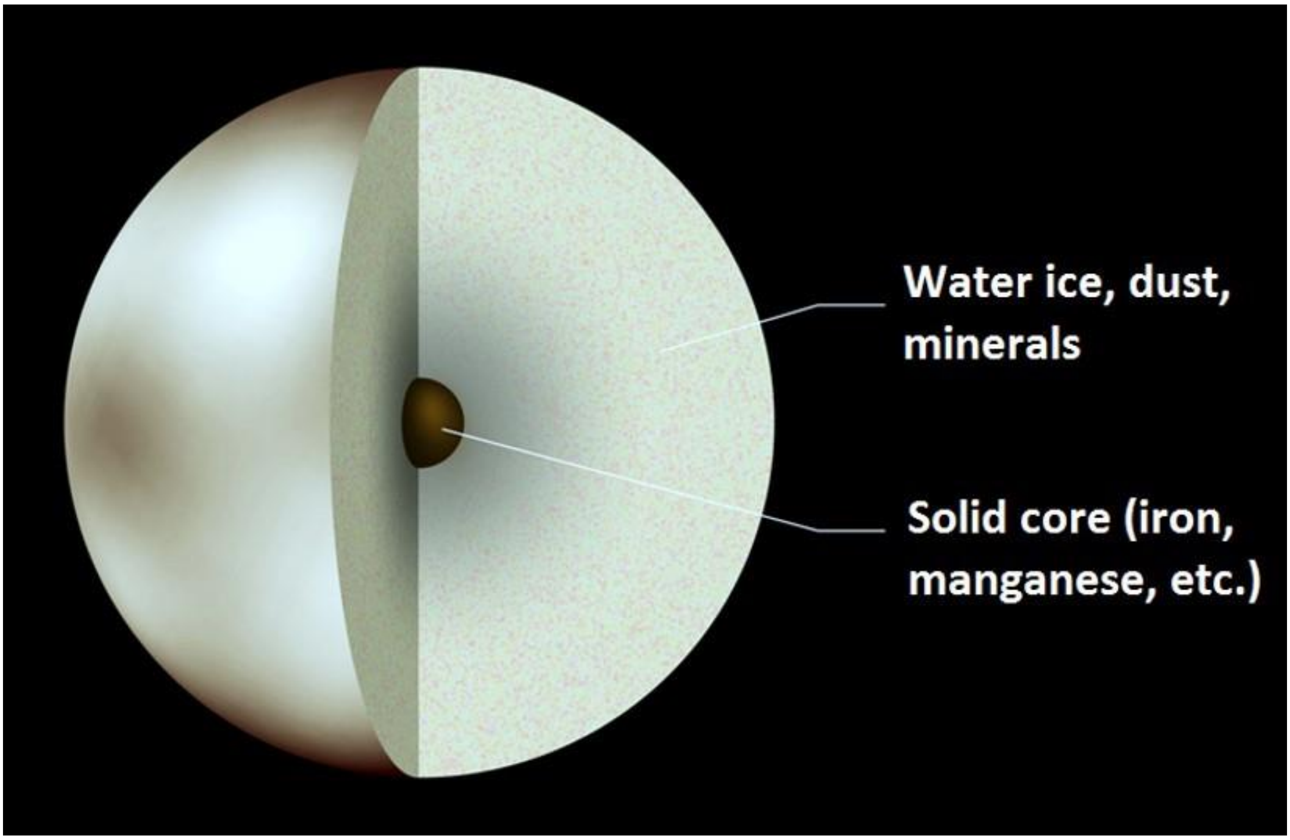

Figure 2. A model of the IO's composition includes a solid core that served as a gravitational sink that attracted materials into its outer layer as it formed, presumably in the Oort Cloud.

What appear to be parallel central scrapes emanating from the impact center of Fig. 1 (top) are actually the sides of a trough measuring 1,000 km in length that was carved by the dense nucleus as it skidded northward. This trough corresponds to a band of intense magnetic anomalies (red stripe on Fig. 1, bottom) created from materials worn from the nucleus during its immediate, post-impact transit. At the end of the trough are the IO's nucleus materials that served as the gravitational sink needed to attract and aggregate the outer ice and debris layer in the Oort Cloud. Effects from entry into Earth's atmosphere caused the fragile IO to split, which accounts for the gap in the center of the crater's crescent. Some minerals introduced by the IO were projected nearly 1,500 km to the north and northeast through the crescent gap by impact velocities and associated forces, as shown by their magnetic anomalies (Fig. 1, bottom). Raised regions interior to the crescent (light blue, Fig. 1, top) are deposit mounds, remnants from the melted mineral-ice complex that comprised the IO's outer layer. These mounds correspond to regions of intense magnetic anomalies (Fig. 1, bottom).

Geologists presume that a comet struck an ice sheet in North America and projected ice chunks several hundred to more than a thousand miles thereby creating the Carolina Bays and other impact craters found in North America (Zamora, 2017). Interestingly, but as yet unrecognized by geologists, thousands of similar impact craters are found along the length of South America – we can identify them using Google Earth. Some are shown on Figure 3; a table with crater locations in North America and South America is found in the Appendix.

Figure 3. IO fragment-created craters of various sizes are shown in this map of coastal Argentina. The long axes of the larger craters measure several km, whereas the smaller craters are roughly one-tenth that size. Note the NNW-SSE orientation of the craters.

Clearly, the hypothesized North American impact could not project ice particles over such distances as to create the South American craters. Consequently, a more correct explanation for the craters' formation is needed, and it is this: ice impact craters in both North America and South America were created by IO fragments that rained down along its flight path just prior to impact. The approximate overflight route of the IO's core is shown on Figure 4; it was obtained by back-propagating the direction of the parallel central scrapes found in the impact crescent's interior.

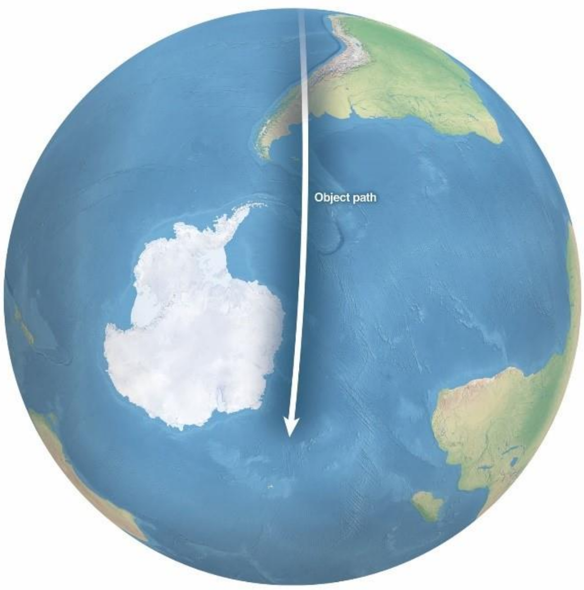

Figure 4. Back-propagating the impact trough's parallel central scrapes indicates the IO's pre-impact flight footprint, shown by the white arrow.

Upon impact, collisions and interactions between energetic IO-borne minerals and terrestrial materials created the YD nano-diamond layer, placing the impact approximately 12,800 years before present. In addition, the massive IO impact, its direction, its size, and its energy would have created an immense particulate cloud that would have been carried aloft and deposited over vast regions. Thus, the IO accounts for the YD debris fields found in North America, Europe, Africa, Australia, and southeast Asia. The heat sink presented by such a volume of ice as introduced by the IO accounts for the sudden, post-impact YD temperature drop.

2.2. *The Worldwide Flood*

Given that the IO was composed as Tempel 1, that is, 75% open space, 2/3 of its mass pure water ice, then 1/6 of the sphere's volume would be ice (A'Hearn et.al., 2005; Kerr, 2005; Sunshine et.al., 2007). With an approximate diameter of 2,500 km, the IO would have occupied a volume of $5.58 * 10^9$ km^3. But that ice melted, so we must account for the slight volumetric difference between ice and its melted form; thus, the IO's equivalent water volume was $1.29 * 10^9$ km^3. To approximate the equivalent depth of water delivered, the volume can be divided by the present oceans' surface area. Since the earth's oceans are reported to cover $3.62 * 10^8$ km^2, the IO delivered an average depth of 3.57 km.

The IO's waters flooded the planet, and they did so from the abyss upward – they did not inundate presently exposed landscapes. This is a critical observation, for it explains the following map images where, in each of Figure 5(a)-(d) the white arrows identify submerged river systems:

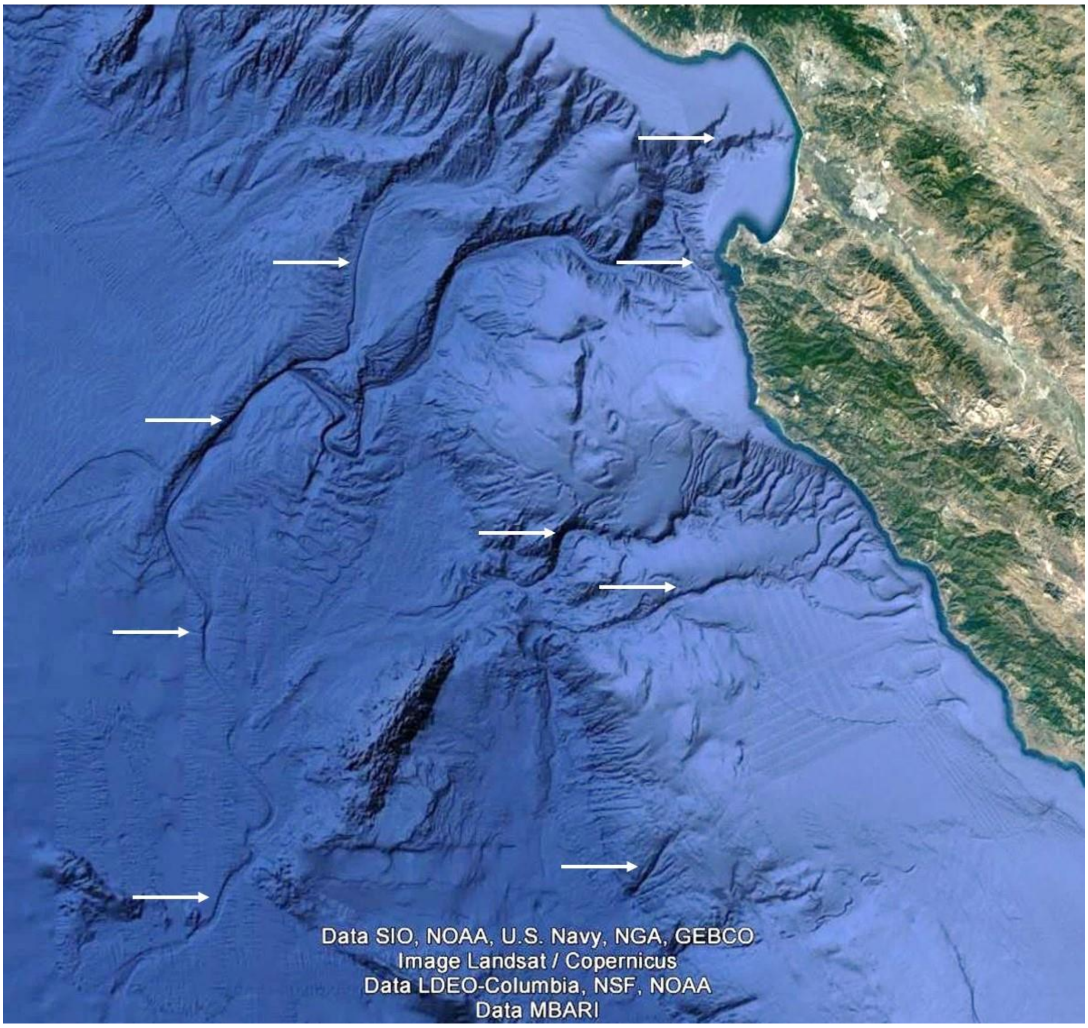

Figure 5(a). A Google Earth image of the bathymetry off Monterey, California.

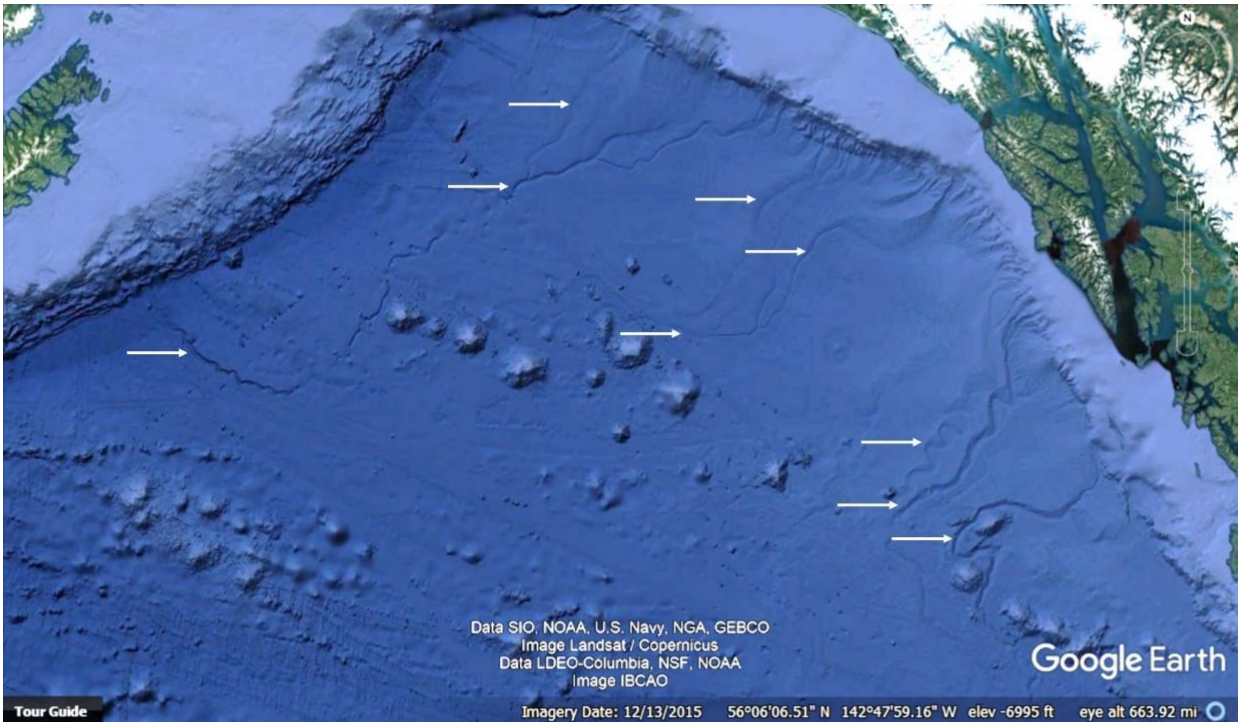

Figure 5(b). A Google Earth image of the bathymetry off the Gulf of Alaska. Note in the lower right that the former river wove between two volcanoes.

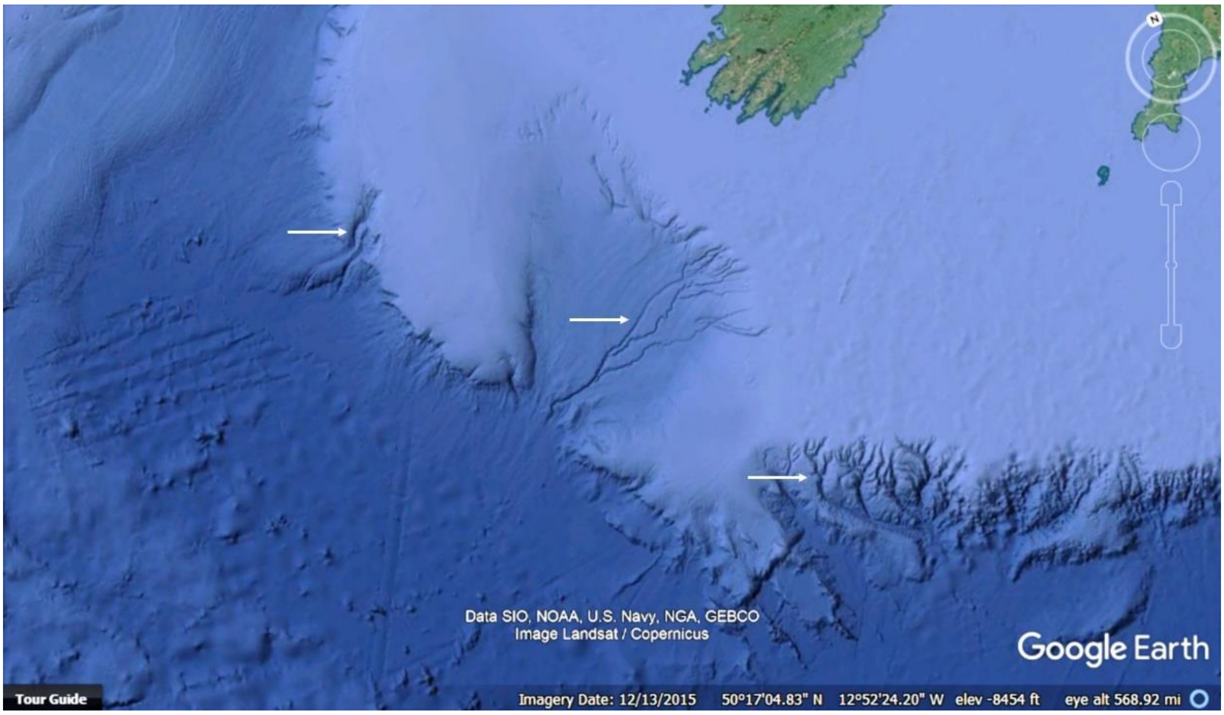

Figure 5(c). A Google Earth image of the Celtic Sea.

Figure 5(d). A Google Earth image of the Western Mediterranean Sea.

Geologists believe that these submerged structures were carved by subsurface processes (e.g. Metevier et.al., 2009) because their science holds that there was never a worldwide flood. This is fitting data (submerged structures) to theory ("no flood"), which exemplifies anti-science. Instead, quick inundation by the IO's waters preserved the formerly subaerial drainages.

Ensuing, irreversible, planet-wide ecosystem changes induced by the IO's waters would lead to reported megafauna extinctions, as well as all other reported YD effects. Therefore, it is no surprise that we find recollections of the IO in ubiquitous, ancient oral traditions where it is known by names such as Phaethon, Typhon, Set, Ta-vi, and Satan.

At 10,000 times the surface area of Halley's comet and 1,000,000 times its volume, the IO had a fiery appearance and an incredibly lengthy tail as it approached Earth. It would have dominated the sky, particularly as it neared impact. To the ancients, the illumination from the nucleus and its tail as it approached Earth would have been frightening and memorable, particularly since the flood ensued nearly immediately after its disappearance. Hence, the event's commemoration at Göbekli Tepe (Sweatman & Tsikritsis, 2017). The IO's appearance and effects explain the many snake and dragon images in various narrative traditions. For instance, in some depictions the Chinese New Year dragon is a glowing orange serpent above the clouds with water emanating from its mouth.

Pliny the Elder described Phaeton's approach: "A terrible comet was seen by the people of Ethiopia and Egypt. It had a fiery appearance and was twisted like a coil, and it was very grim to behold; it was not really a star so much as what might be called a ball of fire."(Rackham, 1938) According to Allan and Delair, Phaeton "was anciently regarded as a generally round, brilliantly fiery body of appreciable size, and much more star-like or sun-like than conventional comets: and it was held to have in some way caused the Deluge."(Allan & Delair, 1997) The fiery comet-like appearance of the IO as it neared Earth impact and the irreversible changes induced by its flood account for the long-held notion that comets are harbingers of change.

Flood accounts are found in cultures throughout the planet because it wholly transformed the ecosystem, and it nearly killed our species (the number of human survivors was in the thousands, a number derived from population growth models and pre-industrial age population estimates). Survivor accounts passed on corroborate the science, and they support the simple yet universally overlooked observation: the flood transformed humans' nature because we are ill-adapted to the post-flood ecosystem.

2.3. Flooding the Mediterranean Basin

Figure 6 depicts two identical maps of the western Mediterranean Sea. On the lower map is a superimposed white outline that approximates the pre-flood shoreline. We note on Fig. 6 that drainages from higher altitudes outside the white outline terminate at the former shoreline's common depth. This is well understood: the drainage waters' erosive action ceased upon encountering the former sea, and the drainage systems would become well-preserved in the bathymetry after the Med flooded through the Strait. We note that this pre-flood shoreline matches that in a *Nature* paper regarding the flooding of the Mediterranean basin (Garcia-Castellanos et.al., 2009); however, the paper reports that the event took place 5.3 million years before present, a consequence of the prevailing "no flood, ever" paradigm.

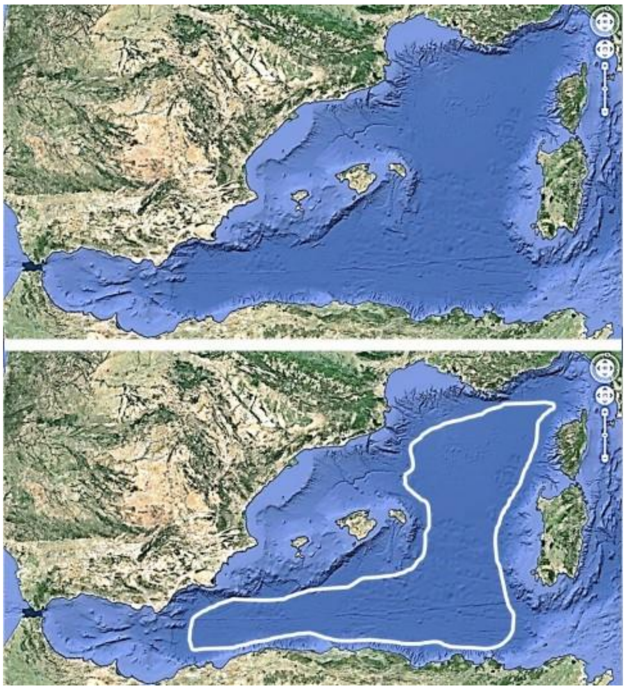

Figure 6. Identical map perspectives of the western Mediterranean Sea. The white outline in the lower map approximates the region's pre-flood shoreline.

Once the water in the western Med attained a level roughly 400 meters below present sea level, the eastern Med would begin flooding through the deepest portions of the region between Tunisia and Sicily, then through the Pantelleria Trough. The floodwaters' path is approximated by the white arrow on Figure 7.

Finally, as the worldwide flood neared attaining its present level, the Black Sea would flood via the Bosporus Strait.

Figure 7. The white arrow identifies the approximate path taken by the flood waters as they began to inundate the eastern Mediterranean Sea.

We note that the west-to-east flooding of the Mediterranean basin through the Strait of Gibraltar occurred after the IO impact and subsequent inundation of the planet's ocean basins. As a consequence, during the period immediately after the IO's impact yet before the flood waters reached the Strait, human inhabitants of the former Med basin would have noticed dramatic environmental changes that included rains, prolonged cold, and earthquakes.

Assuming that Göbekli Tepe was a pre-flood observatory, then its occupants would have chronicled the IO's approach. Furthermore, they would have survived to witness ensuing environmental effects. This would account for its commemoration in stone.

While the Med flooded, there would have been a temporary cessation in the rise of the flood waters elsewhere around the planet. Then, once the Med had completely flooded, the IO's meltwaters would continue to raise the oceans' level to where we find it today.

Thus, to recapitulate: the Mediterranean Sea flooded through the Strait of Gibraltar approximately 12,800 years before present at the Younger-Dryas boundary as a consequence of the IO's impact in the Southern Ocean and the subsequent worldwide flood brought by its melted ice.

2.4. *Pre-flood Earth*

A model of pre-flood Earth is shown on Figure 8. It was created in ArcGIS by removing an estimated average depth of 3.57 km from present sea level.

Humans evolved in equatorial to near-tropical latitudes in the dark tan regions; we are not out of Africa. Variations in human skin pigmentation are explained by the map: deeper, less equatorial regions produced lighter-skinned humans because the atmosphere's thickness would have attenuated higher wavelengths (e.g. UV, blue); higher altitude and/or more equatorial habitats led to greater melanin content in human inhabitants.

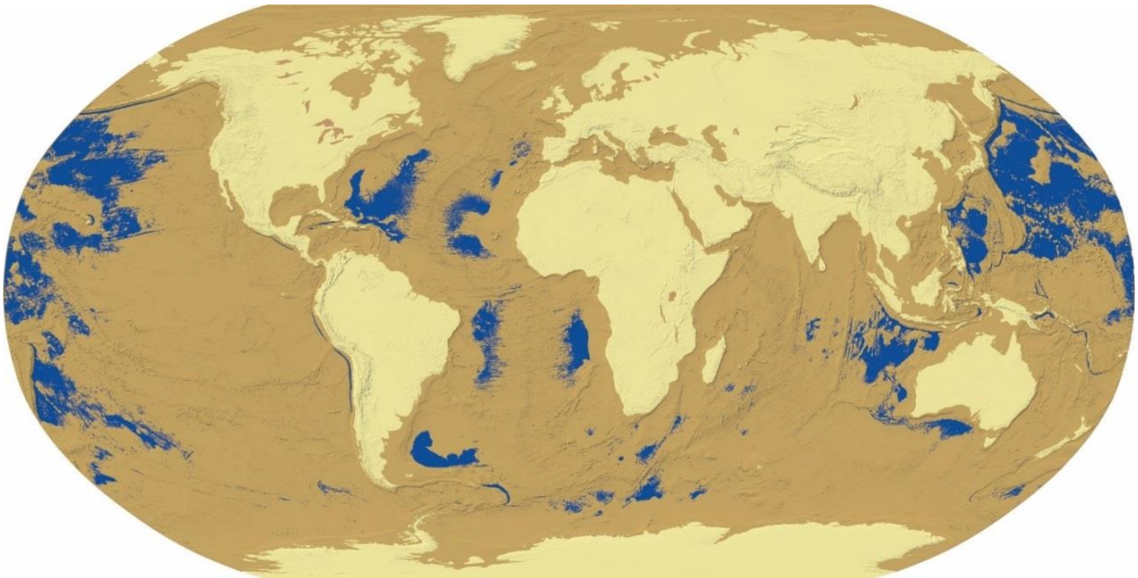

Figure 8. With more than 3 km of water graphically removed, a model of land and sea distributions in pre-flood Earth shows previously exposed but now-submerged landscapes (tan), presently exposed landscapes (beige), and former oceans and seas (blue). The pre-flood extent of the Mediterranean Sea is not coloured blue because the bottom of the basin is at an altitude above that used to create the tan regions.

Vast, pre-flood forested regions would become desiccated by the flood-induced ecosystem changes, and they would burn soon after, likely within decades. Possible fire starters include volcanic activity resulting from the impact, lightning, or survivors' fires. The transformation from pre-flood to post-flood ecosystems would cause human survivors to migrate in search of survivable regions.

3. ARCHAEOLOGY

Recognizing that there was a worldwide flood is likely to resolve the problem of Atlantis. Shown on Figure 9 is a National Oceanic and Atmospheric Agency (NOAA) map, centred at 24.4°W, 31.3°N, about 1700 km west-southwest of the Strait of Gibraltar (NOAA, 2019). The map depicts what could be the Atlantis canal system's remnants.

The feature's perimeter measures approximately 165 km east to west and 120 km north to south, so it was oblong and rectangular. The distance between the presumed canals varies, but the span between two major east-west lines near the centre of the system measures 15 km. In addition, the overall length of the straight features, when laid end-to-end, measures roughly 1,775 km.

For the purpose of comparisons, we need to convert these measured distances to stadia. The Oxford English Dictionary defines a stadium to be an "ancient Roman or Greek measure of length, about 185 metres (originally the length of a stadium)."(OED, 2018) Thus, one kilometre equates to roughly 5.41 stadia, meaning that the 15 km distance between canals is approximately 81 stadia, and the overall length of the system would measure roughly 9600 stadia.

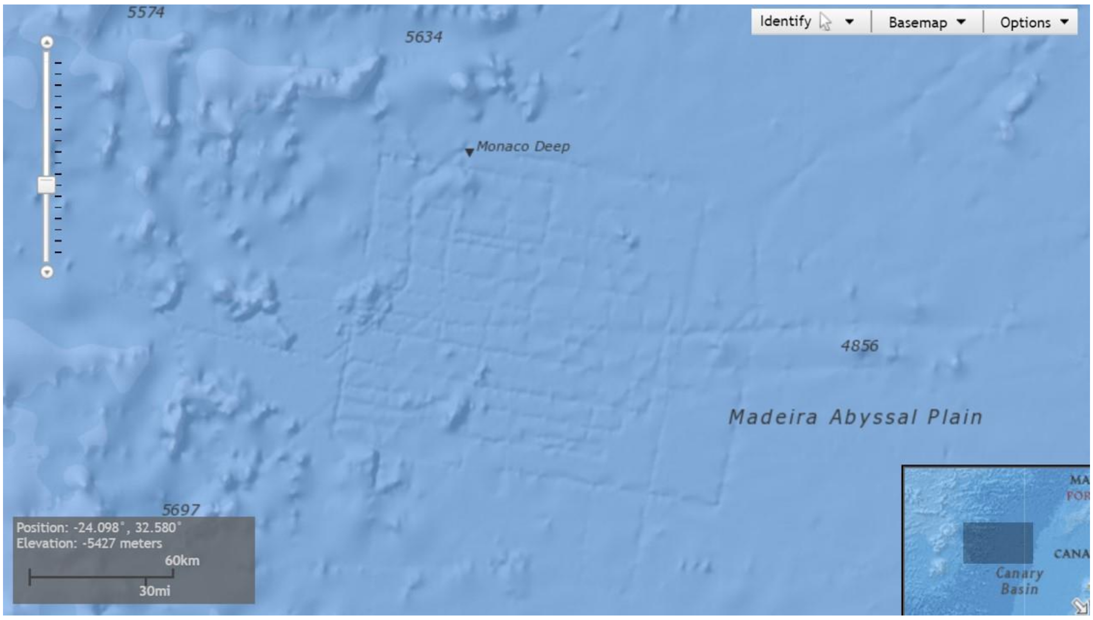

Figure 9. What might be the canals of Atlantis are shown in this NOAA map of the Madeira Abyssal Plain. The centre of the presumed canal system is located near 24.4°W, 31.3°N.

In *Critias*, Plato describes the Atlantis canal system: "*It was rectangular, and for the most part straight and oblong. . . . It was excavated to the depth of a hundred feet, and its breadth was a stadium everywhere; it was carried round the whole of the plain, and was ten thousand stadia in length. . . . The depth and width and length of this ditch were incredible and gave the impression that such a work, in addition to so many other works, could hardly have been wrought by the hand of man. It received the streams which came down from the mountains, and winding round the plain, and touching the city at various points, was there left off into the sea. . . . From above, likewise, straight canals of a hundred feet in width were cut in the plain, and again let off into the ditch toward the sea; these canals were at intervals of a hundred stadia, . . . cutting transverse passages from one canal into another, and to the city*" (Hope, 1991).

We note that Plato's description of the canals is similar to what we observe on Figure 9, that is, rectangular, straight, and oblong. In addition, the interval between canals that he cites, 100 stadia, is close to the measured length of 81. Furthermore, the total measured length of the system in the map is 9600 stadia, which is within 4% of Plato's reported 10,000 stadia.

Finally, Plato describes Atlantis' fate in *Timaeus*: "*At a later time there were earthquakes and floods of extraordinary violence, and in a single dreadful day and night all your fighting men were swallowed up by the earth, and the island of Atlantis was similarly swallowed up by the sea and vanished….*" (Settegast, 1986)

4. CONCLUSIONS

A massive cosmic impact ~12,800 years before present in what is now the Southern Ocean delivered a catastrophic worldwide flood. Not long after the impact, the newly introduced waters flooded the Mediterranean Sea via the Strait of Gibraltar. The impact and its ensuing flood account for all reported Younger-Dryas effects; the worldwide flood and the Younger-Dryas event are synonymous. Culturally ubiquitous flood narratives corroborate the scientific record.

Geology's "no flood, ever" paradigm is arguably the most profound error in the history of science, for it adversely affects geology, anthropology, archaeology, and matters concerning earth and early human history. At a minimum, geology and anthropology require fundamental reformation.

Humans evolved in regions that are now more than 3 km below sea level; we are not out of Africa. With proper equipment, submarine archaeologists will help to reveal a more correct understanding of our past.

Finally, humans are ill-adapted to the post-flood ecosystem, and our survival necessitates environmental abuses.

Appendix: Table of ice crater locations in both North America and South America

Table 1. Ice crater latitude, longitude locations and a brief description. This list is not intended to be exhaustive.

Latitude	Longitude	Description
40.6341N	98.0162W	Nebraska; among crop circles
40.4670N	98.0381W	Nebraska
39.1658N	75.8462W	Maryland
34.8719N	79.0371W	South Carolina, swarm of elliptical craters
34.8370N	79.1854W	South Carolina, elliptical craters
32.8604N	82.0342W	Georgia
33.4013N	104.0641W	New Mexico
34.6756N	103.9874W	New Mexico, swarm
34.8448N	104.1021W	New Mexico, swarm
32.2140N	102.4217W	Texas, swarm with one crater in a backyard
32.5304N	100.6679W	Texas, several in vicinity
26.3530N	97.7112W	Mexico
20.3999N	87.4530W	Mexico; impact string visible at large view scale
20.0234N	87.5858W	Mexico, swarm of large impact craters
19.1279N	87.8039W	Mexico, swarm
18.3340N	88.2799W	Mexico
14.4011N	83.3440W	Mexico
6.1710S	80.7380W	Peru; equatorial latitude impact crater
10.6985S	76.3237W	Peru; grid is center of two elongated impacts in mountainous region
22.8193S	66.8091W	Argentina; swarm
34.8117S	61.6309W	Argentina
35.0281S	62.4160W	Argentina
35.8648S	62.3402W	Argentina; swarm
37.4598S	57.5166W	Argentina;
37.6990S	61.0177W	Argentina; swarm
41.2603S	68.0857W	Argentina; swarm center, ice melt drainage erosion visible
41.3549S	67.7267W	Argentina; swarm
45.1512S	70.6540W	Argentina; vicinity of small swarm, drainages observable
47.7566S	71.5390W	Argentina; crater now a lake; swarm in vicinity
50.5908S	70.3878W	Argentina; large swarm
51.5756S	70.0404W	Argentina; large swarm in 25 km radius
51.9179S	70.0099W	Argentina; large swarm in 20 km radius
51.7803S	59.1534W	Falkland Islands
53.6401S	68.2996W	Argentina; swarm of large craters

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