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NASA's Manipulations of the Giant Impact Theory are in Trouble

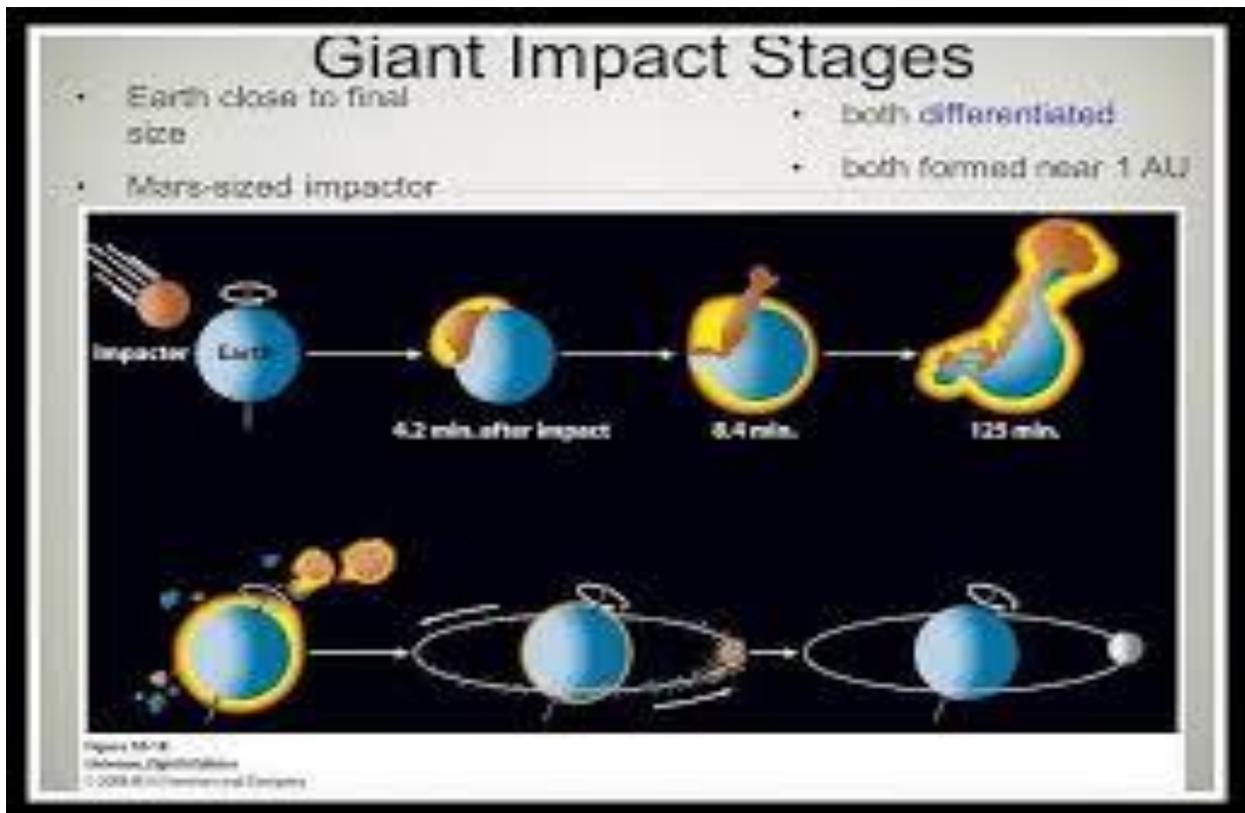
Updating Leading Theories by NASA for the Formation of
the Earth/Moon System

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for Genesis* that tells about the Earth and Moon formation
and why global catastrophes occur.

Douglas Ettinger
Published 4/16/2021

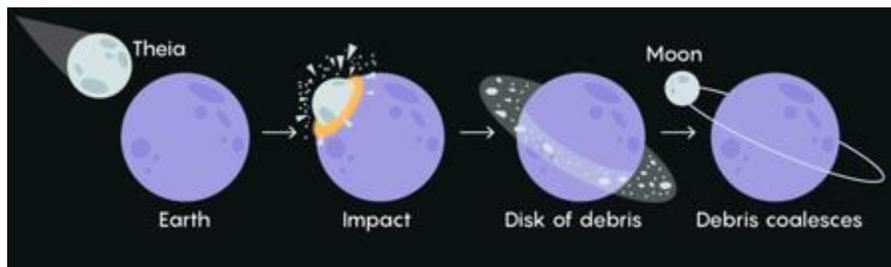
The Manipulation of the Giant Impact Hypothesis Fails to Explain the Earth/Moon System

This article updates the current status of the Earth/Moon formation by comparing NASA's leading theory, The Giant Impact Hypothesis, versus this author's ideas presented in his website article called the Earth's Metamorphosis Hypothesis. NASA is still sticking to the paradigm that a major impact occurred between Earth and an independent body, they now call Theia. The original idea had a moon-sized body striking Earth obliquely, creating a vaporized ejecta that formed a ring that coalesced into the Moon. This idea hopefully explained the anomalous high angular momentum of the system but failed. The computerized glancing collision required increasing the velocity of the Earth's spin axis to a five-hour day. Fixing the glancing impact employed the proposal that a much closer Moon moving outward slowed down Earth's rotation to the present 24-hour day by transferring angular momentum. However, this original hypothesis broke down when the Apollo missions revealed that the apparent chemistry of the two mantles is almost identical thereby refuting the requirement for two independent bodies.



***The original idea of an oblique impact causing high spin of Earth
Earth Moon Formation: Image by Pinterest***

The disproven hypothesis then morphed into a direct collision that vaporized most of both mantles creating a ring of material that could hopefully be sufficiently mixed. Then some of this material would escape the Roche limit and coalesce into the Moon. The majority of material below the Roche limit would eventually fall back to the stripped Earth. This new idea and its various versions were formulated between 2004 and 2021. The first suspicion of its validity is whether enough time is available for thorough mixing before the ring would solidify into various layers of a crystallized structure. When I heard about this new proposal I immediately thought of other objections. Why does the present Moon's small iron core exist if Theia's core more than likely joined Earth's core to make it one of the densest bodies in the solar system? Why did the Earth and Moon have such a difference in the proportion of volatile chemicals? If there was no oblique impact, how is the Earth/Moon system's anomalously high angular momentum explained?



The Latest Vision of the Giant Impact: Simple Model
Image from File: Moon-Giant Impact Hypothesis- Simple Model.png

NASA is left between “a rock and a hard place,” trying to explain both thorough mixing of two mantles and producing enough angular momentum. Empirical data from Moon missions showing close similarity of composition can only be explained by the standard giant-impact hypothesis as an extremely unlikely coincidence, where the two bodies before collision somehow had a similar composition. However, in science, a very low probability of a situation points toward an error in theory. An effort has been focused on modifying the theory to better explain the fact that the Earth and Moon are composed of nearly the same type of rock.

An “equilibration” model was construed for mixing to erase the chemical signature of Theia in the moon-forming disk. However, such mixing must occur rapidly because it probably took the Moon a few hundred years to form a disk. This mixing process must produce an Earth/Moon tungsten isotopic match which produces a more precise dating than even the matching of the oxygen isotope match. But adding another coincidence to an already existing one is highly improbable.

Grappling with the angular momentum crisis is even more difficult. Some scenarios proposed are 1) numerous high-angular momentum impacts producing a rapidly rotational Earth needed for the transfer of energy back to the Moon, and 2) siphoning angular momentum from Earth's spin to its orbit around the Sun which seems unlikely and currently lacks any computerized proof.

Another conundrum is the source of Theia so early in the formation of the solar system considered to be only 0.01 billion years after its birth. Edward Belbruno and J. Richard Gott III proposed in 2004 that Theia coalesced at the L-4 or L-5 Lagrangian points relative to Earth similar to the trojan asteroids of the other planets. An inadequate two-dimensional computer program suggests that its formation and orbit would have been affected when Theia exceeded the mass of Mars. This mass as proposed for Theia

seems like a forced conclusion. However, direct observations prove trojan asteroids around the outer planets always form into groups of smaller asteroids that never coalesce. And this speculative trojan planetesimal for Earth had little time to form. Anyway, the storyline continues with a gravitational perturbation that causes Theia to depart from its Lagrangian location with a subsequent collision between Theia and Earth. Again other evidence of observed trojan asteroids contradicts any instability in these systems.

Diagraming the proposed collision of Theia coming from a Lagrangian location.

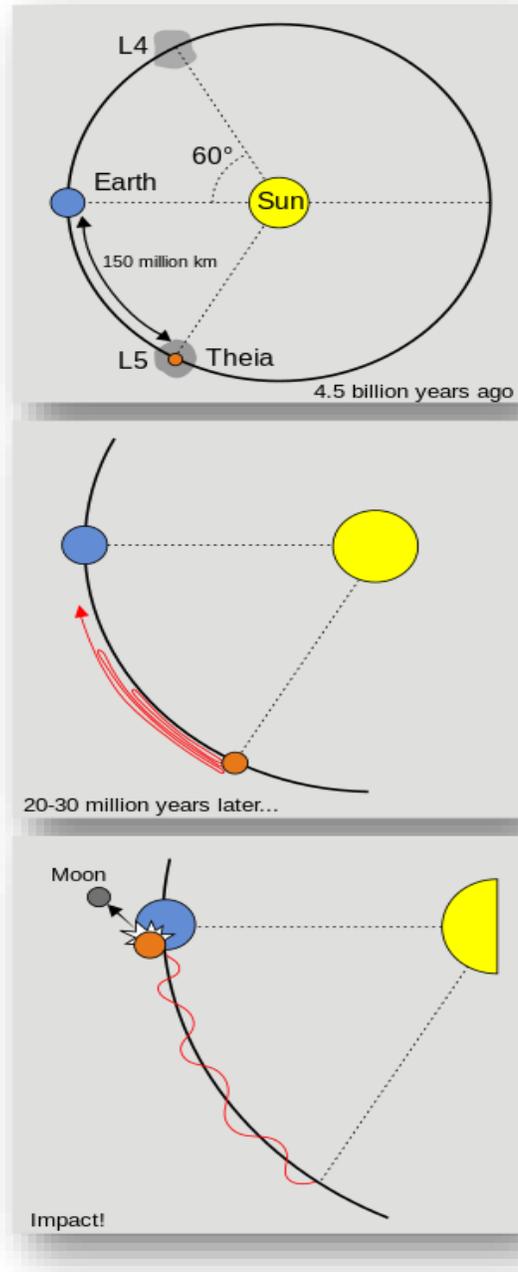
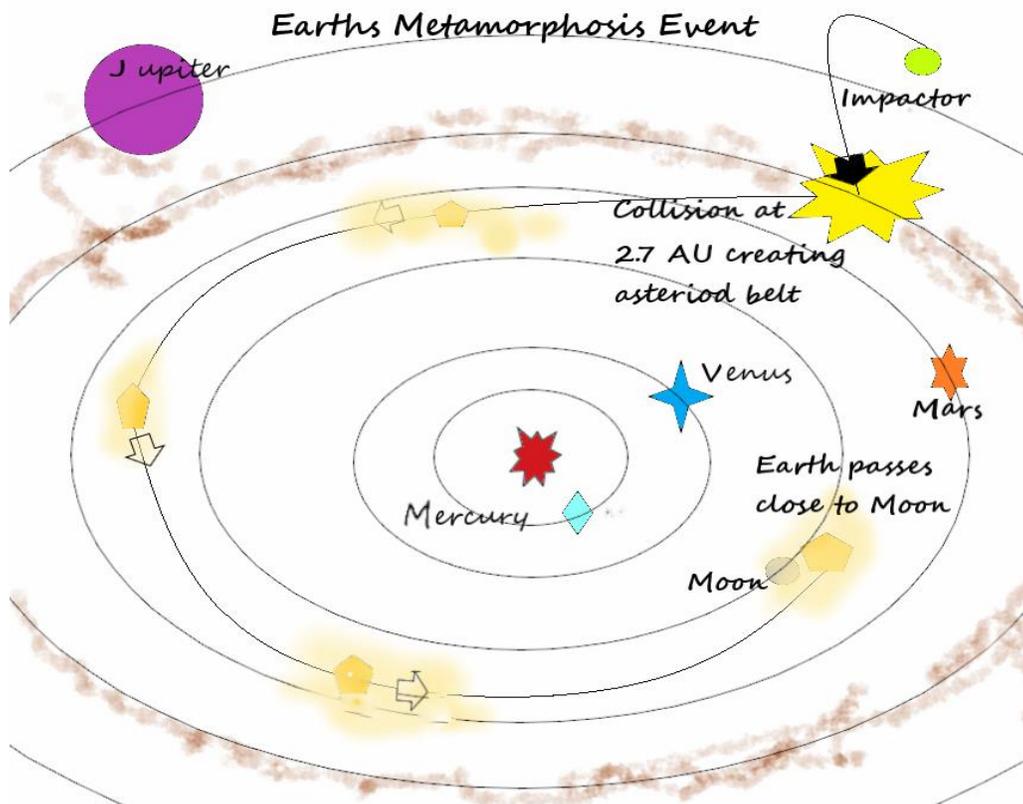


Image from space.fandom.com/wiki/Giant_Impact_Hypothesis

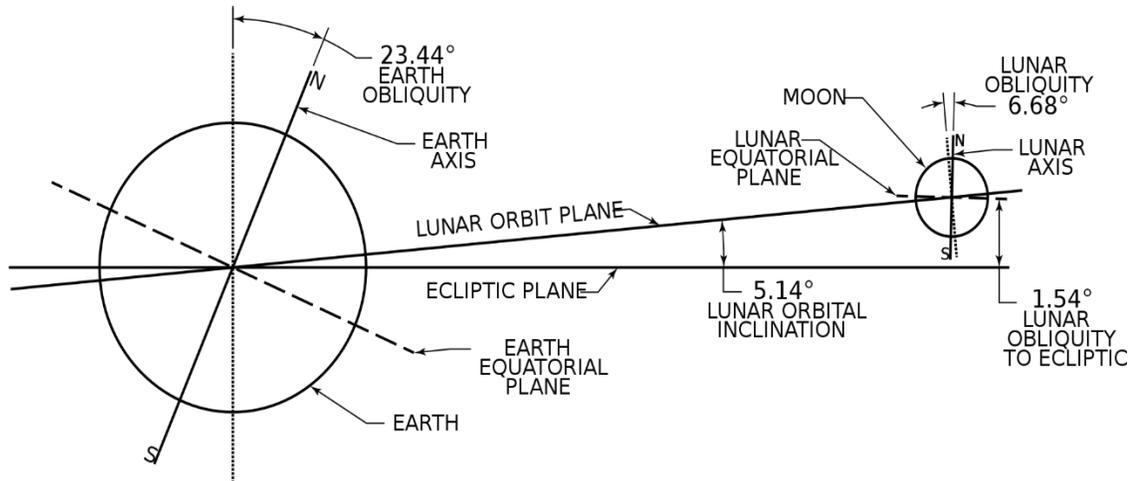
Another idea is that Theia came from the outer solar system, but the timing for this scenario is too soon. Thus far, astrophysicists make no connection to the Late Heavy Bombardment (LHB) that is confidently dated as occurring about 3.9 billion years ago, and the Theia collision with Earth. The current researchers do not utilize a disturbed outer Kuiper Belt object striking Earth because of the thinking that any such ruckus in the inner solar system was caused by a much later event, the LHB. I refute this entire scenario of the Giant Impact by proposing that Earth's collision with a Mars-size planet occurred 3.9 bya causing the LHB and displacing Earth from the location of the Main Belt of Asteroids to a new orbit very close to the existing Moon.

If NASA and their supporting academia could freely let go of some of their cherished paradigms, they would have a chance at arriving at some parts of my theory of the Earth's Metamorphosis Hypothesis (EMM). I repeat some of their possibly erroneous entrenched ideas:

1. The possible collision has to occur close to 0.1 billion years after the solar system's birth due to misunderstood dating methods and logic.
2. The Moon was never originally a planet like the other terrestrial bodies.
3. The Earth was never displaced from a farther orbit making it possible to keep its precious volatiles during the protostar's T-Tauri phase. With these three existing paradigms, no clear vision or result can be made about how the Earth and Moon begin to share orbits by using a peculiar gravitational synchrony; and how the Earth brought collisional debris of its mantle and crust to be swept up by the Moon during the initial passing orbits. See the cartoon diagram below depicting what possibly occurred.



Let's review what NASA thinks passes for their currently accepted theory and see how the EMM explains the same things. The so-called supporting evidence of the Giant Impact Hypothesis is untrue as listed by Wikipedia in 2021.



NOTE: EARTH AND MOON RELATIVE SIZES AND ANGLES ARE TO SCALE.
EARTH AND MOON RELATIVE DISTANCE IS NOT TO SCALE.

The Orbit of the Moon: Image from en.wikipedia.org

- a. The planes of the Earth's equator and Moon's orbit have similar orientations. *Their similarity is not true. An oblique collision by Theia should have created almost identical planes. A head-on collision should have dramatically slowed Earth's rotation compared to some of the other terrestrial planets. The EMM hypothesis with the Earth falling toward the Sun and creating an orbit near the Moon's orbit does not require the Moon being on the ecliptic plane, or having equivalent obliquity angles, or being in the Earth's orbital plane.*

The Earth/Moon system has an anomalously high angular momentum, unlike other planetary/satellite families. A giant impact may have supplied this excess momentum. This hopeful fact is erroneous. The glancing collision as first proposed would have spun the Earth's rotation to a 5-hour day which is unrealistic. The head-on collision cannot possibly supply much angular momentum to produce either any substantial rotational or orbital velocities.

The EMM hypothesis envisions both bodies already having ample angular momentum because of their existing orbital velocities. The EMM predicts some exchange of angular momentum by having the Earth's arriving slightly faster orbital velocity slowed passing the Moon during each orbit. The Moon compensates by moving away from the Earth's orbit and eventually becoming tidally locked. When the Earth's orbital velocity matches the Moon's velocity at 30 km/s their orbits become synchronized by the Moon weaving in its orbit which appears from Earth's perspective to be a typical satellite's orbit.

- b. The Moon landing data and its samples indicate the crust was once molten to a substantial but unknown depth. Calculations show that more energy is required than is available from a normal accretion of a body at birth of the Moon's size. NASA believes this fact aligns with a very energetic process such as the Giant Impact.

Without the EMM hypothesis in hand, NASA understandably cannot envision another type of collision scenario. The EMM hypothesis predicts a sizable amount of collisional debris was brought along with Earth on its journey from the Asteroid Belt to the vicinity of the Moon's orbit. Each time the Earth passed the Moon, collisional debris would be swept up by the Moon. Of course, much debris would also fall back to Earth. These smaller bodies of debris caused the Moon's landscape of craters of all sizes that we see today; these bodies were surely energetic enough to create an abnormal magma depth measured by the Moon astronauts. This storyline is made more credible by evidence that the Moon's mares or level lava fields remained partially molten for as long as 900 million years. This length of time seems reasonable for the total sweeping of debris or asteroids that followed Earth in its orbit. Further evidence for this postulation is the discovered mascons (gravitational anomalies) in the center of some of the larger craters. NASA believes slow-moving asteroids struck the Moon and embedded their cores without disintegrating. The researchers lack a good reason for this phenomenon. A satisfying answer is that when Earth and Moon came closer to matching their orbital velocities some remaining Earth asteroids piled into the Moon at predictably lower velocity.

- c. The Moon has a relatively small iron core. This gives the Moon a lower density than the Earth. Computer models of a Giant Impact of Theia with Earth indicate that Theia's core would fuse with Earth's core and leave the Moon with less iron for its core.

The Earth's Metamorphosis Hypothesis expects the cores of the two bodies to fuse and make Earth an abnormally dense planet. The mantles also fused except for collisional debris that created the Main Belt of Asteroids and the Late Heavy Bombardment. NASA's best surviving version is the head-on collision that should fuse the cores likewise leaving little metallic materials to remake an iron core for the Moon regardless of how small. NASA's model leaves no reason why the present Moon should have any core at all. The EMM proposal sticks to the main idea that the Moon was one of the original terrestrial planets expected to have a metallic core.

- d. The Moon is depleted of volatile elements and compounds compared to Earth. These materials vaporize at comparably lower temperatures and will be expected to escape due to the Moon's smaller gravity.

This conclusion can reasonably be expected, except for the main idea that the Moon at one AU had already lost its lighter volatiles during the T-Tauri phase of the Sun because of its closeness. The EMM postulates that Earth's frozen impactor delivered more volatiles along with volatiles the Earth already possessed being located beyond Mars during the T-Tauri phase. The present lighter volatile inventories of the two bodies align with the EMM hypothesis.

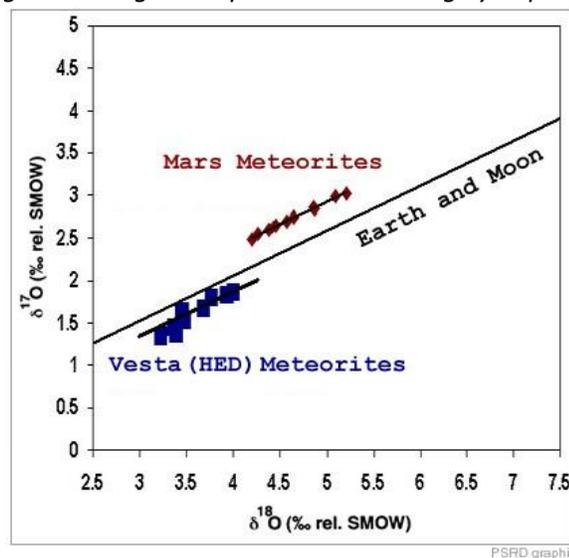
- e. Giant collisions are consistent with the leading theory of the formation of the solar system which is the nebular theory utilizing the accretion of dusty disks of primordial materials.

This theory lies on very thin ice and is mostly discredited. As the dusty disks accrete into ever larger chunks, computerized models show that these bodies are equally apt to disintegrate as well as fuse together upon their next collision. This is proven by the observation of the Main Belt of asteroids between Mars and Jupiter. Some lame excuse is used to convince researchers that resonance by the outer planets prevents the normal accretion process.

Also, disks surrounding exo-solar stars cannot possibly accrete into a planet in the expected time spans computed by astrophysicists. My favored solar system formation theory is the binary method generated by electromagnetic imbalances inside the star or planet causing the body to reject outwardly along its equatorial plane another smaller body. Solar system formation is up for grabs but clearly, the end result is known.

- f. The stable-isotope ratios of lunar and terrestrial rock are nearly identical implying a common origin.

*This data directly contradicts the Giant Impact Hypothesis because Theia is a rogue body having no common origin with Earth. NASA has been trying to develop the idea that both of their mantles were vaporized and then thoroughly mixed to remove any independent signature. However, this perfect mixing is highly improbable and not proven by any computerized model. The graph below shows the relative abundances of oxygen isotope ratios found in rocks from the Moon and Earth (the solid black line), meteorites from Mars (red diamonds), and meteorites from asteroid Vesta (blue squares). The study of oxygen isotope ratios reveals a certain undeniable flavor for each different celestial body throughout the solar system. Possibly if Theia formed at one of Earth's Lagrangian points **and** the same accretion disk was the mode of formation **and** there was enough time for two bodies to form together in the same disk **and** this was the only orbital location in the solar system for this occurrence, then these bodies may have had the same isotope signature. Again I repeat that this is highly improbable.*



Oxygen Isotopes: Image from Planetary Science Research Discoveries

The EMM hypothesis has no problem dealing with similar isotopes from both the Earth and the Moon. As explained before the impacted Earth brought collisional debris from its mantle and crust that then crashed onto the Moon for millions of years until the surrounding space was swept clean. The Moon's surface was fairly inundated with meteorites coming from proto-Earth. The Moon rocks brought back by the lunar astronauts were mostly surface rocks that landed there over a span of 3.9 to 3.0 billion years ago. In reality, a mixture of mantle materials from both Earth and its rogue impactor that penetrated Earth's mantle provides a mixed signature of isotopes thought only to be from proto-Earth.

- g. NASA is bothered by why Venus has no satellites. A sizable collision is predicted for Venus to cause its retrograde rotation that should have also created a moon. So why does Venus have no Moon like Earth? Either its moon spiraled into Venus due to its reverse spin or strong solar tides destabilized any orbiting satellites.

The Earth's Metamorphosis hypothesis is so unique with its combination of collision, orbital displacement, and slow capture mode that the probability of repeating such an occurrence is practically zero. This miracle is considered God-like.

A statement is quoted by a researcher in Wikipedia, "The energy of such a giant impact is predicted to have heated Earth to produce a global magma ocean, and evidence of the resultant planetary differentiation of the heavier material sinking into Earth's mantle has been documented. However, there is no self-consistent model that starts with a giant impact event and follows the evolution of the debris into a single moon." The differentiation of heavier materials sinking to the center is a proven concept. No news here. The differentiation of lighter materials rising to the top like CO₂ bubbles rising in a carbonated drink is also no news. However, the almost direct impact of a ball of frozen volatiles driven into the Earth's mantle resulting in a secondary differentiation close to 3.9 billion years ago is what NASA needs to resolve the anomalous conditions found on Earth: a mega-continent that erratically drifts and rides on top of a lithosphere aided by an underlying slippery Moho layer. No other celestial body possesses these features because Earth's metamorphosis is unique only to itself.